

Determinants of social inequalities in self-rated health: analysis at the intersection of gender, class and migration type

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Ai miei genitori

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Abstract

This dissertation aims to describe social inequalities in self-rated health in an integrated framework of gender, social class and immigration, and to identify the main intermediary factors and health problems that contribute to these inequalities. Three cross-sectional studies were performed with data from surveys of the general population residing in Catalonia and Spain in 2006. Migration from poor regions of Spain to Catalonia emerged as a health inequality dimension in addition to and interaction with gender and social class, highlighting the transitory nature of the ‘healthy immigrant effect’ partially observed in foreign immigrants. Material and economic resources made major contributions to all three types of health inequalities: individual income made the greatest contribution to gender inequalities; household material assets and financial difficulties to migration-related inequalities; and both to social class inequalities. Poorer self-rated health of women was showed to be not an issue of perception but a precise reflection of the higher burden of chronic conditions they suffered compared to men, such as musculoskeletal, mental and other pain disorders, which could be targets for a health system responsive to gender inequalities. Intersections between axes of inequality created complex social locations with unique consequences on health.

Resum

Aquesta tesi té com a objectius descriure les desigualtats socials en l'autovaloració de la salut en un marc integrat de gènere, classe social i immigració, i identificar els principals factors intermedis i problemes de salut que contribueixen a aquestes desigualtats. S'han dut a terme tres estudis transversals amb dades d'enquestes a població general resident a Catalunya i a l'Estat espanyol l'any 2006. La migració a Catalunya des d'altres regions més pobres de l'Estat aflora com a dimensió de desigualtat en salut que s'afegeix i interactua amb el gènere i la classe social, posant de manifest la transitorietat temporal de l'efecte "immigrant sa" parcialment observat en els immigrants estrangers. Els recursos materials i econòmics tenen contribucions molt destacables per a tots tres tipus de desigualtats en salut: especialment els ingressos individuals a les desigualtats de gènere; les dotacions materials de la llar i les dificultats financeres a les desigualtats relacionades amb la immigració; i ambdós tipus de factors a les desigualtats segons classe social. S'ha mostrat que la pitjor autovaloració de salut per part de les dones no és una qüestió de percepció, sinó que és una conseqüència concreta precis reflex de la major càrrega de condicions cròniques de les que pateixen respecte als homes, com ara els trastorns osteomusculars, mentals i altres relacionats amb el dolor, que podrien constituir dianes per un sistema sanitari que faci front a les desigualtats de gènere. Les interseccions entre eixos de desigualtats generen complexes posicions socials amb conseqüències molt determinades sobre la salut.

Prefaci

Aquesta tesi és un intent de resposta a algunes preguntes d'investigació que em vaig plantejar a l'hora d'aproximar-me a l'estudi de les desigualtats socials en salut, i el fruit de l'estimul i suport de diverses persones i institucions.

Vaig començar a pensar en la tesi doctoral incentivat per l'aposta de la Unitat Docent de Medicina Preventiva i Salut Pública IMAS (ara PSMAR)-UPF-ASPB perquè els residents hi dediquéssim una petita part de temps setmanal, i en determinats casos, els vuit mesos de rotació en unitats de recerca. Finalitzada la residència, em vaig incorporar a l'Agència de Salut Pública de Barcelona, on he seguit rebent tot el suport per dur a terme la tesi, compaginant-la amb la realització de treballs finançats per la Dirección General de Salud Pública del Ministerio de Sanidad y Política Social, l'Agència de Gestió d'Ajuts Universitaris i a la Recerca de la Generalitat de Catalunya i el Seventh Framework Programme de la Unió Europea, i treient especialment profit del temps finançat per l'Observatorio de Salud de las Mujeres del Ministerio de Sanidad y Política Social per la realització de l'informe del qual s'ha derivat el tercer article d'aquest compendi.

Al principi em vaig interessar en què influïa en la “salut percebuda”, i em vaig llençar a la recerca dels “components (problemes de salut) i mediadors” de les desigualtats en salut per classe social i gènere com a punts d'entrada sanitaris i socials per reduir les desigualtats, recollint l'encoratjador finançament de la Sociedad Española de Epidemiología a través de la ajuda per joves

investigadors “Enrique Nájera”. Amb els directors de tesi vam acordar afegir l’immigració, ja que era un tema encara poc estudiat en el nostre entorn i tenia ganes d’aprofundir-lo teòricament i aprofitant les possibilitats d’anàlisi de la immigració interna.

D’aquell trencaclosques que era el marc conceptual amb el que començava la tesi, no vaig aconseguir explorar totes les peces, però sí algunes que consideravem clau. Incidir en la idea que no és la immigració en sí un factor de risc per la salut, sinò les desigualtats territorials, socials i econòmiques, que s’hi manifesten. Explorar mètodes i maneres d’ensenyar i entendre les desigualtats en salut en dues o tres dimensions socials a l’hora. Mostrar que la “pitjor percepció de salut” de les dones és molt més que una percepció, i que les prioritats del sistema sanitari deixen desatès el patiment de moltes dones; i que les causes de les desigualtats de gènere cal buscar-les en els mateix tipus de factors de poder econòmic i social que expliquen les desigualtats entre classes socials.

Venen ara com a reptes de futur l’estudi sobre en quines de les ‘interseccions’ la crisi econòmica ha colpejat amb més força, i a través de quins factors intermediaris, i el desenvolupament de nous mètodes per a fer una anàlisi de les interseccions i dels camins causals en el marc l’avaluació dels efectes de les polítiques econòmiques i socials sobre les desigualtats en salut. Tot i esperant, en temps de tan profunda contracció de la inversió pública en aquest país, que tant jo com altres companys i companyes puguem seguir la nostra dedicació professional a l’anàlisi, recerca, intervenció i divulgació sobre les desigualtats socials en salut, les seves causes i les seves solucions.

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INTRODUCTION

This dissertation will aim at describing inequalities in self-rated health in Catalonia according to three social dimensions – gender, social class and immigration – and at identifying the intermediary determinants of these inequalities. Therefore, the present introduction will begin with a description of the concept and the main evidence of social inequalities in health according to these three dimensions. I will then expose the main theories on the causes of health inequalities, the dissertation conceptual framework, and focus on aspects of power and of intersectional analysis. I will then deepen on the main health measure used in the dissertation, self-rated health, and its validity for the study of inequalities, and on the state of knowledge about the contribution of intermediary factors to health inequalities; the study of health inequalities in Catalonia and Spain will be put into context to reach the justification of the study.

Social inequalities in health

Social inequalities in health are often defined as those systematic, unjust and avoidable differences in health between population groups socially, economically, demographically or geographically defined. These inequalities are considered the result of the unequal health-related opportunities and resources that people have based mainly on their social class, gender, ethnicity or territory, resulting in poorer health among socially disadvantaged groups (Whitehead 1992). As will be discussed below, these

unequal opportunities and resources are the product of social structures and the impact that political, economic and legal institutions have in different population groups (Bolívar and Daponte 2008, Navarro and Shi 2001).

Social inequalities in health between and within countries have been described by a huge amount of studies in the last three decades (Amick 1995, CSDH 2008). The contribution of social inequality to the population's burden of illness and disease largely exceeds what can be averted by medical advances (Woolf et al. 2007), and there is a growing recognition of their existence, and of the need to understand and contrast their causes and mechanisms (CSDH 2008, EUROTHINE Project Group 2007). The conceptual framework developed by the Commission on the Social Determinants of Health of the WHO points out to the existence of health inequalities according to different spheres that shape the individual position in society, such as social class, gender and ethnicity (Solar and Irwin 2010). Through this dissertation, I will focus on social inequalities in health combining these three dimensions (with, as I will motivate later, migration instead of ethnicity), as the three reflect social processes of unequal power allocation which accounts for health outcomes of individuals and groups.

To understand the main features of each dimension, and given that in general, studies on social inequalities in health have treated them separately, I will start with a brief review of concepts and evidence for each.

Social class and health

Inequalities in health according to social class or socioeconomic position are certainly those that have been most studied in recent decades, so much that the expression "health inequalities" is often used as a short for these inequalities. A large body of scientific studies show that health inequalities by socioeconomic position or status are enormous, omnipresent (CSDH 2008, Mackenbach et al. 2008), comparable in both men and women (Black et al. 1988, Matthews and Power 2002), and responsible for excess mortality and morbidity than most disease risk factors known (Benach and Muntaner 2005, Woolf et al. 2007). Although its most proximal determinants – for example, behavioural risk factors such as tobacco or alcohol consumption – may differ in different societies (Kunst et al. 1998) or change over time, they continue to reproduce themselves as their root causes persist (Link and Phelan 1995). In addition, other studies have reported, especially in high-income countries, an increase in these inequalities, as the most advantaged social classes usually benefit earlier and to a greater extent of healthcare interventions and changes in knowledge about disease prevention, but also of political and historical determinants (Alvarez-Dardet et al. 2001, Phelan et al. 2010). The importance of the concept of "social gradient" should be stressed to understand inequalities in health by social class. Many studies have shown that these inequalities are often not reducible to the gap between rich and poor, but the determinants and health outcomes worsen progressively as worsens the position in the social scale (Adler et al. 1994, Black et al. 1988).

Socioeconomic position is a combined concept including measures based on both resources, including income, wealth, material or educational credentials, and prestige or status of an individual within a social hierarchy, such as occupational prestige, but also income and educational attainment (Krieger 2001a). Occupation, education and income have been the most used measures or stratifiers in studies of socioeconomic inequalities in health (Galobardes et al. 2006a, Galobardes et al. 2006b). Among them, in this dissertation we have opted to focus on an occupational-based social class measure, as in the majority of empirical sociological studies (Borrell et al. 2004), considering that the key process of unequal and unfair power allocation in our societies lies in the occupational position; education is mainly a tool to achieve it – itself influenced by the family social background; income is one – probably the principal, but not the only – reward attached to the occupation. This theoretical preference parallels with empirical evidence of the impact of occupational social class on health throughout countries and morbidity indicators (Cavelaars et al. 1998), causes of death (Erikson and Torssander 2008), and over and above education (Arber 1996, Davey Smith et al. 1998, McFadden et al. 2008a, McFadden et al. 2008b). Moreover, taking into account the aim to analyse the intersections with other inequality dimensions such as migration and gender, current socioeconomic position in the host society for foreign immigrants may be best described by occupation than by an educational level obtained abroad, frequently not recognized legally or not corresponding to the qualification required by current occupation.

Educational level, which has indeed been the other most used measure of socioeconomic position in studies of social inequalities in health, is relatively easy to obtain and available for the whole population above a certain age, but often shows a strong “cohort effect”, which has been especially rapid in the case of Catalonia and Spain, and its use as a measure of socioeconomic position can be misinterpreted in terms of causal implications: health inequalities by educational level can thus be inappropriately understood as the mere consequence of differential knowledge, information and preferences.

Social class traditions and its occupation-based measures

We could define social class as a basic indicator of the structure of societies and the distribution of privileges in the same (Borrell and Benach 2003). Two main different traditions are described, Marxist and Weberian, from which different definitions and different occupation-based classifications derive (Muntaner et al. 2010).

In the Marxist view proposed by the scientist and revolutionary Karl Marx, social classes are antagonistic social groups in which one appropriates the other's work because of the different position it occupies in the economic structure, primarily determined by the specific way in which it is related to the means of production (Wright 1997).

The main classification of social class in the "neomarxist" school was elaborated by the US sociologist Erik Olin Wright, considering three types of property and power relations: the means

of production, the knowledge (skills and credentials required for the job) and organizational resources (position in the structure of the workplace: managerial, supervisor, employee). Twelve possible positions result from this division resulting, three among the owners of the means of production (large employers, small employers, self-employed), and nine among the rest (derived from the combination of three degrees of knowledge and three positions in the organization) (Wright 1997). Catalonia is one of the few areas of the world where health inequalities by social class have been studied using the classification of Wright, thanks to the specific interest of a group of researchers led by Carme Borrell and Carles Muntaner. Their studies point first of all to a worse health situation of unskilled workers, which combine low training and a subordinate position; secondly, to a situation where people who are not owners, but in managerial positions and higher education, often have the best health indicators; and thirdly, to the existence of contradictory class locations, potentially damaging for health, such as that of low-level supervisors (Borrell et al. 2004, Muntaner et al. 2003, Muntaner et al. 2009).

The stream called “weberian”, initiated by the German sociologist Max Weber, generally bases the position of an individual in society on three characteristics: the ownership and control of resources (not only means of production, but also knowledge and material wealth), social prestige and political power. Class situation reflect different life opportunities derived from credentials, the position in the market, and consumption (Borrell et al. 2004, Muntaner et al. 2010). The Goldthorpe classification of

social class represents the continuation of this stream in what has been called “neoweberian”. It combines occupations with similar income, employment conditions and economic prospects, but also incorporates workplace position, that is the authority and control that the occupation entails (Regidor and Grupo de Trabajo de la SEE 2001).

While Goldthorpe’s or Wright’s schemas try to measure class relations, other classifications are limited to describe and rank positions between classes. For example, the social class classification used in the UK statistics by the Registrar General from 1911 to 2000 was developed based on a hierarchy that ranked occupations by their implicit level of education or training: I) Professional occupations, II) Managerial and technical occupations, III) Skilled non-manual occupations, IIIM) Skilled manual occupations, IV) Partly-skilled occupations, V) Unskilled occupations (CeLSIUS 2011).

The recognition of the need for a theoretically coherent approach to classifying occupations led the UK to abandon the Registrar General’s Social Classes and adopt instead, in 2001, its new National Statistics-Socioeconomic Classification (NS-SEC), an occupational schema designed to capture key aspects of the social relations of work (Krieger 2010), distinguishing between different social positions in terms of both their typical labour market and work situations (Drever et al. 2004). Also following the neoweberian tradition, an European socioeconomic classification (ESEC) has recently been proposed and used (Rose and Harrison 2007).

The classification used in this dissertation

In Spain, the most widely used occupational social class classification in epidemiology has been the adaptation of the aforementioned British Registrar General classification, first by Domingo and Marcos using the codes of the 1979 National Classification of Occupations (CNO), and later by a working group of the Spanish Society of Epidemiology (SEE) and the Spanish Society of Family and Community Medicine (semFYC), which used the 1994 CNO and incorporated aspects of the Goldthorpe's model (Domingo-Salvany et al. 2000, Regidor and Grupo de Trabajo de la SEE 2001).

To apply the latter classification, occupation coded with three digits and, for employers, the number of employees are needed. The following categories are obtained:

- Social class I: administrative managers, directors of large companies (10 or more workers), higher-level professions (requiring second or third cycle university degrees);
- Class II: directors of small companies, medium-level professions (requiring first cycle degree), artists and athletes;
- Class III:
 - o IIIa: administrative workers, clerks, safety and security workers;
 - o IIIb: self-employed in manual occupations;
 - o IIIc: supervisors in manual occupations;
- Class IV:
 - o IVa: skilled manual occupations;

- IVb: semi-skilled manual occupations;
- Class V: unskilled manual occupations.

In practice, a very limited number of studies have looked at health inequalities maintaining the division in these eight groups. Sometimes the IVa and IVb division has been kept, or at least the division into five classes; other analyses have grouped the most privileged (I and II) and disadvantaged (IV and V) groups; and finally, the classification has often been grouped in two categories: ‘non-manual’ (I-III) and ‘manual’ (IV-V) (Chilet-Rosell et al. 2012). In this dissertation we try to retrieve all categories of the SEE classification and to base groupings in an analysis of the theoretical and empirical similarities and differences between them.

Furthermore, a common critical point of measures of social class based on occupation lies in its application to non-employed persons. In this dissertation social class will be based on the current or previous occupation of the interviewee (Arber 1996), or in the case of those who have never entered the labour market, on the occupation of the partner or household reference person; we assume that, despite not sharing the properly occupational risks or benefits, this constitutes a sufficient approach that reflects the economic and social environment of the individual.

Gender and health

The health of women and men is different and unequal. The complexity and uniqueness of gender inequalities are illustrated by their opposite sign depending on the types of outcomes considered. Almost worldwide, the paradox is described that women enjoy a

longer life expectancy, but they suffer more than men from a large host of non-fatal, disabling physical and mental illnesses, as indicated by indicators of mental health, chronic illness or disability (Bambra et al. 2009, García-Calvente et al. 2008, Lahelma et al. 1999, Rueda et al. 2008). So while men have a higher incidence of chronic life-threatening diseases, women have more chronic non-fatal conditions, daily symptoms and acute disorders (Verbrugge 1989). In other words, "men die of their diseases while women have to live with theirs" (García-Calvente et al. 2008). Poorer self-assessed health among women is a constant finding in Southern European countries; not so in all the rest of Europe, particularly in Finland and the UK (Bambra et al. 2009, Lahelma et al. 1999, Macintyre et al. 1996).

Most of these differences may be considered unfair and unnecessary inequalities derived from the differential risks of social positions, roles and expectations of men and women in society because of the gender system of oppression (Krieger 2003b, Verbrugge 1985). Indeed, both the excess male mortality and the excess female non-fatal morbidity could be considered a result of patriarchy, the systematic domination of women by men (Stanistreet et al. 2005). As we will discuss later, some studies have showed how women's worst health status results from the unequal distribution of power between men and women, the persistent gender division of labour, and unequal exposures that they entail (Bird and Fremont 1991, Cherepanov et al. 2010, Denton et al. 2004). In this case, patriarchy restrains women's access to social and work-related privileges and economic resources and assigning

them the most, and least desirable, domestic responsibilities (Doyal 1995, Kamo 1988, Ross and Bird 1994).

In this thesis we will give priority to the study of general health and morbidity indicators which have traditionally shown a female excess. However, it is worth mentioning that men's shorter life expectancy can be attributed not only (if at all) to biological disadvantages, but also to gendered patterns of health-related behaviours and risk-taking (Bird and Rieker 1999), related to patriarchy to the extent that men are constrained, to maintain this power, to adhere to behavioral patterns of hegemonic masculinity, including risk-taking and the development of some personality traits (Courtenay 2000, Mahalik et al. 2007, Stanistreet et al. 2005). There is an acknowledgement that it is this very power asymmetry in gender relations which is the underlying motivation for much of men's negative health attitudes and behaviours. It is the pursuit of this power and privilege which often leads men to harm themselves due to the fact that it is the very social practices which undermine men's health that also facilitate men to demonstrate manliness and acquire power in sexist and gender dichotomous societies (Courtenay 2000, Lohan 2007).

There is actually some evidence that a higher risk-taking attitude explains some of the male excess in road accidents (Turner and McClure 2003); that "traditional" men have higher incomes (Judge and Livingston 2008) but also higher mortality (Mansdotter et al. 2006), and that it is the adherence to either masculine or feminine gender roles, more than biological sex itself, that is

associated to relative disadvantage either in mortality or general health (Annandale and Hunt 1990, Hunt et al. 2007).

In the words of Lesley Doyal (2001): “So long as masculinity continues to be defined in ways that are hazardous to health too many men will continue to experience preventable diseases and even death. At the same time, too many women will continue to be damaged by the actions of male partners who are following the scripts of masculinity. (...) unless they are tackled, gender inequalities will continue to be one of the factors limiting the capacity of both women and men to realise their potential for health.”

Migration and health

“Social class, gender and ethnicity” are traditionally listed when the theoretical texts on social inequalities in health talk about different axes of inequality, and are also shown in the conceptual framework of the WHO CSDH (Solar and Irwin 2010). Ethnicity (or race) has been a frequent field of analysis in the US or UK, and there has been a large debate on the contribution of genetics, culture, socioeconomic factors and racism to racial and ethnic inequalities in health (Krieger 2003a, Muntaner et al. 1996, Nazroo 2003, Williams et al. 2010), whereas in continental Europe more attention has been paid to the issue of migration (Nielsen and Krasnik 2010). This is no chance, as it largely reflects the history of immigration in a country: a long history implies that the descendants of immigrants are now identified as racial or ethnic minorities, while a shorter one implies that most people belonging

to ‘visible minorities’ are first-generation immigrants or their children.

In Catalonia and Spain, this phenomenon has largely occurred since the turn of the century, and ‘migration and health’ studies have literally boomed since then (Aerny Perreten et al. 2010, Carrasco-Garrido et al. 2007, Hernández-Quevedo and Jiménez-Rubio 2009, Oliva and Pérez 2009). It is worth mentioning that in Spain, there is an ethnic minority with centuries of settlement, such as the Roma people, about which recently for the first time a survey was carried out throughout the country that has exposed deep inequalities in health compared with the rest of the Spanish population (La Parra 2009). However, we decided to focus in this thesis on the emerging issue of the health of immigrants in Catalonia and Spain, taking into account that only occasionally it had been addressed within a framework of social determinants and health equity, and that besides studying recently immigrated foreign populations, research on the health of Spanish people migrated decades ago to Catalonia had been a yet almost missed opportunity. We will go back on this latter issue in the chapter on the Catalan context.

We should clarify that when referring to (international) immigrants, we are talking about people who come to a country other than where they were born to establish their residence (Malmusi and Jansà 2007, UNDP 2009). In a group of experts in Spain that addressed the issue of definitions and variables for the study of the health of immigrant populations some years ago (Malmusi and Jansà 2007), we discussed the nuance according to which it was

more appropriate to limit the use of the term "immigrant" to recent arrival of people (up to 5 or 10 years), and talk of "immigrated people" to refer generally to all persons from a different country settled in the territory. This is a nuance of Catalan and Spanish but not English, which always used the term "immigrant", or French or Italian using instead what would be literally translated as "immigrated". In any event, the children already born in the destination country, commonly called 'second generation immigrants', are not included in the definition. Just as a note, in other countries similar or worse health indicators have been reported for the second generation than the first (Escobar et al. 2000, Lert et al. 2007, Smith et al. 2009, Sundquist and Li 2006).

That said, it can be stated that the 'immigrant' population profile that attracts the interest of biomedical and epidemiological research is often an abstract and homogeneous entity of individuals or groups that a priori seem to share only the characteristic of having performed a geographical (transnational) shift. We hypothesize here that, in studies of health inequalities, it is appropriate to operate various distinctions, at least at the three levels described below.

Wealth of the place of origin

The first distinction is the one based on the country or geographic region of origin. Until the date, studies on immigration and health have usually placed in a separate group or directly excluded from the analysis people from 'Western', 'wealthy' or 'developed' countries, with scarce theoretical discussion (Clough

2011, Hjern et al. 2004, Hosper et al. 2007, Levecque et al. 2007, Norredam et al. 2004, Pudaric et al. 2003, Rasch et al. 2008).

We will explore the hypothesis that this separation reflects the difference between one type of migration likely to be a source of inequities, and one that is not. Emigration from disadvantaged (low or middle-income) countries is usually a constrained choice, shared by a wide sector of the population, as the result of big differences in economic and social opportunities between origin and destination (Castles 2003); this usually implies an access to the host society in a subordinated position, with low negotiating power, and high vulnerability to discrimination, exploitation and unhealthy living and working conditions. This type of migration – based on labor movement from less developed to economically advantaged regions – is the predominant in both internal and international migration flows (Lu 2008). One can argue that it is the one that mostly matters to an analysis of health inequalities based on power relations. The minority of immigrants moving between areas with a comparable level of wealth generally do so for individual circumstances and opportunities, and do not share the characteristics we enumerated.

Time of residence: the deterioration of the healthy immigrant

The second distinction, also with much importance to health status, is the one defined by time of residence. Several studies, mainly from Canada and the United States but also from Europe, indicate the existence of the phenomenon called "healthy immigrant effect", according to which recently arrived immigrants show (even

when controlling for their younger age) better health than the native population in the country of destination or, at least, better than expected for their socioeconomic conditions (De Maio 2010, McDonald and Kennedy 2004). However, this advantage is reduced over the years, and may even get to reverse (Acevedo-Garcia et al. 2010, De Maio 2010, Newbold 2005, Nielsen and Krasnik 2010, Ronellenfitch and Razum 2004, Uretsky and Mathiesen 2007).

Two major competing explanations have been set out for this pattern. One has its origin in US studies on Hispanic immigrants, generally healthier than US natives despite poorer socioeconomic conditions, and suggests that culture-based healthier lifestyles and stronger social bonds and support from the origin country exert a protective effect on immigrant health; and that these factors are progressively lost as immigrants “acculturate”, i.e. assimilate dominant culture and habits, and in subsequent generations (Abraido-Lanza et al. 2005, Diez Roux et al. 2005, Escobar et al. 2000, Hosper et al. 2007). With respect to this hypothesis, a critique has been moved on the dangerous policy consequences of focusing explanation on cultural traits rather than on social determinants (Viruell-Fuentes 2007); but we may also observe other methodological pitfalls, in that the cited studies simply attribute to acculturation observed patterns by immigrants’ generations or duration of residence, without directly measuring the construct.

The alternative explanation emerges from an integration of a labour-related positive health selection with mechanisms that are well recognized as causal factors of racial and ethnic inequalities in health, such as embodiment of discrimination and cumulative

socioeconomic disadvantage (Harris et al. 2006, Krieger 2003a, Krieger 2005, Nazroo 2003). There is evidence that even before leaving their country of origin, health of immigrants is better than the rest of the population, suggesting the existence of a selection effect of the "healthy worker" among people who take part in migration processes (Lu 2008). On the other hand, the fastened health decline that follows can be attributed, I argue, to the late-effect result of cumulative experiences of inequality, both in the place of origin, with poorer socioeconomic environment in childhood and growth (Ronellenfitch and Razum 2004), and in the place of destination, with chronic exposure to hardship, work hazards, exploitation and discrimination (De Maio 2010, Viruell-Fuentes 2007), as well as the psychobiological impacts of a migration forced by circumstances, separation from friends and relatives, and loss of social status. Indeed, several studies show that lower social class and socioeconomic conditions account partly or totally for health disadvantages of immigrants from a low-income country background (Hjern et al. 2004, Levecque et al. 2007, Lindström et al. 2001, Reijneveld 1998, Tinghög et al. 2007, van der Wurff et al. 2004).

Internal migrations: a neglected issue

The third level of distinction is actually a first and preliminary one: we have focused until now on international immigrants, when estimations of the 2009 Human Development Report make patent that they are a minority (195 millions worldwide) compared to the so called "internal immigrants", that is, those from elsewhere within

the same country or region, and which number about 740 million people (UNDP 2009). While legal barriers are usually specific of international migration, the majority of internal migration is also based on labor movement from less developed to economically advantaged regions (Lu 2008), thus sharing a likely mechanism of health inequality.

Examples of epidemiological studies referring to situations of migration between regions of the same country or between adjacent countries are very scarce and can mostly be found in other national European contexts, with findings of poorer health of Finns in Sweden (Iglesias et al. 2003, Pudaric et al. 2003, Westman et al. 2008) and higher mortality for Irish and Scottish immigrants in England (Raftery et al. 1990, Wild and McKeigue 1997).

As I will discuss later in the chapter on the Catalan context, the opportunity of studying inequalities between native population and internal migrants is especially relevant to this thesis, and to the debate introduced in the previous section; thus, we will be able to some extent to display the contribution of the mentioned cumulative experiences of inequality in a large immigrant group such as the one from the rest of Spain to Catalonia, with long duration of residence and quite similar cultural background as natives, therefore ruling out the influence of the healthy immigrant effect and acculturation aspects.

The causes of social inequalities in health

In addressing the causes of social inequalities in health, several theories have been proposed, and can be considered complementary

to a certain extent (Kelly et al. 2007, Krieger 2011). Early explanations (Black et al. 1988) have included aspects such as the artefact and the social selection that have been refuted or minimised; the materialist or structuralist theory proposing that inadequacy in income levels leads to a lack of resources to cope with stressors of life and thus produces ill health; and the psychosocial model arguing that discrimination based on one's place in the social hierarchy causes stress which causes a neuroendocrine response that produces disease. On the other hand, the social production of disease and political economy of health theories (Doyal 1983, Navarro and Shi 2001) have been based on the premise that capitalist priorities for accumulating wealth, power, prestige and material assets are achieved at the cost of the disadvantaged, and that the social patterning of health and disease in a given society is produced by the structure, values and priorities of its political and economic systems. At the turn of the century, the eco-social theory sought to bring together all these models, looking at how individuals 'embody' in their biology aspects of the contexts in which they live and work (Krieger 2001b).

According to Link and Phelan, key resources such as knowledge, money, power, prestige, and beneficial social connections constitute "fundamental causes" that can be used to avoid risk, adopt protective strategies and gather health advantages no matter what the risk and protective factors are in a given circumstance (Link and Phelan 1995).

Hilary Graham (2004) called for a distinction between the "social determinants of health" (SDH) and the "social determinants

of health inequities” (SDHI). The unequal distribution of the social and economic determinants of health such as income, employment, education, housing and environment produce inequities in health. Then, the concept of SDHI refers to those SDH which, due to their unequal distribution, not only influence the population’s health but also produce social inequalities in health.

The final report of the WHO Commission on Social Determinants of Health (CSDH) shifted the debate from causes to solutions by stating that “social injustice is killing people on a grand scale” and that health inequalities “arise because of the circumstances in which people grow, live, work, and age, and the systems put in place to deal with illness. The conditions in which people live and die are, in turn, shaped by political, social, and economic forces” (CSDH 2008). The CSDH adopted a conceptual framework that distinguishes between structural and intermediary determinants of health inequalities: the former include the socioeconomic and political context as well as the individual characteristics that shape position in the social structure, such as social class, gender or ethnicity among other; the latter include those exposures that lay in the causal pathways between social position and health (CSDH 2008).

Conceptual framework of the social determinants of health inequalities

In this dissertation I adopt the conceptual framework of the determinants of social inequalities in health that we have developed and adopted in the Commission on the Reduction of Social

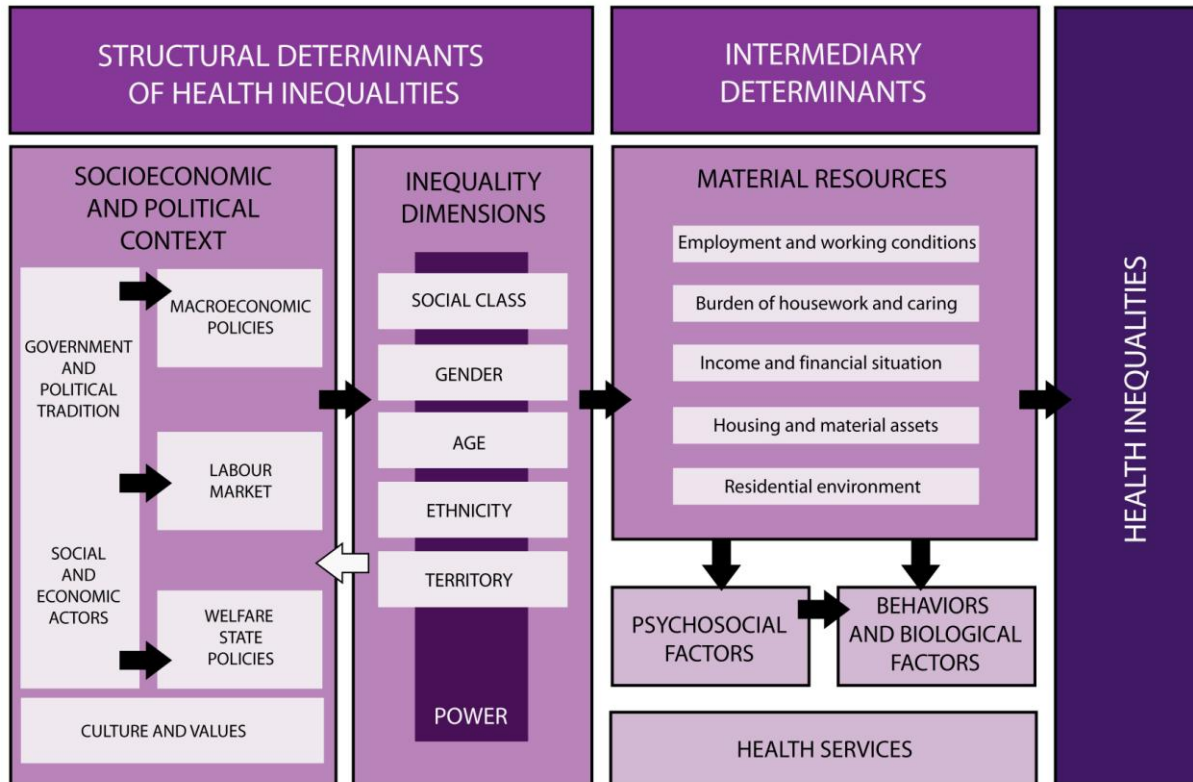
Inequalities in Health in Spain (Comision para reducir las desigualdades sociales en salud en España 2011, 2012) (Figure 1). The framework is based on several existing models, but mainly on the aforementioned CSDH framework (CSDH 2008) and especially on the first proposal that Solar and Irwin made for that Commission (Solar and Irwin 2010) and on the political economy of health theory premises (Navarro and Shi 2001). The framework highlights different axes or dimensions of inequality such as social class, gender, age, ethnicity and territory (of origin, as we study it in the analysis of immigration, and of residence, such as is often analyzed in geographic or area studies), and first mentions ‘power’ as a factor to cross them all. On one hand, these axes are influenced and interact with the socioeconomic and political context, so that the interaction between economic, social and political actors and the broad policy lines derived from it significantly affect the social stratification and the distribution of power and resources according to the aforementioned axes.

On the other hand, these dimensions of social inequality determine power hierarchies that affect the chances of good health through the exposure to so-called ‘intermediary determinants’. I will elaborate on them later in the introduction, but it is important to note here that both the literature review and new analysis provided by this dissertation have contributed notably to the configuration of this block in the framework of the Spanish Commission and its further development compared to the CSDH model. The framework includes first material resources, broadly conceived, as are employment (e.g., employment status, precariousness) and working

(e.g., physical, ergonomic, psychosocial and organisational hazards) conditions; the burden of unpaid household work and caregiving; income level, economic status and wealth; the quality of housing and its facilities; and the neighborhood or area of residence and its characteristics. These resources, together with the position of power, have both a direct impact on health and an indirect one, influencing psychosocial processes such as lack of control, self-realization, or stressful situations, and behaviors which negatively influence health. Finally, the framework includes health services, which although do not constitute by themselves the main determinant generating inequalities in health, can have an either multiplier or bufferer effect of inequality, depending on whether the access, utilization and quality they are lower, equal or greater for disadvantaged social groups.

Finally, the framework includes health inequalities as a whole, without detailing the mechanisms that lead to inequalities in the incidence of various diseases or in the result of general indicators of various kinds such as self-rated health, functional limitation or mortality. Throughout this dissertation we will enter more deeply into this "box", reviewing and investigating for example which health issues affect health self-assessment and whether the observed inequalities with one or other indicators are consistent.

Figure 1. Conceptual framework of the social determinants of health inequalities.



Power as determinant of health inequalities

A major modification to the previous conceptual frameworks provided by the Spanish Commission framework lies in the explicit inclusion of the concept of "power" as a critical factor in the formation of various axes of inequality such as social class, gender, age, ethnicity or race and territory of origin and/or residence, and in determining opportunities for good health through greater or lesser access to privileged positions in various environmental, social, employment or economic factors that mediate the generation of inequalities in health (Krieger 2008).

The public health literature that has considered power as a crucial issue for health and health inequalities is particularly scarce, and it is beyond the scope of this introduction to deepen in the sociological and political science literature on the concept of power. Nevertheless, I have tried to approach this topic because underlying to this dissertation is the assumption that mechanisms of power (and power relations) are behind the social inequalities, including health inequality, that both social class, gender and migrant status bring about. I summarize here some aspects deriving from this first, general approach to the topic.

Two of the most important aspects that the theory of power refers to are the "Power-to" (the ability to achieve a desired outcome) and the "Power-over" (power over something or someone and to make decisions) (Bambra et al. 2007).

“Power-to” is considered as the ability to bring about change through willed action, or what Giddens has termed ‘the

transformative capacity of human agency', in the broadest sense 'the capability of the actor to intervene in a series of events so as to alter their course". This kind of power at the individual level has been somehow directly linked to health outcomes, including mortality, and to health inequalities by studies measuring control in the workplace or, more broadly, control over life (Marmot and Wilkinson 1999, Gilmore et al. 2002). At this regard, Yamin and other authors refer that the right to health aims at the creation of social conditions under which previously disadvantaged and disempowered groups are enabled to achieve the greatest possible control over the major factors that influence their health. However, these kind of theories also urge skepticism towards approaches that claim to empower disadvantaged individuals and groups while leaving the distribution of key social and material goods largely unchanged (Solar and Irwin 2010).

On the other hand, "power-over" is considered the ability to determine other people's behavior. An actor or group achieves its strategic ends by determining the behavior of another actor or group, through suggestion or coercion. Three dimensions of power-over are described (Guinier and Torres 2003): the power to win the game; the power to design the rules, expressed primarily in direct and indirect political power; and the power to define the discourse about why the winners won the game, and why the losers deserve their condition. This is related with Gramsci's concept of hegemony, that is the ability of the ruling class to maintain dominance by projecting its own ideological vision of the world so that it is accepted as natural and common sense (Bambra et al. 2007).

Ideologies of superiority such as classism, sexism and racism justify institutional and interpersonal practices that perpetuate privileges (Krieger et al. 2005).

This “power-over” is especially relevant in the generation of health inequalities to the extent that is used by dominant groups to secure their material and social resources. According to Lynn Weber, power relations exist between opposing groups where dominant groups hold power over others and use that power to secure material and social resources such as wealth, income, or access to health care and education (Weber 2006). This relational conception of social hierarchies such as those constituted by race, class, gender is contrasted by Lynn Weber with the distributional conception dominant in biomedical research and social epidemiology, used to display how subordinate groups “deviate” in practices, resources, etc. from the dominant group (the unquestioned norm), thus obscuring the nature of institutional and interpersonal power relationships (Weber 2006).

The intersections between axes of inequality

Despite the existence of conceptual frameworks that point out to the existence of health inequalities according to different spheres that shape the individual position in society, such as social class, gender and ethnicity (Solar and Irwin 2010), studies of health inequalities have mostly analysed these social dimensions separately. Studies describing health inequalities in two dimensions (social class and gender; social class and race/ethnicity; race/ethnicity and gender; migration status and gender) are

relatively common, even if focus is usually on one dimension and the second one is treated as stratification variable. Studies of social class and migration status are less frequent (Acevedo-Garcia et al. 2010, Marmot et al. 1984, Raftery et al. 1990), as the former is more often used as confounder of the latter, as we saw previously. Finally, only a limited number of studies have attempted to analyse inequality in three dimensions simultaneously, usually with gender, socio-economic position and race/ethnicity (Almeida-Filho et al. 2004, Clarke et al. 2009, Cummings and Jackson 2008, Pamuk 1999, Veenstra 2011), but also with migration status (Borrell et al. 2008, Sanchez-Vaznaugh et al. 2008).

The underexploration of the field of study of intersections in inequalities in health contrasts with the immense popularity of intersectionality theory in humanities and social sciences circles. A large and growing body of intersectionality research includes applications of both qualitative and quantitative methodologies and has found that gender and class, as well as race, ethnicity, caste, sexual orientation and other social inequalities, often work together and interact with each other (Schulz and Mullings 2006, Veenstra 2011, Weber and Parra-Medina 2003). These interactive processes or intersections can have important effects that are not uniform but depend on contexts and settings (Iyer et al. 2008). Intersectionality is being recognized as a valuable normative and research paradigm for furthering understandings of the complexity of health inequities (Schulz and Mullings 2006, Cummings and Jackson 2008, Hankivsky and Cormier 2011, Hankivsky 2012, Iyer et al. 2008, Weber 2006).

Intersectionality theory, an influential theoretical tradition inspired by the feminist and antiracist traditions, demands that inequalities by race, gender, and class (as well as sexuality and other dimensions) be considered in tandem rather than distinctly. This is because these fundamental axes of inequality in contemporary societies are considered to be intrinsically entwined; they mutually constitute and reinforce one another and as such cannot be disentangled from one another. Intersections between axes are thought to create complex social locations that are more central to the nature of social experiences than are any of the axes of inequality considered singly (Veenstra 2011). It begins with the premise that focusing on single markers leads to a false classification of people, whose lives, their experiences and positions are created by intersecting social locations: groups in society are affected by multiple systems of power and oppression, a “matrix of domination” that changes over time and place and in different institutional domains (Hankivsky and Cormier 2011).

Some central tenets of intersectionality include the lack of a predetermined or pre-hierarchical pattern between categories; the consideration of simultaneous interactions between different aspects of social identity, striving to understand what is created and experienced at the intersection of two or more axes of oppression; and the consideration of the impact of systems and processes of oppression and domination, being attentive to time, place, and historical and localized specificity (Hankivsky et al. 2010).

Quantitative researchers have acknowledged the tensions between conventional research designs, which are intended to test

for independent effects of dimensions of inequality typically measured as binaries, and intersectionality which seeks knowledge about the processes of interaction between fluid and actually embodied social identities. The development of research designs and methods that can capture effectively all of the tenets of intersectionality theory remains underexplored (Hankivsky 2012). This has not impeded the emergence of intersectionality-informed quantitative studies that utilize techniques to examine significant interactions which constitute health (Sen et al. 2009, Veenstra 2011).

Self-rated health as an indicator for the study of inequalities

The main health indicator that will be used in this dissertation is the self-evaluation of the general health status, also known as ‘self-perceived health’ or ‘self-rated health’. This indicator is widely used in epidemiological studies as a measure of health of individuals and populations (for instance, it has been included among the forty basic indicators of the European Community Health Indicators – ECHI – project) and of health inequalities (see for instance Kunst et al. 2005, van Doorslaer et al. 1997). Self-rated health (SRH) has proven to be a valid and synthetic indicator of disease burden, health service use and risk of death, even more valid than a medical assessment (Mossey and Shapiro 1982). Besides that, SRH has intrinsic value as a measure of the individuals’ own perception of what their health is. It reflects a global judgment of the individual which combines evaluation of

fatal and non-fatal, acute and chronic, physical and mental diseases; as well as symptoms, functional abilities and general wellbeing (Jylha 1994, Quesnel–Vallée 2007, Simon et al. 2005, Singh-Manoux et al. 2006), fairly close to the WHO definition of health as a state of well-being, not simply the absence of disease.

Moreover, SRH gives some advantages in the description of social inequalities in health: as a sensitive and precocious marker of health deterioration, even at young ages (Macintyre et al. 2005, Quesnel–Vallée 2007), SRH may be useful to detect health inequalities affecting immigrants; and as an all-inclusive measure, it should not be biased toward inclusion of only "male" or "female" problems, and, unlike measures of health based on physician diagnosis, it is not biased by differential diagnosis of a problem based on the person's gender (Ross and Bird, 1994).

The components of self-rated health

According to several studies (Kivinen et al. 1998, Manderbacka 1998, Mavaddat et al. 2011, Mossey and Shapiro 1982, Ratner et al. 1998, Simon et al. 2005, Singh-Manoux et al. 2006), the process of evaluating one own's health is influenced by various health aspects: from diseases and objective syndromes, both physical and mental, to subjective somatic and psychological symptoms, as well as the level of autonomy and functional capacity.

Only a small part of the variability in self-rated health is explained by objective conditions (Mossey and Shapiro 1982). Subjective symptoms, well-being or mental distress and physical function add up to chronic diseases (Kivinen et al. 1998). Contrary

to preconceptions that associate perceived health mainly to mental health, studies show the preponderant influence of physical health issues (Ratner et al. 1998), accompanied to a lesser degree by evaluations of functional and adaptation capacity, and well-being (Simon et al. 2000, Simon et al. 2005). While a qualitative study shows that all respondents base their assessments on ill-health, modified by the severity, duration and restrictions posed by ill-health (Manderbacka 1998), two other studies (Benyamini et al. 2003, Benyamini et al. 2000) find that even if this is true for people reporting poor/fair SRH, risk factors and positive indicators are considered more relevant by those reporting good or better health, and feelings of energy, positive mood, social support and active functioning are as or more important in determining current and future SRH as negative indicators such as disease history, disability, medication and negative mood. Finally, while the same qualitative study shows that some respondents base their assessments also on fitness and health behaviour (Manderbacka 1998, Manderbacka et al. 1999), in a recent study people with healthier behaviors were found to be more pessimistic in their own health rating (Layes et al. 2012).

We could not identify studies that explore which specific chronic conditions have more influence on SRH. There are some studies using disability or more complex health-related quality of life scores as outcomes, and identify either arthritis and back problem (CDC 2009), depression (Moussavi et al. 2007) or musculoskeletal disorders followed by depression (Saarni et al. 2006). Therefore, a pattern emerges where diseases that don't kill,

but rather chronically “cohabit” with individuals, are more likely to have a greater burden on general health measures.

Validity and comparability of self-rated health between social groups

The comparability of SRH across social groups is of course an issue of concern in light of its extended use for the description of social inequalities in health, and has been addressed in last years for all the three dimensions we focus on.

Comparability between social classes

A quite large set of studies has dealt with this issue by comparing the predictive power of SRH over mortality, or their strength of association, between different socioeconomic positions or social classes. Many of them have found the same predictive power (Burstrom and Fredlund 2001, McFadden et al. 2009, Nishi et al. 2012, van Doorslaer and Gerdtham 2003) while some found a stronger association for higher socioeconomic position (Lima-Costa et al. 2012, Quesnel–Vallée 2007, Regidor et al. 2010) and one for lower social class (Quesnel–Vallée 2007). One of these studies, on a Spanish population of 60 years and above, also showed that SRH was more strongly linked to potentially fatal diseases among the higher educated and to non-fatal diseases among the lower educated (Regidor et al. 2010).

In a synthesis editorial, Quesnel-Vallée casts doubt on considering the association of self-assessment of health with mortality as the only test of its validity: “Maddox, one of the pioneers of research on self-ratings of health, once wrote that they

‘clearly measure something more—and something less—than objective medical ratings’. Yet, it would appear that much of the work discussed here is rather working under the broad assumption that ‘true’ health is defined as the absence of diseases and especially those that are life-threatening, or ‘mortality relevant’. Moreover, ‘true’ health is equated with objective measures of health, of which mortality is undoubtedly the gold standard. However, life-threatening conditions are in this perspective only one component of SRH (...)” (Quesnel–Vallée 2007).

Subsequently, a study on a subsample of the SHARE European survey (Bago d'Uva et al. 2008) used an innovative method that partially solves Quesnel-Vallée’s critique: surveyed individuals, besides rating their own health status according to different dimensions, rated on the same scale three hypothetical situations described in vignettes for each dimension. In 6 of 8 countries (all except Sweden and Spain, where the pattern was unclear) there was a consistent trend towards a worse assessment of health in these hypothetical situations by people with higher education levels; adjusting for this effect increased observed socioeconomic inequalities in self-rated health and function. Different expectations or comparison with the immediate environment could explain the worse rating or less "tolerance" of comparable situations by more advantaged groups. Recently, this study was replicated in the United States, with the same conclusion (Dowd and Todd 2011). Again in the US, Delpierre *et al* found a stronger association between presence of chronic conditions or functional limitations and poor self-rated health in people with higher education level,

interpreting it as an evidence of a greater propensity of this group to report poor health when experiencing a health problem, and therefore of a probable underestimation of socioeconomic inequalities in health through self-rated health (Delpierre et al. 2009). Layes *et al* conclude the same while showing that in Canada people with more income or education are more pessimistic in their health self-assessment compared to what a standard health-related quality of life instrument such as the Health Utilities Index does measure (Layes et al. 2012).

Comparability between men and women

As a consequence of the wider proportion of non-fatal health problems that affect women and induce their poor health assessment without posing them at a greater risk of dying, it is easy to imagine that the relationship between SRH and mortality will be stronger among men. This seemed actually the case in a review of studies by Benyamini et al. (2000) and in a more recent study (Nishi et al. 2012), although another meta-analysis found the same strength of association among both sexes (DeSalvo et al. 2006). In any case, as the same Benyamini et al. argue, “although women’s SRH is less ‘accurate’ than men’s in one respect (predicting mortality), it may be as accurate, or more accurate, in relation to other criteria” (Benyamini et al. 2000). As we described, diseases that don’t kill, but rather chronically “cohabit” with individuals, are more likely to have a greater burden on general health measures (Saarni et al. 2006).

It has been argued that differences in symptoms perception, evaluation and reporting might account for sex differences in illness

reports (Hibbard and Pope 1986, Mechanic 1976). As a consequence, women are more likely than men to have their symptoms attributed by physicians to psychological factors such as ‘over-anxiousness’, even in the presence of positive test results indicating an organic disorder, and to be told that problems are ‘in their heads’ (Ruiz-Cantero and Verdú-Delgado 2004, Tannenbaum and Mayo 2003). However, other studies show that women are actually not more likely to report health problems at a same level of illness (Gijbbers van Wijk et al. 1999, Macintyre et al. 1999). Even if they express emotions more freely, this does not account for excess distress (Mirowsky and Ross 1995). Instead, it is possible to observe in a few studies that gender differences in self-rated health are accounted for in statistical models by gender inequalities in other morbidity measures (Arber and Cooper 1999, Case and Paxson 2005, Jylhä et al. 1998, Orfila et al. 2006). In some of the studies focused on testing the validity of SRH across socioeconomic position, it is also possible to observe that the association between SRH and functional limitations or chronic conditions is the same in men and women (Delpierre et al. 2009, Regidor et al. 2010).

Comparability between native and immigrant populations

There is relatively less information regarding the comparability of health self-assessments between ethnic groups, or between natives and immigrants. Language and cultural differences have been raised as possible sources of bias. As far as we know, a study in the UK showed similar associations of SRH with other morbidity and healthcare use measures across ethnic minorities (Chandola et al. 2003); a study comparing US-born and foreign-born Asian

Americans (Erosheva et al. 2007) showed similar use of the five items of the response scale; and in a Dutch study, even if some interactions with ethnicity were found in strength of relationship between the presence of a given chronic condition and SRH, the poorer health rating of Turkish and Moroccan was consistent with their greater global burden of diseases and use of health care (Agyemang et al. 2006). A study of Chinese in Canada found their health status was poorer than white Canadians' with 5-point single questions, equal with the 0-100 visual analogical scale and better if assessed by the EQ-5D or the number of chronic conditions (Leung et al. 2007). Evidence of language bias in SRH responses has emerged from US studies on Hispanics, showing that language of interview is independently associated with the probability of declaring fair/poor health, which investigators attribute to the translation of "fair" into the Spanish "regular" inducing respondents to use this category (Bzostek et al. 2007, Viruell-Fuentes et al. 2011), though they can't rule out residual confounding for socio-economic or other factors associated with preferred language.

Which health problems account for inequalities in self-rated health?

This question is important on one hand, with reference to the issue just addressed: self-rated health is a valid measure of social inequalities in health to the extent that the differences between social groups observed with this indicator correspond to differences in concrete and reasonably objective health problems, so that from a statistical standpoint, after adjusting for these other health variables

no independent association persists between the self-rating process itself and belonging to a disadvantaged social group. On the other hand, to know which conditions have a greater impact on social inequalities in a general health indicator can help prioritize research, prevention, diagnosis and treatment efforts on these conditions as tools to mitigate inequalities from the health system.

The answer to this our question is at present limited to few studies, showing how inequalities in both subjective and objective aspects of health can account for the vast majority of the observed differences in self-rated health by gender and socioeconomic status; we found no studies of this kind in regard to ethnicity or migrant status.

In a subsample of the Dutch study ‘GLOBE’, about three quarters of inequalities in SRH by educational level were statistically ‘explained’ by other health variables, both objective (chronic conditions and functional limitations) and subjective (psychosomatic symptoms and level of distress or discomfort according to the Nottingham Health Profile), with a greater contribution of the latter (Simon et al. 2000). The differences in the severity of diseases, in addition to their prevalence, seem to be another important component (Eachus et al. 1999).

In the case of gender inequality, there are some studies, as mentioned before, in which gender inequalities in self-rated health (Case and Paxson 2005) or in a health-related quality of life scale such as the Nottingham Health Profile (Orfila et al. 2006) were explained entirely by the distribution of chronic conditions (Case and Paxson 2005) or by four chronic conditions (arthritis, back pain,

diabetes and depression) combined with functional capacity (Orfila et al. 2006).

The contribution of intermediary factors to health inequalities

With the concept *intermediary determinants of health inequalities*, we refer to those factors and conditions that are unequally distributed according to the social structure, that influence health, and that therefore constitute a ‘meso’ causal pathway leading to health inequalities. These factors have sometimes been referred to as ‘explanatory factors’, however I will prefer the use of ‘intermediary determinants’ or ‘mediators’ considering their position in the causal chain between social dimensions of inequality and health outcomes. It must be stressed that they are not the fundamental and ultimate causes of inequality (Link and Phelan 1995), but the consequences of unequal social power distribution, and that their relevance may vary between societies and along time. But indeed, they constitute a potential target for interventions that buffer inequality and reduce its expression.

In presenting the conceptual framework I have mentioned the three main blocks in which these intermediary factors are usually split: material factors such as employment, economic resources, the quality of neighborhood and housing, burden of care; psychosocial factors, such as stressful events, self-esteem, recognition or social support; and behavioral factors such as substance use, nutrition and physical activity. I already pointed out the existence of a causal hierarchy among them. Probably the first authors to conceptualise

the relationship among the three were Adler and Ostrove (1999), that presented a framework, focused on socioeconomic status (SES) as an axis of inequality, according to which SES has a direct influence on the material resources (which Adler and Ostrove call 'environmental') and also has psychological effects on its own (for the power position that it entails). Material resources, in turn, have direct effects on health through directly pathogenic exposures, and other indirect effects on the above mentioned psychological processes which in turn end up influencing (physical) health through activation or alteration processes of the nervous, endocrine, immune and cardiovascular systems, and others. Behaviors are not a direct result of SES (although it is important to recognize the influence of the environment of peers and of social stereotypes) but are essentially influenced by these material resources and psychological processes. Other authors have assumed this sequence thereafter (van Oort et al. 2005).

Alternative statistical approaches for estimating the contribution of intermediary factors

In this dissertation we will replicate the by large most used approach in social epidemiology for the statistical estimation of the contribution of intermediary factors to health inequalities, which consists of calculating the percent reduction in the association between the social stratifier (e.g. social class or gender) and the health outcome as intermediary factors are included in regression models. In the Discussion, we will comment further on the merits, pitfalls and limitations of this method. It is worth mentioning that a

few studies have used other methods for this same purpose, such as the decomposition analysis (Hosseinpour et al. 2006, Morasae et al. 2012, Nedjat et al. 2012) or structural equation models (Beydoun and Wang 2010, Borodulin et al. 2012, Matthews et al. 2008, Mulatu and Schooler 2002, Ross and Van Willigen 1997, Sacker et al. 2001).

The decomposition analysis, a method widely used in health economics, requires first calculating a concentration index of the dependent variable (a health indicator) according to the independent variable (a dimension of social inequality), which measures how much this outcome is equally distributed or concentrated in the higher or lower ranks of the independent variable. Then this concentration index is decomposed in the effect of various intermediary variables; this procedure allows to obtain the portion of inequality (concentration of health) explained by each intermediary variable, in turn decomposed into the effect of differences in the prevalence of mediator (the mediator concentration index itself) and the strength of association between the variable and health (van Doorslaer and Koolman 2004). The main disadvantage lies in the impossibility of adjusting first for variables considered as confounders such as age, and then estimate the contribution of the actual mediators only.

Structural equation models are characterized by: the estimation and quantification of multiple and crossed dependency relationships (path analysis); the ability to represent unobserved concepts (latent variables through factor analysis), an highly desirable property to include dimensions that are measured by more than one variable; to

take into account the measurement error in the estimation process. A first theoretical model of chained relationships between variables is drawn, based on a theoretical plausibility of causation and a significant association in the bivariate analysis, and the goodness of fit of this model to the data is tested using appropriate software. In this case, the weight of a variable as an intermediary factor between an inequality dimension and health would be estimated by the coefficients produced by the path analysis, with the possibility to assess direct and indirect contributions. Despite having initially considered it as a candidate method for this thesis, when the approach was limited to two axes of inequality (gender and social class), the complexity and difficulty of construction, adjustment and interpretation of each model was unembraceable in the context of an analysis of intersections of three axes of inequality.

The contribution to inequalities by social class

Quite a lot of studies have been published on the contribution of one or more groups of intermediary factors to health inequalities by socio-economic position (SEP) and/or social class. Health outcomes include SRH, mental distress, physical function, sickness absence and mortality. Overall reductions in the association between SEP/social class and the health outcome as intermediary factors are included in regression models usually range, depending on the study and variables included, from 20-30% to the total association.

Working conditions have been a major focus in most of these studies, and for that purpose, many of them have been restricted to the working population. Both physical and psychosocial working

conditions make important contributions to inequalities in SRH (Bauer et al. 2009, Borg and Kristensen 2000, Borrell et al. 2004, Hemström 2005, Kaikkonen et al. 2009, Murcia et al. 2012, Niedhammer et al. 2010, Schrijvers et al. 1998). Some studies found evidence for a major role of either the former, with variables such as heavy workloads or repetitive movements (Aittomäki et al. 2006, Laaksonen et al. 2010, Lundberg 1991), or the latter, including support at work, demand but especially job control, decision authority and skill discretion (Aldabe et al. 2011, Rahkonen et al. 2006, Stansfeld et al. 2003). *Employment conditions*, that is the terms under which a person is engaged in a job, including rights, power relations at work, and precariousness (Benach et al. 2010, Vives et al. 2010), are also likely to contribute to health inequalities, as it can be deduced by the relevant contribution of job insecurity in some studies (Bauer et al. 2009, Borrell et al. 2004), and by the skewed social distribution of precariousness showed by studies with the recently developed EPRES scale (Vives et al., 2011); unemployment and labour inactivity also make an important contribution (Popham and Bambra 2010, Ross and Van Willigen 1997, Schrijvers et al. 1999). *Material standards of living* (either material assets, financial difficulties or insecurity, or economic resources) have emerged as a major contributing factor to socioeconomic inequalities in health status (Borrell et al. 2004, Daoud et al. 2009, Ferrie et al. 2003, Ross and Van Willigen 1997) and mortality (Khang et al. 2009, Schrijvers et al. 1999, van Oort et al. 2005). We consider *income* itself, which is commonly used as a SEP marker, as an intermediary factor between education and/or

occupation and health; indeed, it has been found to contribute partially (in Sweden) or substantially (in Britain) to social class inequalities in SRH (Yngwe et al. 2001). Very few studies have explored and found some role of physical and social *neighbourhood* characteristics (Daoud et al. 2009, Franzini et al. 2005). Among all the studies reviewed, only two included variables of *household and care roles and tasks*: the first found that, despite a significant interaction between class and home roles, these did not explain the gradient in psychological distress (Matthews and Power 2002); the second study found that, in Barcelona, weekly hours of household labour made a small but non negligible contribution to class inequalities in women (Borrell et al. 2004). Finally, the importance of a *lifecourse* perspective becomes evident in the intermediary role that few but significant studies demonstrate for early life socio-economic exposures such as childhood social class (Bosma et al. 1999, Power et al. 1998, Van De Mheen et al. 1997, Van Lenthe et al. 2004) and economic hardship (Lundberg 1991) and further pathways such as family environment (Matthews et al. 2010), or school qualifications (Bosma et al. 1999, Power et al. 1998).

Psychosocial factors include a very wide range of constructs and indicators, such as life events, stress, social integration, social support, negative emotions, self-efficacy, life satisfaction (Matthews et al. 2010), and their contribution varies largely: in selected studies, control over life totally explained inequalities in SRH in Ukraine (Gilmore et al. 2002), locus of control made important contributions to inequalities in mortality (van Oort et al. 2005), and social integration (Klein et al., 2012) or hostility

(Schrijvers et al. 2002) made some contribution to inequalities in SRH; while in other studies personality traits (Chapman et al. 2010), or social capital (Dahl and Malmberg-Heimonen 2010) made little or no contribution. While *health-related behaviours* are (more or less, depending on context) important in explaining inequalities in mortality (Khang et al. 2009, Skalická et al. 2009, Stringhini et al. 2011) or in the loss of physical function (Martikainen et al., 1999), they make less contribution to inequalities in SRH (Borg and Kristensen 2000, Daoud et al. 2009, Laaksonen et al. 2005). Moreover, as mentioned, they lay themselves in the pathway between other intermediary factors (e.g. material and psychosocial) and health, thus their independent contribution is limited (Laaksonen et al. 2005, Schrijvers et al. 1999, Schulz et al. 2008, van Oort et al. 2005).

Finally, the largest study on this issue, with data from 28 European countries, explored contributions to social class inequalities in SRH from a constellation of factors, the most powerful being material deprivation, financial difficulties, job reward and social exclusion (namely, sense of uselessness and lack of recognition and acceptance) (Aldabe et al. 2011).

Some of these studies have used sex simply as adjustment variable, while many have stratified the analyses and thus investigated the contribution of intermediary factors to class inequalities in women and men separately. In a Finnish study on the contribution of material and behavioural factors, the former made a greater contribution to class inequalities in women, and the latter in men (Laaksonen et al. 2005). In a Dutch study, physical working

conditions made a greater contribution in men than in women (Schrijvers et al. 1998), but the reverse was true in two Finnish studies (Aittomäki et al. 2006, Kaikkonen et al. 2009). A study in Barcelona found that, whereas in men employment and working conditions were the only factors making a contribution, material standards of living and household work were also relevant for class inequalities in women (Borrell et al. 2004).

The contribution to gender inequalities

Fewer studies have used this kind of approach to the study of gender inequalities, and apparently none in Europe. A group of studies in the US coincide in totally explaining women's poorer health indicators with inequalities in resources and social roles (Bird and Fremont 1991, Gove and Hughes 1979, Ross and Bird 1994, Verbrugge 1989), while researchers from Canada find that higher frequency of distress and selected chronic conditions cannot be accounted for (or at least not completely) by differences in exposures and vulnerabilities (Denton et al. 2004, Walters et al. 2002). In a nationwide Indian survey, material assets and economic independence totally explained women's poorer SRH (Roy and Chaudhuri 2008). A more recent study showed again that household income largely explained gender inequalities in physical and mental health in the US (Cherepanov 2010), while last year, a North American cross country study found that adjustment by household income and employment status halved the excess risk of poor health of US women compared to men, while in Canada – a country with lower gender inequity in wages and access to resources than the US

– female gender seemed protective for self-rated health, and adjustment by income rendered this effect statistically significant (Prus 2011).

Burden of care and household tasks should be a key issue, as most other inequalities in participation in society are justified by the gender ideology that attaches to women the primary responsibility for these tasks. Surprisingly, few studies found this group of factors as relevant mediators of gender inequalities in health. One reason for that might be the ubiquity of gender roles, so that some of the differential exposures are almost exclusive of either gender (for instance, very few men are homemakers, and the few women with no participation in domestic tasks do so because of poor health). Indirect evidences of their importance include the findings that large family size is detrimental to women's health but not men's (Artazcoz et al. 2001), that being married is more beneficial to men's health than to women's (Staehelin et al. 2012), and that couple inequality in share of domestic tasks is associated with psychological distress in both men and women (Grote et al. 2004, Harryson et al. 2012).

The contribution to migration-related inequalities

As a consequence of the relative novelty of research on health inequalities affecting migrants, the analysis of the intermediary factors behind these inequalities has been limited to a few studies in a small group of countries including Belgium, the Netherlands, Norway and Sweden. Most of these studies have shown that belonging to a less privileged SEP and living with poorer socio-

economic conditions (including employment status, material factors and social support) account partly or totally for the poorer health outcomes of immigrants from low-income countries compared to natives; however, none of these studies has attempted to disentangle the relative importance of each factor (Claussen et al. 2009, Hjern et al. 2004, Levecque et al. 2007, Lindström et al. 2001, Lorant et al. 2008, Nielsen and Krasnik 2010, Reijneveld 1998, Tinghög et al. 2007). It is interesting to note here that indicators of SEP, such as education, occupation and income level, have generally been treated as intermediary factors between the migrant status or country of birth and health outcomes (Claussen et al. 2009, Hjern et al. 2004, Levecque et al. 2007, Lorant et al. 2008, Reijneveld 1998, Tinghög et al. 2007).

Immigration within or between rich countries has been much less object of studies, and even less as for what regards inequality mediators. In three Swedish studies, adjustments by education, employment, social support and financial difficulties partially reduced the excess of poor health of immigrants from Western countries (Lindström et al. 2001), Southern Europe (Iglesias et al. 2003) and Finland (Iglesias et al. 2003, Westman et al. 2008). In an Australian study, the higher severity of low back pain of older Italians was explained by education and occupational history (Stanaway et al. 2011). We are not aware of studies on the contribution of intermediary factors to health inequalities between native populations and internal immigrants.

Social inequalities in health in Catalonia and Spain

Spain belongs to the most privileged areas of the world in terms of wealth, welfare and physical health, with an estimated life expectancy of 84.8 years for women and 78.9 for men in 2010 (Instituto Nacional de Estadística 2012). Catalonia is the fourth richest Spanish region according to income per capita statistics (Instituto Nacional de Estadística 2012). In this context, the persistence of large inequalities in health opportunities and outcomes between social groups should constitute an important challenge for society as a whole.

Evidence on social inequalities in health has existed in the last twenty years in Catalonia (Borrell and Arias 1995, Borrell and Benach 2003, Borrell et al. 2006) and in Spain (Navarro and Benach 1996, Regidor et al. 1996). Previous reports have described health inequalities by both social class and gender, with women in disadvantaged classes presenting the worst indicators of morbidity and SRH (Borrell et al. 2006, Rodríguez-Sanz et al. 2005). Socioeconomic inequalities in mortality in Spain have been shown to be relatively small compared to the rest of Europe (Mackenbach et al. 2008); conversely, social class inequalities in SRH (Espelt et al. 2008) as well as gender inequalities in SRH (Bambra et al. 2009) and in depression (Vandavelde et al. 2010) are among the largest. Geographic inequalities have also been extensively described (Benach and Yasui 1999, Benach et al. 2004, Borrell et al. 2010), and more recently ethnic inequalities have also started to be analysed (La Parra 2009). At the time of conceiving this dissertation, the need was perceived to move from the stage of

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description and exposure (which unfortunately are still necessary) to uncover the causes and mechanisms of these inequalities, and to disseminate, create links and promote a policy response and intersectoral action. The publication of the work of the WHO global commission (CSDH 2008) and of the Spanish Health Ministry commission (Comision para reducir las desigualdades sociales en salud en España 2012), among other recent reports, has brought about some first steps in this direction.

Catalonia and Spain have experienced in the past decade a rapid increase, unique in Europe, in foreign immigration from all over the world, especially Latin America, which brought foreign-born population in municipal continuous registers from 4% in the year 2000 to 14,8% in 2007 in Catalonia (Idescat 2008). As mentioned, this phenomenon has generated in recent years a strong increase of studies on the health of this population (Aerny Perreten et al. 2010, Carrasco-Garrido et al. 2007, Hernández-Quevedo and Jiménez-Rubio 2009, Oliva and Pérez 2009). At the time of setting up the dissertation (2007-2008), quality data on the health of this sector of the population had just started to be available, and had seldom been approached from a perspective that also integrated both gender and social class. Possibly the first experience in this regard has been the report *La salut de la població immigrant de Barcelona* (The health of the immigrant population in Barcelona), in which we systematically analyzed health indicators at the intersection of birthplace, social class and gender (Puigpinós 2008).

However, immigration has a large history in Catalonia, with the arrival of several distinct waves from other Spanish regions in the

past 50 years, especially in the 60s and 70s, when the rapidly expanding industrialization in the regions of Catalonia, the Basque Country and Madrid required workers, and the areas of the south and west of Spain were hit by unemployment and poverty (Silvestre Rodríguez 2002). Actually, in a paper on immigration in 2000 it was felt necessary to remind that although the expression ‘immigrants’ was exclusively attributed to these internal immigrants, the reality of immigration from other countries “could not be obviated” (Solé 2000); nowadays the reverse is true, and in the public discourse ‘immigrants’ stands for foreign immigrants. Nowadays in Catalonia, in the age cohorts between 55 and 74 years people born in other Spanish regions are more than native Catalans (Idescat 2008). This heterogeneity has been largely omitted in public health studies. Recently, the first study to our knowledge was published which investigated health inequalities by place of origin including in a separate group people born outside Catalonia but within Spain (Borrell et al. 2008).

In the 1960s, the arrival in Catalonia of people mostly from Andalusia, Extremadura and Galicia was explosive from the demographic point of view and concurred with major problems of land speculation, housing, job discrimination and reduced socio-cultural integration (Solé 2000). It is important to remark that the health effects of this migration process and the living and working conditions associated with it have hardly been tested.

An analysis in the early years of the twenty-first century, decades after the settlement of these populations, allows studying with sufficient historical perspective the possible health effects of

situations of social inequality and discrimination caused by these movements. The methodological opportunity to avoid the "healthy immigrant effect" can offer valuable results for public health policy planning for more recent immigration phenomena. The two migration processes share the mechanism of 'reserve army' - on arrival, immigrants are inserted into the lower strata of the occupational structure shunned by local workers - and problems of socio-economic integration, although in the case of foreign immigrants, legal (restrictions of the Foreigners Act), cultural and even racial discrimination barriers can add (Solé 2000).

Justification

This thesis aims to advance knowledge of the causes that contribute to the continuous generation of social inequalities in health, from an integrated perspective of several key axes or dimensions of social inequality, such as gender, social class and migration related with geographical differences in wealth. Most of the observed differences in health according to these axes meet the definition of health inequalities: "differences in health between populations that are unnecessary, avoidable and unjust" (Whitehead 1992), since, as we'll argue, they are the result of power inequalities that are reproduced in an unequal distribution of factors that influence health.

The emerging issue of the health of foreign immigrants in Spain has only been partially addressed within a health equity framework; research on the health of Spanish people migrated decades ago to Catalonia has been a yet missed opportunity; and there is a general

lack of theorisation on what types of migration can be relevant for a health inequalities analysis.

Moreover, studies that have simply described the health inequalities in the intersections of three axes of inequality are limited, and even more with migration. The lack of an analytical approach to address all these important areas at a time, the complexity of integrating them and the lack of adequate information could be mentioned as potential explanations. In the introduction, we pointed to some theories and methods that can be useful in this respect and we'll try to contribute with some new ones in this dissertation.

Consistent with the definition of public health as "the science and art of preventing disease, prolonging life and improving health through the organized efforts of society" (Winslow 1920), and in a moment where there is an increase of initiatives aimed at promoting intersectoral action and assess the health and equity impact of policies from outside the health sector (WHO 2012a, 2012b), we'll try to contribute to the knowledge of the impact on inequalities of intermediary factors and health problems that can be modified and/or addressed with actions from all levels and sectors of governments and society.

Many epidemiological studies in several countries have studied the contribution that different mediating factors make to explain the health gradient, especially in the case of inequality according to social class or socioeconomic position. However, even in this specific field, there is a scarcity of studies in Southern Europe (Borrell et al. 2004, Borrell et al. 2008). There is evidence that the

factors that generate and reproduce social inequalities in health may differ depending on the geographical, social and political context (Kunst et al. 1998). Spain has been characterised, together with Portugal and Greece, as a late democracy with an underdeveloped welfare state, with potential consequences on the nature and extent of social inequalities in health (Borrell et al. 2009).

For what regards gender inequality, as far as we know, no studies of their intermediates factors have been conducted in Europe; studies elsewhere have been limited, heterogeneous in determinants and their measures, and the contribution of single factors has not been specified. The latter also holds for studies that analysed the contribution of socio-economic factors to poorer health outcomes of immigrants in Europe.

Finally, there have been no studies of the intermediate factors of inequality in an integrated framework of two or more social dimensions of inequality, consistently with the general neglect of intersectional analysis in health equity research that we have described. Moreover, previous studies have generally been based on health surveys with a limited number of questions about social and economic determinants: an analysis of a survey with comprehensive information on economic conditions, housing, paid work and housework, among others, such as the Survey of Living Conditions and Habits of the Population of the Statistical Institute of Catalonia, can increase the capacity to get at key determinants.

Another issue of interest is that inequalities in general self-rated health reflect inequalities in various health dimensions and problems. Knowing their relative importance can be useful from the

perspective of equity in health systems, to promote a prioritization of preventive and therapeutic efforts in those disorders with more "weight" on health inequalities, as a tool to alleviate inequalities from the health system. Studies at this regard are very limited. Besides, claims to the validity of self-rated health for estimating inequalities across social groups can be found, and despite during the last years the issue has been largely addressed for what regards socio-economic position, there is still room for more robust evidence for what regards gender and migrant status. In this dissertation, I will try to address this issue for gender. The population survey data that I'll use will not allow to rule out that differences in the interpretation of the question and response categories might explain part of the differences in SRH between natives and foreign immigrants, especially those with different mother tongues. However, the analysis of inequalities between native Catalans and immigrants from the rest of Spain should be free of this kind of bias.

OBJECTIVES AND HYPOTHESES

General objectives

The general objectives of this dissertation are:

- To describe social inequalities in self-rated health in the adult population of Catalonia in an integrated framework of gender, social class and migration.
- To identify the main intermediary factors and health problems that contribute to the unequal distribution of self-rated health according to these dimensions.

Specific objectives and substudies

These objectives were developed in three articles which are presented below with their specific objectives:

Article 1. Migration-related health inequalities: Showing the complex interactions between gender, social class and place of origin

- To review theories and findings regarding migrants' health and propose a classification of migration types from the health equity perspective.
- To analyse social inequalities in self-rated health in Catalonia exploring the intersections of migration type with gender and social class.

- To explore the contribution of socio-economic assets and privileges to the relationship between migration type and health in Catalonia.

Article 2. Material determinants of inequalities in self-rated health in the intersections of gender and social class

- To analyse the contribution of different intermediary factors to health inequalities by gender and social class, and in their respective intersections.

Article 3. Perception of illness? How chronic conditions explain gender inequalities in self-rated health.

- To assess whether, in Spain, poorer general health outcomes in women compared with men are attributable to a higher prevalence of chronic conditions.
- To identify the type of conditions that contribute most to these inequalities.
- To analyse whether this pattern is modified by age, social class and country of origin.

Hypotheses

In relationship to these objectives, the hypotheses of this dissertation were the following:

- Women will have less socioeconomic resources compared to men, and so will disadvantaged social classes compared to more privileged ones, and immigrants from less developed regions and

countries compared to native Catalans. These inequalities will be reflected in inequalities in self-rated health.

- Social class inequalities in self-rated health will be persistent throughout the two sexes and all migrant groups. Gender inequalities in self-rated health (with women disadvantaged compared to men) will also be persistent but might be even greater in disadvantaged migrant groups and social classes.
- Immigrants from privileged regions and countries will be more likely to be in privileged social classes; within the same social class, they will not be different from the native Catalan population in terms of socioeconomic characteristics and health outcomes.
- Immigrants from poor regions or countries, and especially those placed in disadvantaged social classes, accumulate over time a disadvantage in terms of health, which becomes visible some years after migration, as migration selection masks it at first.
- The economic and material conditions will show up as major mediators of health inequalities by social class, by immigrant status and, to a lesser extent, by gender. The burden of domestic work can play an important role in gender and in class inequalities among women. The availability of variables will affect the results.
- The worse self-rated health of women compared to men is due to a true inequality in the prevalence of some physical and mental disorders, mostly non-fatal and relatively neglected by health services.

ARTICLE 1. MIGRATION-RELATED HEALTH INEQUALITIES: SHOWING THE COMPLEX INTERACTIONS BETWEEN GENDER, SOCIAL CLASS AND PLACE OF ORIGIN

Davide Malmusi, Carme Borrell, Joan Benach (2010). [Migration-related health inequalities: Showing the complex interactions between gender, social class and place of origin](#). *Social Science and Medicine*. 71(9): 1610-9.

ARTICLE 2. MATERIAL DETERMINANTS OF INEQUALITIES IN SELF-RATED HEALTH IN THE INTERSECTIONS OF GENDER AND SOCIAL CLASS

Davide Malmusi, Joan Benach, Alejandra Vives, Carme Borrell (2012). Material determinants of inequalities in self-rated health in the intersections of gender and social class. *Submitted and under evaluation.*

ABSTRACT

Objectives: To explore the contribution of different material factors to inequalities in general self-rated health (SRH) by gender and social class, in their respective intersections.

Methods: Cross-sectional study of residents in Catalonia aged 25 to 64, using data from the 2006 population living conditions survey (n=5,817). Three social classes (non-manual, skilled manual and unskilled manual) were compared among men and women, while men and women were compared among each of the three social classes. The contribution of variables assessing the material and economic situation, employment conditions, household chores and residential environment was estimated as the reduction in the fair/poor SRH rate ratio after their inclusion in Poisson regression models.

Results: Inequalities in SRH were observed for both gender and social class. Associations were reduced by 62-100% adjusting by all variables. Individual income made the greatest contribution to gender inequalities, especially among manual classes, and household material assets and financial difficulties to social class inequalities.

Conclusions: Material and economic resources contribute largely to both social class and gender inequalities in health. Intersectional analysis helps to understand specific pathways to inequalities in health.

KEYWORDS

Health inequalities, material factors, self-rated health, social class, gender, intersectionality.

MAIN TEXT

Introduction

There is a growing recognition of the existence of large, avoidable and unacceptable social inequalities in health between population groups, and of the need to understand and tackle their causes and mechanisms (CSDH 2008). In the pathway between an individual's position in the social structure according to mechanisms such as social class, gender or ethnicity, and health, there lie factors that influence health outcomes and are unequally distributed, referred to as "intermediary determinants" in the framework of the WHO Commission on Social Determinants of Health (CSDH 2008).

A large body of scientific literature has focused on the study of intermediary determinants of health inequalities by socio-economic position or social class. Previous authors have identified three main groups of intermediary factors: material, psychosocial and behavioural factors, with their own inner causal hierarchy, as material factors may act as a source of psychosocial stress and psychosocial stress may influence health-related behaviours (Solar and Irwin 2010; van Oort et al. 2005). The contribution attached to psychosocial factors varies largely depending on the study and measure used (Gilmore et al. 2002; Dahl 2010). Health-related

behaviours can be quite important in explaining inequalities in mortality (Stringhini et al. 2011), but make a smaller contribution to inequalities in self-rated health (SRH) (Laaksonen et al. 2005; Daoud et al. 2009). Moreover, as these factors are also in part mediators of the impact of material factors on health, their independent contribution is limited (Schrijvers 1999; van Oort et al. 2005; Laaksonen et al. 2005).

On the other hand, material factors or resources, in a broad sense, have been regarded as a major contributing factor to socioeconomic inequalities in health. Namely, factors such as material standards of living, financial difficulties or insecurity, or economic resources have been shown to largely explain inequalities in health status (Borrell et al. 2004; Daoud et al. 2009; Aldabe et al. 2010) and mortality (Schrijvers et al. 1999; van Oort et al. 2005). Other important material factors include employment conditions, such as access to labour market and unemployment (Schrijvers et al. 1999; Popham and Bambra 2010); working conditions, both physical and organisational (Lundberg 1991; Schrijvers et al. 1998; Borrell et al. 2004; Kaikkonen et al. 2009); and, to a lesser extent, physical and social neighbourhood characteristics (Daoud et al. 2009) as well as early-life socio-economic exposures (Lundberg 1991).

Fewer studies have applied this kind of analysis to the study of gender inequalities in health. While men's shorter life expectancy can be attributed to both biological differences in disease susceptibility and gendered patterns of health-related behaviours and risk-taking (Bird 1999), we focus here on women's poorer

indicators of health status and morbidity which have been interpreted as unfair and avoidable inequalities resulting mainly from patriarchy, the systematic domination of women by men (Doyal 1995). A group of studies in North America coincided in partially or totally explaining women's poorer health indicators with inequalities in resources and social roles (Verbrugge 1989; Ross 1994; Cherepanov et al. 2010). In an Indian study, the lack of material assets and of economic independence totally explained women's poorer SRH (Roy et al. 2008). To our knowledge, no such studies have been conducted in Europe, besides a recent pooled multicountry analysis of the World Health Survey with relatively few explanatory variables (Hosseinpoor et al. 2012).

The conceptual framework of the Commission on the Social Determinants of Health of the WHO points out to the existence of health inequalities according to different spheres that shape the individual position in society, such as social class, gender and ethnicity, among other (Solar and Irwin 2010). The intersectional analysis of these key intertwined mechanisms of power relations in society has emerged as a priority for future health equity research (Kelly et al. 2010; Ostlin et al. 2011), but there are limited empirical examples of such studies up to date (Almeida-Filho et al. 2004; Malmusi et al. 2010; Veenstra 2011). Similarly, we are not aware of studies assessing the contribution of intermediary determinants to health inequalities across several social dimensions simultaneously, besides those studies on social class inequality that stratify their analyses by sex and identify differences in the contribution of different factors (Schrijvers et al. 1998; Borrell et al. 2004;

Laaksonen et al. 2005; Kaikkonen et al. 2009; Aldabe et al. 2010). Given this framework, the objective of this study is to explore the contribution of different material factors as intermediary determinants of inequalities in self-rated health by gender and by social class, in their respective intersections.

Methods

Study population, sample and data collection

The study population was the 2006 non-institutionalised population of Catalonia, Spain (around 7,000,000 inhabitants). Data from a cross-sectional survey were used: the “Enquesta de Condicions de Vida i Hàbits de la Població” (Population Living Conditions and Habits Survey) 2006. The sample was stratified by territory, age and sex; in each stratum individuals were selected randomly from the population census (with non-responders replaced by subjects of the same territory, age and sex); and information was collected during face-to-face interviews at home: a total of 10,397 were completed.

For this study, the sample was restricted to subjects aged 25 to 64 (n=7,179) in order to include population in working age and that has largely completed its studies and achieved its own occupational social class. We excluded subjects declaring inability to work (n=283), a health issue as the reason for leaving the last job (n=113) or a dependency (difficulty to move within the house, get dressed, wash themselves or eat on their own; n=81) to prevent reverse causality to SRH for employment status and household chores

variables. Foreign-born subjects (n=871), that had showed a 'healthy immigrant effect' in a previous analysis of this survey (Malmusi et al. 2010) that could distort the estimation of associations between material conditions and health, were also excluded from the analyses, as well as subjects without coded social class (n=14), resulting in a total sample of 5,817 subjects.

Indicators and variables

The dependent variable was SRH, measured with a single question: "Would you say your overall health is..." with a 5-point Likert-type answer scale, ranging from 'very good' to 'very poor'. Answers were dichotomized into fair/poor (fair, poor or very poor) and good health (good or very good).

As for independent variables, gender was approached through the sex of the respondent (male or female). Social class was based on the current or last occupation of the subject, or for never employed subjects, the occupation of the partner or household reference person. The Spanish adaptation of the British Registrar General classification was used (Domingo et al. 2000). Following findings of previous analysis of the survey (Malmusi et al. 2010), three occupational social class groups were created: Class I, II (professionals, managers, directors) and III-non-manual (administrative workers, clerks, safety and security workers) were merged in "non-manual"; III-manual (self-employed and supervisors in manual occupations) and IV (skilled manual occupations) in "skilled manual", and V (unskilled manual occupations) left separate as "unskilled manual".

As for the intermediary determinants, we identified those variables that best described the categories of material factors detailed by the Spanish Commission to Reduce Social Inequalities in Health in its adaption and expansion of the CSDH conceptual framework (Comision para reducir las desigualdades sociales en salud en España 2012):

- Employment conditions: a variable was created combining employment status (with the following categories: employed; unemployed but seeking job; dedicated to housework; student; early retired) and type of contract (with those employed additionally divided in: employer or self-employed; wage worker with permanent; temporary; or no contract), considering that absence of employment and quality of employment standards for those engaged in a paid job are part of a continuum (Benach et al. 2010).
- Individual income: monthly individual income reported by the respondent. Income is commonly used as a marker of socio-economic position but can also be considered an intermediary factor between education and/or occupation and health.
- Household economic and material resources:
 - o Household financial difficulties. An index was created by adding up four items: difficulty in making it through the month, savings capacity, economic difficulties during the last 5 years, and need to reduce spending during the last 5 years (Cronbach's alpha 0.74; factor analysis confirmed that all items loaded positively onto one factor).

- Household material assets. An index was created by adding up ten items: dishwasher, vacuum cleaner, dryer, personal computer, internet connection, DVD player, video camera, stereo, holidays during last year (away from home for at least four consecutive days), and monthly spending for leisure over 50 euros (Cronbach's alpha 0.76; factor analysis confirmed that all items loaded positively onto one factor).
- Residential environment: measured as a global assessment by respondents, on a scale 0-10, of:
 - Neighbourhood quality of life, and
 - Perception of safety problems in the neighbourhood.
- Household tasks: average daily hours dedicated to household tasks, calculated based on information on a regular weekday and weekend.

Analytical strategy

All analyses were carried out using the Stata 10 statistical software package and included weights derived from the complex sample design. First, we described demographic characteristics and the distribution of fair/poor SRH and intermediary determinants across the six groups derived from combining gender and social class. Second, the association between SRH and each determinant was estimated within each of the six groups, as age-adjusted prevalence ratios (PRs) by means of robust Poisson regressions (Barros et al. 2003).

Then, age-adjusted PRs of fair/poor SRH by gender and social class were calculated. For gender inequalities, men and women were compared in the whole sample and within the three social class groups. Social class inequalities were analysed in men and women separately, comparing skilled manual to non-manual, unskilled manual to non-manual and unskilled manual to skilled manual. When significant inequalities were detected ($p < 0.05$), the potential mediators were added separately to the model, and their individual contribution was estimated as the percent reduction in the social dimension (e.g. gender) regression coefficient after their inclusion, using the formula $100 * (PR_{model 1} - PR_{model 2}) / (PR_{model 1} - 1)$, where model 1 is adjusted by age, and model 2 is adjusted by age and the variable(s) of interest. Variables that reduced the association by 5% or more were included simultaneously in a final model.

Secondly, this analysis was repeated but mediators were entered in the model one next to the other, following a sort of causal sequence: employment conditions first, then individual income, economic conditions, neighbourhood quality and burden of housework.

Results

Table 1 shows the distribution of the study variables in each of the groups derived from combining gender and social class. There were more women than men in non-manual and unskilled manual classes, while there were more men among the skilled manual. Non-manual women were the younger group (mean age 40.3) and

unskilled manual women the older (46.9). As expected, women and manual social classes had worse SRH than men and non-manual social classes respectively.

A large proportion of women (up to 34.7% among the skilled manual) were dedicated to housework, and employed women were more likely than men to have temporary or no contract, while more men were self-employed; among both sexes, people in manual classes were more likely to be unemployed or with a temporary or no contract. 19% of women versus 1% of men declared no individual income. People of manual social classes (and especially the unskilled) compared to non-manual and women compared to men were far more likely to have a low individual income (even within employed subjects, data not shown). Financial difficulties and material assets showed a large gradient by social class and, coherently with being household measures, small (albeit present) gender inequalities. Manual classes tended to rate quality of life in the neighbourhood worse and to report more safety problems; more women than men reported safety problems in the neighbourhood. Huge gender inequalities existed in the burden of household tasks, with 56.5% of unskilled manual women dedicating more than 3 hours a day, compared to 29.3% of non-manual women and around 5% of men in all social classes.

The association of intermediary variables with SRH in each of the six subgroups can be found in Table 2. Unemployment was significantly associated to worse SRH among men, whereas other associations for employment conditions did not reach significance within subgroups. Individual income, financial difficulties, material

assets and neighbourhood quality of life were quite consistently associated with health in all subgroups. Rating safety problems 10 out of 10 was significantly associated with poor SRH, mostly among women and non-manual groups. Men who didn't participate at all in household tasks and women dedicating more than 3 hours a day had a generally increased risk of fair/poor health.

Table 3 shows PRs of fair/poor SRH for gender within subgroups of social class, and vice versa, and the estimated percent contribution of each intermediary determinant to inequalities in SRH. Gender inequalities in SRH were present across all social classes (overall PR women vs men =1.38, 95% CI: 1.21-1.56). Adjusting by individual income eliminated differences in the overall sample and among manual groups while they persisted, though not significant, among non-manuals (PR from 1.35 to 1.16). Employment conditions also brought about a relevant reduction in the overall sample (33%) and among the skilled manual (24%). Household financial and material situation reduced the association around 20% among all subgroups but the unskilled manual (1%). When adjusting for household tasks, the PR increased among the skilled manual and decreased in the rest of subgroups. Adjustment by neighbourhood safety problems reduced 18% the association among the non-manual.

Inequalities in SRH between skilled and unskilled manual were absent among men (PR 1.02, 95%CI 0.70-1.48) and near to significance among women (PR 1.21, 95%CI 0.99-1.47). Inequalities in SRH between non-manual and manual groups were significant in both sexes. Household economic situation variables

reduced the associations to about a half, except among men where the PR of unskilled manual was reduced by four fifths and rendered not significant (PR 1.16, 95%CI 0.74-1.80). Individual income reduced the association between 27% and 39%. Neighbourhood quality also made minor contributions among men (23% for the unskilled manual).

Figure 1 summarises data showing the effect of sequentially adding groups of mediators to models of inequality in SRH. With the exception of non-manual, where almost all variables brought about a progressive reduction, the pattern by gender showed a small reduction by adding employment, a complete one with income, and a new onset of association (not significant) when adding the rest of variables. Regarding social class comparisons, reductions are evident in all subgroups with adjustments by individual income and economic conditions.

Discussion

To our knowledge, this is the first study that explores the contribution of intermediary factors to inequalities in self-rated health by gender and social class in their respective intersections. Our main finding is that material resources and exposures make major contributions to both of these health inequalities with relevant differences in the importance of concrete factors to each of them and across different subgroups.

Individual income made an especially striking contribution to SRH inequalities by gender, and contributed also to inequalities by social class, alongside with material standards of living and

financial difficulties, which reinforced the finding of some previous studies (Daoud et al. 2009; Aldabe et al. 2010). This was the first study in Europe on intermediary determinants of gender inequalities besides a pooled analysis where individual income was not measured and employment status was the single most powerful explanatory factor with a contribution of 20% (Hosseinpoor et al. 2012). Early North American studies had mainly focused on social roles as explanation of gender inequalities in health (Verbrugge 1989; Ross 1994), while in more recent studies household income largely explained gender inequalities in physical and mental health in the US (Cherepanov et al. 2010), and adjustment by income and income source halved the excess risk of poor health of US women compared to men, and rendered statistically significant the protective effect of female gender in Canada – a country with lower gender inequity in wages and resources than the US (Prus 2011). Compared to household income, individual income is not only indicating availability of economic resources, but also the personal history of access to the labour market and the degree of independence and existing bargaining power in the household. We already mentioned that in an Indian study, material assets and economic independence basically explained gender inequalities in SRH (Roy et al. 2008).

Another innovation of the present study, the analysis of intersections between gender and social class, allowed detecting peculiarities in the pathways of producing inequalities. For example, individual income could explain on its own gender inequalities in manual classes, among which a large proportion of

women were non-employed or receiving a very low income; among non-manual, a wider set of factors made contributions, but some degree of inequality persisted (although non-significant) after all adjustments, suggesting that even when some key barriers are overcome such as that of access to professional positions in the labour market, more subtle aspects of gender norms, discrimination, social power, “glass ceiling” and care responsibilities still may produce an unequal burden on women’s health. Actually, in Spain it has been reported that perceived sexism is higher among employed women and especially in managerial positions (Borrell et al. 2011).

As indirect evidence of this, gender inequalities in dedication to household tasks were larger in manual classes, but still huge among non-manual classes. Burden of housework and caring has been rarely investigated as a determinant of socioeconomic inequalities despite its salience to the health of women, especially in the working class women (Artazcoz et al. 2001). In the present study, however, only housework and not care tasks could be measured, and despite some likely reverse causality in their association with health status (with those not participating at all having worse health, and more men in this group), their contribution to health inequalities was not negligible in some subgroups. Other factors investigated in this study also played some role as a pathway to health inequality. Neighbourhood quality seemed to play a little, but probably not independent role in some subgroups; nevertheless, the relatively low discriminatory power of the measures used should be noted (respondent-rated neighbourhood quality of life was not very dissimilar between social classes). Employment status and

conditions seemed quite relevant for gender but not for social class inequalities. Future studies using longitudinal data could probably make more evident the contribution of conditions such as unemployment and precarious contract arrangements that are much more frequent among young adults and whose cross-sectional association with health can underestimate their real impact. It is important to bear in mind that lifelong employment conditions are themselves major determinants of income or household economic and material situation.

Psychosocial and behavioural factors were not collected in the survey; however, as they can be partly depending on the effect of material factors, their independent effects may be limited (Schrijvers 1999; van Oort et al. 2005; Laaksonen et al. 2005). One of the most important set of material determinants of health inequalities by social class according to previous investigations, that is working conditions, were also absent in this survey. On the other hand, material and economic situation was collected deeply, and showed a larger contribution to social class inequalities than that found in previous studies with health surveys in Catalonia (Borrell et al. 2004), and more in line with other European studies (Aldabe et al. 2010; van Oort et al. 2005). This makes a case to use social surveys as a very valuable source of information for studies of health inequalities (Lundberg 1991; Popham and Bambra 2010; Aldabe et al. 2010). Although in many of these surveys health information might be limited to the single question on SRH, as it was the case in the present study, this simple variable combines an evaluation of the individual of diseases, symptoms, functional

abilities and general well-being, and has demonstrated to be a good reflection, when not an underestimation, of health inequalities by socio-economic position (Delpierre et al. 2009) or gender (Malmusi et al. 2011).

The use of cross-sectional data is a bidirectional threat to the validity of estimations of the association between some material factors and health, and consequently to their contribution to health inequalities: for example, for income or employment conditions, the lack of information of lifetime exposures can lead to an underestimation of the association, whereas reverse causality can lead to an overestimation. To limit the latter as much as possible, several categories of subjects were excluded from analyses (those declaring inability to work, a health issue as the reason for leaving the last job or a dependency).

The calculation of the percent change in the strength of association between models with and without one or more intermediary variables was our method of choice for estimating the contribution of mediators, following the majority of the aforementioned literature (Verbrugge 1989; Schrijvers et al. 1998; Borrell et al. 2004; Laaksonen et al. 2005; van Oort et al. 2005; Kaikkonen et al. 2009; Daoud et al. 2009; Aldabe et al. 2010; Hosseinpoor et al. 2012). None of those studies, including the present one, have presented confidence intervals for these percentages, despite the existence of methods for calculating the standard error of the indirect effect, such as the Sobel's test (Baron and Kenny 1986) or bootstrapping methods (Miura et al. 2011) that are however of limited application with categorical variables and

non-linear models. Moreover, the very point estimates of the percentages of contribution have to be interpreted with caution for the cross-sectional measurement and high level of correlation between different factors. Therefore, we suggest that this technique is useful to approximate the relative importance of one factor over the other more than producing exact estimations of the ‘causal fraction’. Besides that, interpretation of comparisons involving the unskilled manual social class should take into account the limited number of subjects in this group, especially among men.

Assignment of social class to never employed subjects based on the occupation of the household reference person can be disputed: in any case, only 138 subjects (2.4%) had social class assigned in this way, mostly concentrated among ‘skilled manual’ women where they made up the 7.3%. On the other hand, one of this study’s strengths lies in including the whole population in active age and not only the working population as the majority of previous studies on social class inequalities (Lundberg 1991; Borrell et al. 2004; Laaksonen et al. 2005; Kaikkonen et al. 2009; Aldabe et al. 2010): this had been acknowledged as a challenge to the external validity of conclusions over the relevance of different intermediary factors. This study was carried out in Catalonia, a region in the northeast of Spain: intermediary determinants of inequalities may differ in different countries and societies (Kunst et al. 1998), and therefore these results should be replicated at different points in time (for example, with changing economic contexts such as the current crisis affecting Southern Europe) and in countries with different welfare state regimes.

In conclusion, the present study is a first attempt to expand the study of intermediary determinants to more than one dimension of health inequalities at a time, considering gender, social class and their intersections. With slightly different pathways, individual and household material resources and exposures made major contributions to the observed health inequalities, providing support for the WHO Commission on Social Determinants of Health claim to tackle “the inequitable distribution of power, money and resources”, and address “inequities – as those between men and women – in the way society is organized” (CSDH 2008) as some of the key factors to reduce social inequalities in health.

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CONFLICTS OF INTEREST

None declared.

Table 1. Description of the study variables in subgroups of gender and social class.

Gender		Men			Women		
		<i>Non-manual</i>	<i>Skilled manual</i>	<i>Unskilled manual</i>	<i>Non-manual</i>	<i>Skilled manual</i>	<i>Unskilled manual</i>
<i>Social class</i>							
<i>N (weighted)</i>		1281	1515	156	1386	1179	299
Mean age		42.1	43.1	42.1	40.3	43.8	46.9
Fair/poor self-rated health %		10.0	18.6	18.2	12.7	25.6	34.2
Employment conditions							
Self-employed or employer %		23.7	23.1	10.4	13.7	12.8	4.3
Employed, permanent contract		59.8	54.8	64.2	57.5	32.6	37.3
Employed, temporary contract		6.2	9.1	14.3	10.4	8.6	14.2
Employed, no contract		0.0	0.1	1.0	0.4	1.1	11.2
Unemployed		3.8	5.2	7.0	3.9	7.1	6.2
Housework		0.1	0.0	0.0	12.6	34.7	23.3
Retired		5.6	7.2	2.9	1.1	2.4	3.5
Student		0.9	0.5	0.3	0.4	0.7	0.0
Individual monthly income							
None %		0.9	1.2	1.0	11.8	27.6	20.2
450€ or less		2.7	3.3	7.8	6.9	18.2	36.8
451-900€		6.1	13.0	25.4	14.6	24.7	26.4
901-1500€		34.4	52.2	48.3	36.0	15.3	8.4
>1500€		44.2	16.5	11.4	20.7	1.7	0.3
Not declared		11.6	13.8	6.2	10.0	12.5	7.9

Household economic resources							
Financial difficulties	mean no. (0-4)	1.1	1.7	2.1	1.3	1.8	2.4
	% >2	15.9	30.1	46.6	20.2	33.8	51.4
Material assets	mean no. (0-10)	7.6	6.1	5.2	7.4	5.7	4.9
	% <5	7.6	25.9	36.7	7.8	31.8	46.3
Neighbourhood quality							
Quality of life	mean rating (0-10)	7.0	6.8	6.7	7.0	6.9	6.7
	% <6	13.5	21.6	23.5	15.4	21.0	21.8
Safety problems	mean rating (0-10)	4.5	4.6	5.0	4.7	5.0	5.3
0-5	%	64.1	61.7	59.0	59.5	54.8	52.0
6-9		32.0	30.3	30.4	32.6	35.8	36.1
10		3.9	8.1	10.6	8.0	9.4	11.8
Household tasks							
None	%	9.8	14.8	10.3	1.7	0.9	0.1
Up to 3 hrs/day		82.3	78.2	84.3	66.1	45.4	38.7
More than 3		4.7	4.4	5.2	29.3	50.5	56.5
Not declared		3.2	2.6	0.3	2.9	3.2	4.6

Population aged 25 to 64 residing in Catalonia. Source: Enquesta de Condicions de Vida i Hàbits de la Població, 2006.

Table 2. Age-adjusted prevalence ratios of fair/poor with self-rated health according to intermediary determinants in subgroups of gender and social class.

Gender <i>Social class</i>	Men			Women		
	<i>Non-manual</i>	<i>Skilled manual</i>	<i>Unskilled manual</i>	<i>Non-manual</i>	<i>Skilled manual</i>	<i>Unskilled manual</i>
Employment conditions						
Self-employed or employer	1.43	0.84	n/a	1.07	0.97	n/a
Employed, permanent contract (ref)	1	1	1	1	1	1
Employed, temporary contract	0.59	1.49	0.46	0.86	0.86	1.07
Employed, no contract	n/a	n/a	n/a	n/a	0.98	0.70
Unemployed	2.53*	1.31	2.47*	1.53	1.11	1.13
Housework	n/a	n/a	n/a	1.29	1.04	1.34
Retired	1.29	0.96	n/a	1.18	0.73	1.20
Student	n/a	n/a	n/a	n/a	n/a	n/a
Individual monthly income						
None	3.24*	0.65	n/a	1.04	1.62*	4.24*
450€ or less	2.72**	2.01**	2.72*	1.27	1.51	4.03*
451-900€	0.67	1.97***	1.59	1.06	1.45	2.77
901-1500€ (ref)	1	1	1	1	1	1
>1500€	0.78	0.83	0.49	0.55*	0.89	n/a
Not declared	1.08	1.01	0.19	0.95	1.12	2.67

Household economic resources							
Financial difficulties	0-2 (ref)	1	1	1	1	1	1
	3-4	1.62*	1.60***	1.69	1.96***	1.69***	1.12
Material assets	5-10 (ref)	1	1	1	1	1	1
	0-4	1.70*	1.54**	1.36	1.63	1.40**	1.12
Neighbourhood quality							
Quality of life	6-10 (ref)	1	1	1	1	1	1
	0-5	1.52	1.61***	1.69	1.63**	1.56***	1.45*
Safety problems	0-5 (ref)	1	1	1	1	1	1
	6-9	0.67	1.07	0.87	1.28	1.25	1.22
	10	1.89*	1.46*	1.64	2.55***	1.33	1.63
Household tasks							
None		1.63*	1.58**	0.60	1.79	0.31	n/a
Up to 3 hrs/day	(ref)	1	1	1	1	1	1
More than 3		1.40	0.64	n/a	1.49*	1.09	1.34
Not declared		0.09*	1.06	n/a	0.35	0.92	1.10

Population aged 25 to 64 residing in Catalonia. Source: Enquesta de Condicions de Vida i Hàbits de la Població, 2006.

Prevalence ratios derived from robust Poisson regression models adjusted by age. (ref) = Reference category. * p<0.05, ** p<0.01,

***p<0.001. n/a (not applicable) indicates that less than 10 subjects belonged to the selected category in that subgroup: PR was omitted for statistical instability.

Table 3. Contribution of intermediary factors to inequalities in self-rated health by gender and social class, in different subgroups.

Subgroup	GENDER								SOCIAL CLASS							
	overall		NM		SkM		UnskM		men				Women			
	women vs men		women vs men		women vs men		women vs men		SkM vs NM		UnskM vs NM		SkM vs NM		UnskM vs NM	
Comparison	PR SRH	change (%)	PR SRH	change (%)	PR SRH	change (%)	PR SRH	change (%)	PR SRH	change (%)	PR SRH	change (%)	PR SRH	change (%)	PR SRH	change (%)
Baseline (adjusted by age only)	1.38***		1.35*		1.34***		1.59*		1.77***		1.80**		1.73***		2.13***	
1. Employment conditions ¹	1.25**	33%	1.33*	6%	1.26*	24%	1.56*	4%	1.72***	6%	1.84**	-4%	1.68***	7%	2.24***	-10%
2. Individual income ¹	1.00	100%	1.16	55%	0.96	111%	1.00	99%	1.57***	27%	1.49*	39%	1.47***	36%	1.73***	35%
Financial difficulties ²	1.33***	14%	1.30*	16%	1.31**	8%	1.56*	4%	1.57***	26%	1.39	51%	1.54***	27%	1.67***	41%
Material assets ²	1.31***	18%	1.32*	10%	1.28**	18%	1.59*	-1%	1.43**	44%	1.34	58%	1.44**	40%	1.67**	41%
3. Household economic resources ³	1.29***	23%	1.28*	21%	1.27**	19%	1.58*	1%	1.35*	54%	1.16	80%	1.37**	49%	1.45*	60%
Neighbourhood quality of life ⁴	1.38***	0%	1.34*	5%	1.35***	-3%	1.61*	-4%	1.70***	9%	1.71*	12%	1.69***	5%	2.08***	5%
Neighbourhood safety problems ⁵	1.36***	5%	1.29*	18%	1.33***	3%	1.60*	-2%	1.73***	5%	1.68*	15%	1.71***	2%	2.09***	4%
4. Neighbourhood quality ³	1.36***	3%	1.28*	19%	1.34***	-1%	1.63*	-6%	1.67***	13%	1.61*	23%	1.69***	5%	2.08***	5%
5. Household tasks ¹	1.32***	16%	1.27*	23%	1.42***	-26%	1.40*	32%	1.73***	5%	1.78**	3%	1.66***	9%	1.99***	13%
All determinants ⁶	1.09	75%	1.13	62%	1.01	96%	0.94	110%	1.27*	65%	1.12	85%	1.27*	63%	1.33	71%

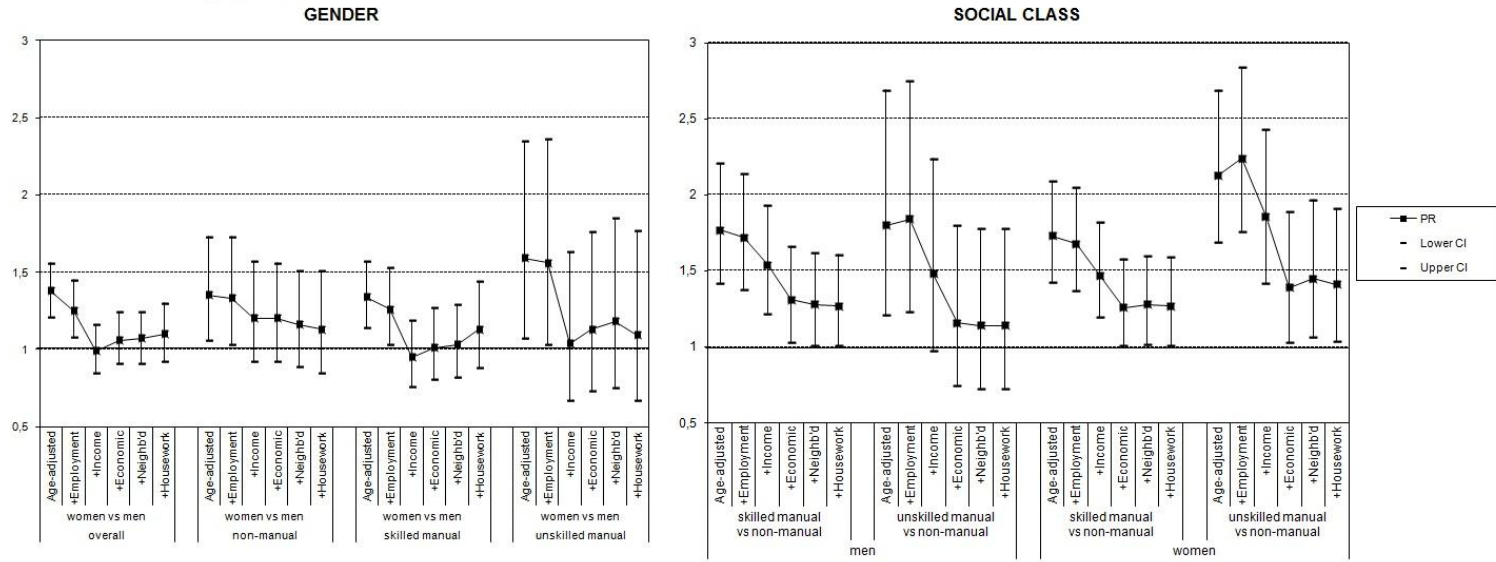
Population aged 25 to 64 residing in Catalonia. Source: Enquesta de Condicions de Vida i Hàbits de la Població, 2006.

NM: Non-manual. SkM: Skilled manual. UnskM: Unskilled manual.

PR SRH: Prevalence ratio of fair/poor self-rated health derived from robust Poisson regression models adjusted by age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Change (%): Percent reduction in the strength of association, compared to age-adjusted model only.

¹ Same categories as in Table 1 and 2. ² Linear index. ³ All variables of the group are included in the model. The model was not calculated when the single variables weren't reducing the association. ⁴ Rating quality of life: 0-5, 6-10. ⁵ Rating safety problems: 0-5, 6-9, 10. ⁶ All groups of variables that reduced the association on their own 5% or more.

Figure 1. Contribution of intermediary factors to inequalities in self-rated health by gender and social class, in different subgroups.



ARTICLE 3. PERCEPTION OR REAL ILLNESS? HOW CHRONIC CONDITIONS EXPLAIN GENDER INEQUALITIES IN SELF-RATED HEALTH.

Davide Malmusi, Lucía Artazcoz, Joan Benach, Carme Borrell (2011). [Perception or real illness? How chronic conditions contribute to gender inequalities in self-rated health.](#) *European Journal of Public Health*. Epub 2011 Dec 16, doi:10.1093/eurpub/ckr184

SUPPLEMENTARY ANALYSES

I present here some additional analyses related with the articles, that have been either submitted within a response to reviewers' comments, mentioned in the article as 'data not shown' or presented for their publication and finally discarded, but that can be of interest in the context of the dissertation.

Article 1

In Article 1 ("Migration-related health inequalities..."), a reviewer asked us about other possible health outcomes to be used. I therefore performed a sensitivity analysis of the comparisons by origin (stratified by sex) with several other indicators available in the Catalan Health Survey, which is shown below and was summarised in the paper as follows: "the foreign-poor performed better on an indicator of chronic limitation than on self-assessed health (except less recent men); while mental health measured with the GHQ-12 showed a similar or worse pattern." More specifically, in women, there were inequalities affecting the foreign-poor (both recent and less recent) in mental health (as with self-rated health) but not in chronic limitations. In men, a non-significant higher risk was found for the two groups in mental health, while the chronic limitations indicator replicated and strengthened the finding of better health for the more recent and worse health for the less recent immigrants.

Table 1. Odds Ratio of poor health outcomes according to migration type, stratified by sex. Population aged 25-64.

Sex and origin	Poor self-rated health	Poor mental health	Chronic limitation	EuroQol-5D, any problem	>3 chronic conditions
Women					
Natives	1	1	1	1	1
Spain-poor	2.06***	1.66***	1.31**	1.56***	1.35***
Foreign-poor, less recent	2.63***	2.01***	0.78	1.29	1.09
Foreign-poor, recent	1.86***	2.04***	1.16	1.58**	1.07
Men					
Natives	1	1	1	1	1
Spain-poor	1.72***	1.29	1.32*	1.44***	1.49***
Foreign-poor, less recent	1.38	1.14	1.69**	1.09	0.61*
Foreign-poor, recent	0.54*	1.27	0.45**	1.53**	0.75

Data of the 2006 Catalan Health Interview Survey (ESCA). * p<0.05 ** p<0.01 *** p<0.001

A reviewer also pointed out:

“The authors make claims that social class and gender are effect modifiers and mediators but no formal statistical tests toward this end were performed. The authors may want to conduct such statistical tests, and/or qualify their comments as such.”

I report my answer and additional analyses below:

“Social class is already used as a mediator in the statistical analysis of Table 3 / Figure 2, and considerably reduces odds ratios (from Model 1 to Model 2) for Spain-poor and Foreign-poor groups. As for effect modifying, performing a statistical test for interaction doesn’t go with the structure and rationale of the paper, which tries to assess interaction using stratification of the analysis, but still we make here an attempt.

Interaction between migration and gender seems evident with stratification: in Table 3, OR for Spain-rich, Spain-poor and Foreign-poor recent are larger among women. Performing a joint model for the two sexes, with the migration*sex interaction term, results are as follows.

Sex and origin	Age-adjusted OR	95% Confidence Interval	
Women	1,33	1,14	1,57
Spain-rich	0,89	0,61	1,30
Spain-poor	1,42	1,15	1,76
Foreign-rich	0,90	0,38	2,10
Foreign-poor, less recent	1,34	0,89	2,02
Foreign-poor, recent	1,15	0,76	1,74
Spain-rich*women	1,46	0,90	2,35
Spain-poor*women	1,54	1,16	2,04
Foreign-rich*women	0,84	0,27	2,58
Foreign-poor, less recent*women	0,92	0,53	1,63
Foreign-poor, recent*women	1,43	0,83	2,45

Data from the 2006 Living Conditions Survey (ECVHP).

A multiplicative interaction effect appears in 3 out of 5 categories, although it reaches statistical significance for Spain-poor only, mainly because of sample size.

Interaction between migration and social class is more complex, and difficult to evaluate because of sample size, especially reduced for immigrants in non-manual social classes. The evidence can be extracted more qualitatively by observing health patterns in Figure 1 (increasing inequalities in manual classes for Spain-rich and foreign-poor women, and Spain-poor men).

So, acknowledging some data limitations, we moderate some statements, for instance [...]"

Article 2

The first approach to Article 2 (“Material determinants...”) was to address simultaneously the intermediary determinants of gender, social class and migration-related health inequalities, each in the subgroups created by the intersections of the other two. We applied restrictions to two groups per dimension (men and women, non-manual and manual, natives and immigrants from regions of Spain poorer than Catalonia), thus generating eight subgroups, and choosed the 40-64 age range in order to have a comparable age cohort of natives and internal immigrants, and to include population in working age. Those analyses were performed on 2,898 subjects aged 40 to 64, after having excluded of subjects (n= 61) born in the five regions (Madrid, Navarra, Basque Country, Cantabria and La Rioja) which at the time of massive internal migration had similar wealth as Catalonia (Herrero et al. 2005), and in Article 1 mirrored the native population in terms of living standards and health; ‘second

generation migrants', i.e., subjects born in Catalonia whose two parents were born in the rest of Spain (n=404); foreign-born subjects (n=327); subjects declaring inability to work (n=228) to prevent reverse causality; and subjects with un-coded social class (n=22) were also excluded from the analyses, resulting in a total sample of 2,898 subjects.

The complexity and at the same time disputable validity of the results – both internal for the sample size limitations affecting especially non-manual immigrants, and external for the restrictions of age and subgroup comparisons – made us finally opt, after a few journals' rejection (including one after peer-review) for a manuscript limited to gender and social class. We present here two tables of that previous version of the manuscript are presented here: Table 2 is the description of the distribution of age, health and intermediary determinants across the eight subgroups, and Table 3 presents the analysis of the contribution of intermediary determinants to each type of inequality in the subgroups created by the intersections of the other two. We omit the equivalent to Table 2 of Article 2, which was one where the association of each determinant with SRH was calculated within each of the eight subgroups.

Table 2. Description of the study variables in subgroups of gender, social class and migrant status.

Gender	Men				Women			
	<i>Non-manual</i>		<i>Manual</i>		<i>Non-manual</i>		<i>Manual</i>	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
<i>N (weighted)</i>	405	187	377	474	437	143	360	515
Mean age	50.2	51.6	51.5	53.7	49.7	50.0	52.1	53.2
Poor self-rated health %	14.3	10.3	23.5	31.8	17.4	27.7	34.4	46.9
Employment conditions								
Self-employed or employer %	28.3	26.5	34.2	18.3	15.3	21.7	15.5	6.9
Employed, permanent contract	57.8	59.1	46.1	51.0	52.7	41.1	23.9	23.2
Employed, temporary contract	2.2	0.6	3.9	6.5	4.9	8.0	5.7	5.7
Employed, no contract	0.0	0.0	0.0	0.0	0.3	0.7	3.2	4.4
Unemployed	2.1	2.9	3.7	7.0	3.6	2.9	4.0	5.6
Housework	0.0	0.5	0.0	0.3	20.8	22.6	42.3	48.1
Retired	9.6	10.4	12.1	16.9	2.4	3.0	5.5	6.3
Individual monthly income								
None %	0.0	2.8	0.4	0.7	20.2	18.4	29.0	36.5
450€ or less	1.9	0.4	6.3	5.8	5.8	7.2	27.0	24.1
451-900€	4.4	2.9	11.6	13.8	7.8	7.5	18.4	20.2
901-1500€	22.5	29.8	44.6	49.2	25.3	29.1	11.2	7.8
>1500€	57.8	49.0	17.2	17.0	29.0	24.4	1.4	0.4
Not declared	13.4	15.2	19.9	13.5	11.9	13.4	13.1	11.1

Household economic resources									
Financial	Index. mean (0-4)	1.0	1.0	1.5	1.8	1.2	1.3	1.7	2.0
difficulties	% >2	12.2	13.5	25.0	33.7	16.3	24.6	27.7	36.9
Material	Index. mean (0-10)	7.6	7.4	5.7	5.2	7.5	6.8	5.3	4.6
assets	% <5	9.8	12.3	31.5	39.0	6.7	16.6	38.5	48.9
Neighbourhood quality									
Quality of life	mean (0-10)	7.1	6.7	6.9	6.6	7.1	6.6	6.9	6.6
	% <6	10.6	18.7	20.1	26.9	15.3	21.4	17.7	25.4
Safety									
problems	mean (0-10)	4.5	4.7	4.4	5.1	4.7	5.4	4.8	5.3
	%	63.8	60.4	63.7	57.3	58.5	53.3	54.1	52.5
	0-5	32.9	34.4	28.3	32.1	34.9	37.8	38.9	36.5
	6-9	3.3	5.2	8.0	10.6	6.6	9.0	7.0	10.9
	10								
Household tasks									
None	%	9.8	15.3	15.6	17.2	0.0	1.2	0.2	0.0
Up to 3 hrs/day		82.2	77.3	77.0	75.0	59.9	60.2	40.9	31.0
More than 3		5.8	5.1	5.0	4.4	37.0	38.1	55.8	64.8
Not declared		2.2	2.4	2.4	3.4	3.1	0.5	3.1	4.2

Population aged 40 to 64 residing in Catalonia. Source: Enquesta de Condicions de Vida i Hàbits de la Població, 2006.

Natives: Born in Catalonia with at least one parent born in Catalonia. Immigrants: Born in other regions of Spain, excluding the five regions with similar development as Catalonia (see Methods).

Table 3. Contribution of intermediary factors to inequalities in self-rated health by gender, social class and migrant status, in different subgroups. Population aged 40 to 64 residing in Catalonia.

Comparison	GENDER (women vs. men)								SOCIAL CLASS (manual vs. non-manual)								MIGRANT STATUS (immigrant vs. natives)							
	<i>non-manual</i>				<i>manual</i>				<i>men</i>				<i>Women</i>				<i>men</i>				<i>women</i>			
	natives	immigrant	natives	immigrant	natives	immigrant	natives	immigrant	natives	immigrant	natives	immigrant	non-manual	manual	non-manual	manual	non-manual	manual	non-manual	manual				
PR SRH	chan ge%	PR SRH	chan ge%	PR SRH	chan ge%	PR SRH	chan ge%	PR SRH	chang e%	PR SRH	chan ge%	PR SRH	chang e%	PR SRH	chan ge%	PR SRH	change %	PR SRH	chan ge%	PR SRH	chang e%	PR SRH	chan ge%	
Baseline (age-adjusted)	1.23		3.00***		1.43**		1.50***		1.54*		2.81***		1.85***		1.55**		0.68		1.24		1.58*		1.33**	
1. Employment conditions	1.15	32%	2.94***	3%	1.34*	21%	1.36**	29%	1.57**	-5%	2.82***	-1%	1.67***	21%	1.48*	12%	0.69		1.20	19%	1.57*	2%	1.33**	-1%
2. Individual income	1.05	79%	2.48***	26%	0.90	123%	1.07	86%	1.25	54%	2.39***	23%	1.45*	47%	1.09	83%	0.71		1.26	-7%	1.54*	7%	1.30**	7%
Financial difficulties	1.18	21%	2.73***	14%	1.39**	8%	1.47***	6%	1.37	32%	2.43***	21%	1.66**	21%	1.37	32%	0.67		1.17	28%	1.48*	18%	1.27*	17%
Material assets	1.22	3%	2.62***	19%	1.37**	13%	1.42***	15%	1.22	60%	2.36**	25%	1.49**	42%	1.27	51%	0.67		1.20	18%	1.38	34%	1.27*	19%
3. Household economic resources	1.18	22%	2.55***	23%	1.35*	17%	1.43***	14%	1.14	74%	2.22**	33%	1.43*	49%	1.21	62%	0.66		1.15	39%	1.36	39%	1.23*	28%
Neighb'd quality of life	1.20	11%	2.92***	4%	1.45**	-6%	1.52***	-4%	1.51*	6%	2.71***	6%	1.83***	2%	1.52**	4%	0.64		1.21	14%	1.53*9%		1.28**	14%
Neighb'd safety problems	1.17	26%	2.81***	10%	1.40**	5%	1.49***	1%	1.50*	8%	2.72***	5%	1.83***	2%	1.55**	-1%	0.64		1.23	5%	1.52*	11%	1.32**	4%
4. Neighbourhood quality	1.15	32%	2.81***	10%	1.42**	1%	1.52***	-4%	1.47*	12%	2.65***	9%	1.82***	4%	1.54**	2%	0.62		1.20	17%	1.48*	17%	1.28*	15%
5. Household tasks	1.18	21%	3.40**	-20%	1.52**	-21%	1.63***	-27%	1.54*	0%	2.79***	1%	1.81***	4%	1.55**	0%	0.66		1.24	3%	1.51*	12%	1.32**	1%
All determinants	1.06	76%	2.06**	47%	1.00	99%	1.13	75%	1.08	84%	1.99*	45%	1.21	75%	0.94	111%			1.08	66%	1.26	56%	1.20	37%

See Article 2, Table 3 (pages 100-101) for the legend.

Article 3

As regards Article 3 (“Perception or real illness?”), in the first version of the paper that we submitted, all analyses were replicated in strata of age and of social class and country of birth. The stratification of the sequential adjustment of the association between sex and self-rated general health by age and number of prevalent chronic conditions was presented in a figure which is still in the final version. We had also included as supplementary tables the stratification of the analyses of prevalence and of the contributions of concrete disorders. Two reviewers considered that there wasn’t enough justification for replicating all analyses in these strata, and we opted for eliminating these tables from the paper. As we consider the analysis of intersections of full interest for this dissertation, I reproduce in the next two pages these two tables (Table 4 and Table 5). Below is the text that explained them:

Systematically in all groups, women had poorer health indicators and, with few exceptions (such as chronic back pain in immigrants), higher prevalence of common chronic conditions (see supplementary Table S1). Differences among strata in the relative weight of different conditions is explored in supplementary Table S2. Arthritis, the condition with the highest simple contribution overall, makes little contribution among young adults, while, on the contrary, headache/migraine makes the biggest contribution together with neck pain. Mental disorders make a relatively high contribution among manual social classes, and mostly immigrants. In this group, as well as in young adults, the total weight of musculoskeletal disorders is reduced.

Table 4. Prevalence (%) of chronic conditions and poor health indicators by sex and different strata of age, social class and birthplace.

	Age group						Social class and birthplace					
	16-44		45-64		65 and more		Non-manual		Manual, Spain		Manual, MLIC ^a	
	M	W	M	W	M	W	M	W	M	W	M	W
<i>Chronic disorders (last 12 months)</i>												
Chronic back pain	14,8	21,0	25,6	34,1	20,8	39,4	16,4	26,6	20,8	31,6	20,8	20,6
Chronic neck pain	11,1	23,5	21,2	38,7	20,0	39,7	15,2	28,8	16,9	34,6	9,8	22,8
Arthrosis, arthritis or rheumatism	3,5	6,6	19,7	39,3	37,9	66,8	11,9	24,1	17,4	35,2	3,4	11,1
Hypertension	5,2	4,4	25,9	23,6	41,3	53,5	17,2	16,4	19,0	24,6	4,8	10,7
Varicose veins in the legs	3,1	18,1	10,3	33,1	13,8	35,6	6,6	22,4	8,3	30,0	2,2	20,6
Migraine or frequent headaches	8,5	20,5	8,4	23,4	7,2	16,1	7,1	18,7	9,0	22,0	9,4	20,4
High cholesterol level	6,3	4,3	22,6	21,0	23,5	29,7	14,1	13,3	15,2	16,8	4,8	4,8
Depression, anxiety, mental disorders	6,1	11,6	10,7	25,1	10,7	27,8	7,8	15,4	9,2	22,3	4,1	15,3
Chronic allergies	12,3	14,7	7,8	12,8	6,3	9,8	11,1	13,6	9,9	12,8	5,9	14,3
Haemorrhoids	3,5	6,8	8,4	13,8	9,8	13,2	5,8	9,3	6,8	11,7	2,3	6,0
Chronic constipation	1,1	7,4	2,9	13,3	10,0	17,0	3,2	9,7	3,4	12,5	0,7	9,7
Diabetes	0,9	1,0	9,2	5,6	18,4	17,0	5,8	3,7	7,4	7,7	0,9	2,1
<i>General health indicators</i>												
Poor general self-rated health	15,5	23,3	35,2	45,7	51,4	66,7	22,5	31,0	32,1	45,4	23,1	34,8
Chronic limitation of activity	13,3	16,4	23,6	28,2	33,9	45,6	17,3	22,7	23,4	29,7	10,1	17,9

^a MLIC: Born in a middle or low-income country. M = Men, W = Women.

Table 5. Contribution of single chronic conditions to the worst outcome for women in self-rated health. Different strata of age, social class and birthplace.

	Age group						Social class and birthplace					
	16-44		45-64		65 and more		Non-manual		Manual, Spain		Manual, MLIC ^a	
	PR	Δ%	PR	Δ%	PR	Δ%	PR	Δ%	PR	Δ%	PR	Δ%
<i>Adjusting by age and...</i>	1,50		1,29		1,29		1,34		1,30		1,48	
<i>Single chronic conditions^b</i>	1,41	18%	1,07	76%	1,13	56%	1,15	57%	1,15	51%	1,36	26%
Arthrosis, arthritis or rheumatism	1,32	36%	1,11	62%	1,20	32%	1,19	44%	1,15	50%	1,26	46%
Depression, anxiety or other mental disorders	1,30	40%	1,12	58%	1,19	35%	1,17	50%	1,16	47%	1,30	38%
Chronic neck pain	1,30	40%	1,17	41%	1,25	15%	1,24	29%	1,20	34%	1,32	33%
Migraine or frequent headaches	1,40	20%	1,20	31%	1,20	33%	1,21	38%	1,21	31%	1,48	1%
<i>Groups of conditions</i>												
Musculoskeletal disorders ^c	1,26	48%	1,01	98%	1,06	80%	1,06	82%	1,07	76%	1,28	41%
Mental disorders ^d	1,25	50%	1,07	75%	1,17	41%	1,18	48%	1,10	66%	1,16	67%

Population aged 16 or more. Source: Spanish National Health Survey, 2006.

PR: Prevalence ratio, Women vs. Men. Δ%: Percent reduction in the strength of association, compared to age-adjusted model only.

^a MLIC: Born in a middle or low-income country.

^b Ordered from higher to lower reduction in the strength of association in the whole population (only five conditions are shown).

^c Arthritis, back pain, neck pain, Osteoporosis. ^d Depression, anxiety or other mental disorders; poor mental health according to GHQ-12.

Finally, despite having focused the analysis of the contribution of health problems to inequalities in self-rated health to the axis of gender in Article 3, I consider of interest at least to report what happens when the same approach is used for inequalities by social class (as for migration, in the Spanish National Health Survey data internal migrants cannot be identified, and the analysis of the health pattern of international immigrants, influenced by the healthy migrant effect, would require additional considerations). The surprising results are reproduced in Table 6 and interpreted in the Discussion, under the heading “Perception, real illness or.. underestimation?”.

Table 6. Association between social class (manual vs non-manual) and general health indicators by sex, adjusted sequentially for age and number of diagnosed and prevalent chronic conditions.

	Women				Men			
	Poor self-rated health		Activity limitation		Poor self-rated health		Activity limitation	
	PR	Δ%	PR	Δ%	PR	Δ%	PR	Δ%
Adjusting by age and...	1,34***		1,17***		1,39***		1,25***	
Number of chronic conditions (diagnosed)	1,22***	34%	1,08*	52%	1,28***	27%	1,18***	29%
Number of chronic conditions (prevalent)	1,23***	33%	1,07*	57%	1,29***	25%	1,17**	33%

Population aged 16 or more. Source: Spanish National Health Survey. 2006.

PR: Prevalence ratio of manual vs non-manual social class calculated by means of robust Poisson regression.

Δ%: Percent reduction in the strength of association (coefficient) between social class and the health indicator, compared to age-adjusted model only.

* p<0.05, ** p<0.01, *** p<0.001

OTHER RELATED PUBLICATIONS

Finally, in this section I would like to mention other publications and presentations, beyond the three articles presented, that I've been involved in during these four years, which are not part of the main body of this dissertation but have been widely influenced by its development. They are ordered according to the paper they mostly refer to.

Article 1. Migration-related health inequalities

Presentations

Preliminary and final results of this paper have been presented in several venues:

- Communication at scientific meetings:
 - o “XIII Congreso SESPAS”, 5-3-2009: Desigualdades en salud en la población adulta de Catalunya según género, clase social y estatus migratorio.
- Presentations in scientific sessions:
 - o CISAL-UPF, 25-3-2009: Desigualtats socioeconòmiques i de salut a Catalunya segons gènere, classe social i situació migratòria.
 - o ASPB, 23-10-2009: Migració i desigualtats en salut: les interaccions entre gènere, classe social i lloc d'origen.

- SESIS-ASPB, 17-3-2010: Descriure i analitzar les causes de les desigualtats en salut “en tres dimensions” (gènere, classe social i migració): reptes metodològics.
- IDESCAT, 15-4-2011: Desigualtats en salut segons gènere, classe social i migració: un anàlisi a partir de les dades de l’ECVHP 2006.

Research strand on internal immigrants across Spain

In 2007, I had the opportunity to know Amaia Bacigalupe and Unai Martín and read their excellent report on social inequalities in health in the Basque Country (Bacigalupe and Martín 2007). The report included an analysis by birthplace, with evidence of poorer health for people born in the rest of Spain aged 45 years and over. After presenting the preliminary results of Article 1 in the SESPAS 2009 Congress, I suggested them to perform a joint analysis (“my sequence of analysis and your age cut-off”). It was the start of a research line on the health of internal migrants, involving researchers from the three largest migrant-receiving communities in Spain (Catalonia, the Basque Country and Madrid), which until now has led to:

- A published article:
 - Martín U, Malmusi D, Bacigalupe A, Esnaola S. Migraciones internas en España durante el siglo XX: un nuevo eje para el estudio de las desigualdades sociales en salud. *Gac Sanit.* 2012 Jan-Feb;26(1):9-15.
- and three communication at national congresses:

- *XXVII Reunión SEE, 2009.* Martín U, Malmusi D, Bacigalupe A. Migraciones internas y desigualdades en el estado de salud: el caso de Euskadi y Catalunya.
- *XXIX Reunión SEE - XIV Congreso SESPAS, 2011.* Díaz Olalla JM, Aerny N, Antona A, Esteban M, Malmusi D, Martín U, Bacigalupe A. Desigualdades en salud entre la población de Madrid nacida en la ciudad y en el resto de España.
- *XXIX Reunión SEE - XIV Congreso SESPAS, 2011.* Bacigalupe A, Malmusi D, Martín U, Rodríguez-Sanz M, García I. Migración a Euskadi y Catalunya del resto del Estado y desigualdades en salud: evolución 1992-2007.

The English abstract of the article is reproduced below:

Internal migration in Spain in the 20th century: a new focus for the study of social inequalities in health.

OBJECTIVE: Catalonia and the Basque Country received substantial immigration quotas from the rest of Spain during the twentieth century. This study aimed to analyze inequalities in health by birthplace (the population born in the same region or other autonomous regions) in these two geographical areas.

METHODS: We conducted a cross-sectional study in the non-institutionalized population aged 50 to 79 years, with data from the health surveys of Catalonia 2006 (n=5,483) and the Basque Country 2007 (n=3,424). We used log-binomial models to estimate the prevalence ratios (PR) of poor self-rated health by birthplace, stratified by sex and social class, and successively adjusted for age, social class and educational attainment.

RESULTS: Immigrants from other autonomous regions had poorer self-rated health than the native-born population, both in the Basque Country (age-adjusted PR in men 1.30, 95% CI 1.11-1.54; women 1.42, 95% CI 1.25-1.62,) and in Catalonia (PR in men 1.41, 95% CI 1.26-1.62; PR in women 1.25, 95% CI 1.16-1.35). PRs were reduced but remained significant after adjustment for social class and educational attainment and stratification by manual or non-manual social class.

CONCLUSIONS: In both communities there are health inequalities that are detrimental to the immigrant population from the rest of Spain, which constitutes approximately half of the population in the studied age cohorts. Future studies should explore the persistence of these inequalities in other health indicators and their reproduction in second generations, and identify entry points for preventive policies.

Article 2. Material determinants

The conceptual framework of the Spanish Commission

Between 2009 and 2010, I had the opportunity to work in and for the Commission to Reduce Social Inequalities in Health in Spain set up by the Spanish Ministry of Health and Social Policy. As we noted in the Introduction, both the literature review and analyses of this dissertation related to the issue of intermediary determinants of health inequalities have contributed notably to the development of this block in the framework of the Commission (Comision para reducir las desigualdades sociales en salud en España 2012) that we also adopt in this dissertation.

A letter to the European Journal of Public Health

Another publication related with this subject is a reply to a paper published in the European Journal of Public Health (Groffen et al. 2012) which was published online as e-letter in the same journal, signed by myself and Joan Benach. It is pasted below.

'Material vs Psychosocial' or 'Material and Psychosocial': A Reply to Groffen et al.

Dear Editor,

We've read with great interest the paper by Groffen et al.(1), which adds to a quite large body of studies on material and psychosocial explanations for socio-economic inequalities in health.

The study had a longitudinal design, with the purpose of analysing explanations for prospective changes in functional health; nevertheless, very few significant differences in functional health trajectories emerged during the study follow-up. Therefore, the Authors focus on explanations for baseline inequalities, and their main finding stems in that the reduction of these inequalities in regression models is wider when psychosocial factors (especially self-efficacy and mastery) are added than when material factors do. This is especially evident for mental function, where inequalities lose statistical significance as these psychosocial factors are added.

We would just like to mention three significant issues that, in our opinion, have not been fully considered in the paper.

A short but formal mention is made in the discussion to the caution needed when results are drawn from cross-sectional studies. However, given the nature of variables studied, this is an important issue in this study, making reverse causality or common reporting tendency very likely, especially as referred to aspects as self-efficacy and mastery with

mental (but also physical) function: people with ill-health or depressed might feel less autonomous and capable to control their life.

The second issue regards the lack of consideration of the plausible correlation and causal hierarchical linkages between material and psychosocial factors. In a quite important reference missing in the paper, van Oort et al (2) draw a causal pathway model, very similar to the one included in this paper, but with an additional arrow leading from material to psychosocial factors. With their subsequent analyses, they estimate the contribution of psychosocial factors that could be considered independent, and the one which was an indirect effect of material factors.

The third issue deals with the fact that although discussion of material vs psychosocial factors may be important for research purposes, it has been argued that the dichotomy between both theories has been overblown (3) (4). Indeed, today there is evidence to support that both material and psychosocial exposures can affect health and that most of these processes are intertwined and should be integrated into a comprehensive framework.

Groffen et al(1) consider that psychosocial factors might be more amenable to change by health promotion programs. The struggle to find proximal, apparently more easily modifiable explanatory factors of health inequalities is laudable. However, this contribution might have been overestimated, and it is also important to remind that improving self-efficacy, mastery or similar individual attitudes might not be such an easy task when their distal causes, such as material assets, living and working conditions, or social power of disadvantaged groups, are not changing - or even getting worse.

References

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4. Macleod J, Davey Smith G. Psychosocial factors and public health: a suitable case for treatment? *J Epidemiol Community Health*. 2003;57(8):565-70.

Article 3. Perception or real illness

A report for the Observatory of Women's Health

It is important to note that I started analyzing this topic with data from the Catalan Health Survey, but as we obtained grant funding for the study of this subject in Spain, we finally wrote the manuscript from the analysis of the countrywide Spanish data. The specific grant funding was obtained from the Ministry of Health *Observatorio de Salud de las Mujeres* (Observatory of Women's Health), for which a complete report was prepared including detailed analyses by age, social class and country of birth, and other markers of health problems such as consumption of medicines. This report, named "Prioridades para la reducción de las desigualdades de género en el estado de salud: ¿qué problemas de salud y qué determinantes sociales contribuyen a estas desigualdades?", was delivered to the Observatory in November 2010 alongside with a draft version of the paper and a policy brief summarising the main findings and recommendations.

Presentations

Results of this paper have been presented in several venues:

- Two communications at scientific meetings. Both of them were prized by the *Sociedad Española de Epidemiología* as one of the best ten communications presented by participants younger than 35. The first one analysed data of the 2006 Catalan Health Interview Survey, obtaining substantially the same findings. The second one compared results with the 2003 and 2006 editions of the Spanish National Health Survey: in the 2003 edition the list of chronic conditions was more limited and restricted to diagnosed conditions, and I found out that when adjusting by number of conditions, a slight excess of poor health for women persisted, and that the same occurred when I created a variable ‘number of conditions’ in the 2006 database that only considered those already included in 2003.
 - *XXVII Reunión SEE, 2008*. Malmusi D, Borrell C. La contribución de trastornos físicos y mentales a las desigualdades de género en la salud percibida.
 - *XXIX Reunión SEE - XIV Congreso SESPAS, 2011*. Malmusi D, Borrell C, Artazcoz L. Perspectiva de género y trastornos crónicos: logros y retrocesos de las Encuestas de Salud en España.
- A presentation in a scientific session:
 - GREDS-UPF, 19-1-2012: Gènere i salut: percepció o desigualtat social?

DISCUSSION

This dissertation aimed to describe social inequalities in self-rated health in the adult population of Catalonia in an integrated framework of gender, social class and immigration, and to identify the main intermediary factors and health problems that account for the unequal distribution of self-rated health according to these axes.

We summarise below the most relevant findings of the three articles, then discuss some of the main strengths and limitations as well as the potentials for future research, and proceed to conclusions and recommendations.

Main findings and contributions

Gender, social class, type of migration and health

Article 1 (from now on, “Migration-related health inequalities”) showed that inequalities in self-rated health by gender, social class and migrant status coexist in Catalonia, and that they largely mirror inequalities in material and economic conditions, with the exceptions of recent foreign immigrants – especially men – whose relatively better health the ‘healthy immigrant effect’ might help to explain.

On one hand, the study confirmed the magnitude and strength of health inequalities by social class and gender, which stood out independently of birthplace. Not only among natives but also within all immigrant groups, social class and gender are fundamental

drivers of living and working conditions and health status. Also, they both seemed to act as effect modifiers, and social class as mediator too, of some of the associations between migration type and health status. This highlights the need for studies on migration and health to take these two dimensions of inequality into account.

On the other hand, the typology of migrations that we defined on the base of sociological theory, historical context and literature review helped to detect and understand migration-related health inequalities. These inequalities affected both internal and international immigrants: inequalities affecting the long-settled immigrant population from Spain highlight the transitory nature of the ‘healthy immigrant effect’ partially observed in foreign, mostly recent immigrants (Martin et al. 2012). Most importantly, for both internal and international migrants, inequalities were mainly limited to immigrants from poor areas, reinforcing the observation of previous studies (Clough 2011, Pudaric et al. 2003), as well as our hypothesis that this type of immigration was the one relevant for a health equity analysis. Actually, in concomitance to “Migration-related health inequalities”, the MEHO project published its restrictive operational definitions of migrants, that excludes migrants from EU-15 and other rich countries, except for “the post World War II guest workers from the Southern European countries periphery (e.g. Italy, Greece, and Turkey)” (Nielsen and Krasnik 2010) – and certainly we could add Spain.

Material determinants of health inequalities

In “Migration-related health inequalities”, we explored the contribution to health inequalities between native and different immigrant groups of social class, standards of living, income and employment conditions, and found that adjustment for the two former largely explained the excess of poor health of Spanish immigrants and rendered significantly protective being foreign-born.

In Article 2 (from now on “Material determinants”), we deepened in the analysis of the intermediary role of these and other material factors to inequalities in self-rated health by gender and social class in their respective intersections. Household economic conditions and individual income emerged as major contributors for social class inequalities in all strata of sex and migrant status, reinforcing the findings of several previous studies (Borrell et al. 2004, Daoud et al. 2009, Ferrie et al. 2003, Ross and Van Willigen 1997, Yngwe et al. 2001). Ours was the first study in Europe to address the contribution of such a large set of intermediary determinants of gender inequalities in health: adjustment by individual income eliminated the association between gender and health status in manual social classes and halved it in non-manual, and employment conditions and the burden of household tasks also made not negligible contributions, taking into account some design biases that will be discussed later.

Self-rated health and gender: real illness, not perception

Several studies have confirmed that self-rated health can even underestimate actual socio-economic inequalities in health (Bago d'Uva et al. 2008, Delpierre et al. 2009, Layes et al. 2012). Some studies also showed that women are not more likely to report health problems at a same level of illness (Case and Paxson 2005, Macintyre et al. 1999): in Article 3 (from now on “Perception or real illness”) we confirmed that poorer self-rated health of women is a mere reflection (when not a subestimation) of the fact that women suffer more often from a wide range of chronic conditions. We identified for the first time which concrete conditions account most for this excess of poor health, namely some musculoskeletal, mental and other pain disorders: a range of non-fatal problems which may be minor from a medical viewpoint, but not so in women's daily lives (Ross and Bird 1994), and that other studies have shown to be major contributors to quality of life at the individual and population level (Knight et al. 2001, Saarni et al. 2006). Verbrugge calls this the "iceberg of morbidity": the visible tip of the iceberg is male, but the bulk of it is female (Verbrugge 1985).

An intersectional perspective on intertwined power relations

Throughout the papers that make up this dissertation, we made an effort to consider simultaneously three complex dimensions of social inequality and how health outcomes are generated within their intersections and across age.

In “Migration-related health inequalities” we started with an innovative description of socio-economic determinants and health status in the intersections generated by the most relevant and irreducible categories of gender, social class and type of migration. Inequalities according to migrant status were not uniform across sexes and social classes: they seemed more evident in manual social classes (a case difficult to evaluate because of the especially reduced sample size for non-manual immigrants) and were larger (and less amenable to explanation by current exposures) in women than in men. In the paper, we discussed some of the potential explanations for this greater impact of immigrant status in women than in men (or of gender in immigrants than in natives). This finding was also replicated for Ecuadorians in Madrid (Del Amo et al. 2011), for US ethnic minorities (Pamuk 1999), and for migrants from the rest of Spain in the 2000 Barcelona Health Survey (Borrell et al. 2008) and in the Basque Country (Martin et al. 2012) but curiously not when we analysed the same Catalan Health Survey data with a different age cut-off (Martin et al. 2012).

“Material determinants” was not only the first study addressing the issue of intermediary determinants of gender and social class inequalities simultaneously, but also that explored the determinants of each dimension in the subgroups created by the other. This intersectional analysis allowed detecting differential pathways to inequality. For example, while individual income was the main explanatory factor for gender inequalities in manual classes, a wider set of factors, including the perception of safety problems in neighbourhood and the burden of housework explained gender

inequalities in non-manual classes. Gender inequalities in household tasks were larger in manual classes, however some degree of reverse causality between participation in household tasks and health status flawed the estimation of their contribution to health inequalities.

“Perception or real illness” focused on the axis of gender, but stratified analyses by age and by a combination of social class and country of birth, as a way to identify consistency in the study findings across more uniform population groups, and (as we saw in supplementary analyses) to detect specificities in the kind of chronic conditions that build up gender inequalities in health in each of them: for instance, arthrosis among the elderly, migraine among young adults or depression among manual class migrants.

Strengths, innovations, limitations and future steps

Probably, the biggest innovation and at the same time challenge of this dissertation lies in the simultaneous analysis of three complex dimensions of inequality. Particularly in “Migration-related health inequalities”, where the simple description of inequalities was complicated by the many relevant categories, the very different age structures of groups to be compared, and for some of them, a limited sample size.

Age-adjusted predicted prevalences

When deciding to address in a single study the health of natives, foreign and Spanish immigrants, I was confronted with the challenge of describing health inequalities in a reference group and

two comparison group that were respectively younger and older. It was not possible, therefore, to select a comparable age range of the population – as for instance we did in the analysis of internal migrants in Catalonia and the Basque country (Martin et al. 2012). Description of crude prevalence of poor self-rated health was not very informative with so huge differences in mean age. Direct standardisation required an accurate test of its pre-requisite that the difference in the health variable between the two compared groups is constant across the age groups (Rué and Borrell 1993), almost impossible to maintain for each subgroup and outcome and with such small numbers of subjects. It was then necessary to move directly to age-adjusted regression models, creating a categorical variable with all possible combinations of sexes, social classes and origins. But to maintain the interpretability of the descriptive analysis, I used the logistic regression post-estimation function to calculate and present predicted prevalences (e.g. of poor health) at 45 years of age for each group.

A sequential approach

To make manageable the simultaneous description of inequalities in the three dimensions, without obviating at the same time important distinctions, my approach consisted in starting with a strong theory of what were the characteristics that could differentiate migrants into types with different relevance for health equity. Another crucial step was to describe socio-economic and health indicators in social classes and migration-based groups, separately (but stratifying by sex). This allowed to select the most

relevant groups for this complex analysis, by merging groups that were acceptably similar both theoretically and empirically; and excluding groups with reduced sample size, little interest from an equity perspective and no evidence of substantial differences from the reference group (as immigrants from high-income countries). In the case of social class, it would have been easy to recur to a standard practice in epidemiological studies in Spain with the SEE-SEMFyC classification (Domingo-Salvany et al. 2000), consisting of directly merging social classes in three (I-II, III, IV-V) or two (I-III and IV-V, named ‘non-manual’ and ‘manual’) categories (Chilet-Rosell et al. 2012), but I opted to start with the eight original categories: I, II, IIIa, IIIb, IIIc, IVa, IVb, V. In the manuscript for publication we directly presented six categories, with class IV merged as well as class IIIb and IIIc. In our data, the empirical evidence shows that class IIIb (self-employed manual workers) and IIIc (manual workers with supervising tasks), commonly merged with higher classes and labelled as “non-manual”, are nearer to class IV than to class IIIa and certainly than to class II.

I finally came up with 24 categories resulting from crossing two sexes, three groups by social class, four groups by migration type. In almost half of these categories, the number of subjects in the Living Conditions Survey was below or around a hundred. To add reliability to the findings and to help discriminating between health patterns that seemed consistent or more probably due to chance, two strategies were complemented: the comparison with the pattern described by the robust socio-economic indicators available, and the

use of the Catalan Health Survey as a confirmation for the self-rated health result.

The limitations of sample size, age differences and the interpretability of multiple comparisons were even more evident when moving, in “Material determinants”, from the description of health inequalities to the explanation of their intermediary factors. When this explanatory analysis was performed in “Migration-related health inequalities” (Figure 2) and limited to inequalities by migration type, it was still feasible to compare five immigrant groups with natives in each sex. In “Material determinants”, we first tried, as showed in the Supplementary analyses, to address simultaneously the three dimensions, applying restrictions to two groups per dimension, and to the 40-64 age range in order to have a comparable age cohort of natives and internal immigrants. But the complexity and at the same time disputable validity of the results – both internal for the sample size limitations affecting especially non-manual immigrants, and external for the restrictions of age and subgroup comparisons – made us finally opt for a manuscript limited to gender and social class, reconsidering three groups of social class and an age range encompassing most of the active age.

The analysis of mediators: strategies, opportunities and limitations

At this regard, it has to be noted that many previous studies of intermediary determinants of social class inequalities were restricted to subjects in paid work (Aldabe et al. 2011, Borrell et al. 2004, Kaikkonen et al. 2009, Laaksonen et al. 2005, Lundberg

1991, Niedhammer et al. 2008), thus excluding a large sector of the population and at the same time making impossible to explore the contribution to health inequalities of factors such as unemployment, labour inactivity or lack of own income. These factors, and especially the latter, turned out to be very relevant in our “Material determinants”. A drawback of this inclusion, which might explain why so many studies opted for the contrary, could have been the inability to introduce in the models work-related factors such as precariousness of contract and at the workplace or physical and psychosocial working conditions, because they would have been missing in a significant portion of the sample. But we could actually introduce employment precariousness (in “Migration-related health inequalities”) or type of contract (in “Material determinants”) by creating composed variables where positions out of employment were added as separate categories.

Nevertheless, measures of working conditions were absent in the data, and this is a limitation that has to be acknowledged, taking into account that factors such as physical workload or decision latitude have been shown to statistically explain a relevant portion of health inequalities by social class (Borrell et al. 2004, Kaikkonen et al. 2009, Lundberg 1991, Niedhammer et al. 2008, Schrijvers et al. 1998). Conversely, the rich information on material and financial assets made possible to identify these as key factors for migration-related and social class inequalities, with a larger contribution to social class inequalities than that found in previous studies with health surveys in Catalonia (Borrell et al. 2004, Borrell et al. 2008). Social surveys, in many of which the single question on SRH is

been increasingly included, can therefore be a very valuable source of information for studies of health inequalities.

Extreme caution needs to be paid to the biases inherent in the cross-sectional design when analysing the contribution of intermediary determinants. Reverse causality is probably the most threatening issue. In “Material determinants” we tried to prevent it applying several criteria to exclude subjects unable to work or to perform such kind of tasks due to health problems. However, this potential bias might have affected our estimations in both senses. For example, I had hypothesized that the burden of household tasks could be one of the most powerful intermediary factors in gender inequalities in health. Actually, we showed that the gender gap in time dedicated to these tasks was impressive, and even larger in manual classes. However, the existence of some degree of association between no participation in household tasks (more frequent among men) and a poor health status resulted in a probable underestimation of their contribution to gender inequalities in health. On the opposite side, we can't exclude completely the presence of reverse causality between employment or income and health which could result in an overestimation of the contribution of these factors. Nevertheless, criteria were very precise at this regard excluding subjects declaring inability to work or health as the reason for inactivity. Another limitation is the lack of lifetime exposures, which might have influenced the lower contribution than expected of employment conditions. Future studies using longitudinal data starting at young ages will allow a more accurate

exploration of the contribution of all these factors, taking into account the accumulation of these social exposures.

Perception, real illness or... underestimation?

The findings of “Perception or real illness” are strengthened by their consistency with both self-rated health and chronic limitation as outcomes, in the various population subgroups analyzed, and even in my further analyses including each condition separately instead that the total number of conditions or with other databases such as the 2006 Catalan Health Survey and the 2003 Spanish National Health Survey. The main potential limitation arises from the use of self-reporting for both the general health and chronic conditions variables. However, results were also consistent when using the number of physician diagnosed disorders, and although the same diagnosis is self-reported, I found no sex differences in the ratio between diagnosed and prevalent disorders. Moreover, it has been shown that the use of checklists of chronic conditions increases their reporting but reporters through checklist are as ill and use as much health services as reporters in free text (Knight et al. 2001).

The solidity and the relevance of the finding that the simple adjustment by the number of chronic conditions explains away the women’s excess risk of poor self-rated health can be even more appreciated taking into account that, as I showed in supplementary analyses, the same does not occur for social class. This is surprising if we consider that there are substantial proofs from other study designs that self-rated health can even underestimate actual socio-

economic inequalities in health (Bago d'Uva et al. 2008, Delpierre et al. 2009, Layes et al. 2012). The interpretation could be that when adjusting simply for prevalence of conditions, what should normally occur is that an excess risk should persist, attributable to inequalities in severity, in not registered conditions, and in a larger set of 'minor' problems and symptoms (Simon et al. 2000). The result of "Perception or real illness" would instead be an indirect evidence that self-rated health underestimates gender inequalities in the whole burden of morbidity and illness.

A pending question: self-rated health validity across countries of origin

As we stated in the Justification section, there is still room for more robust evidence for what regards the validity of self-rated health for estimating inequalities across origin and migrant status. The secondary population-based data that we used for this dissertation were inadequate for addressing adequately this pending question: due to sample size (especially once stratifying by sex and social class), we could not split foreign immigrants by country or continent of origin. As we discussed in the Introduction, there is actually limited evidence, mainly derived from studies of Hispanics in the US (Bzostek et al. 2007, Viruell-Fuentes et al. 2011) but not confirmed in European studies (Agyemang et al. 2006, Chandola et al. 2003), for the existence of measurement biases due to language and cultural differences between ethnic groups or between natives and immigrants. In this dissertation, we minimised this potential bias by prioritising our focus on immigrants from within Spain. On

the other hand, several studies found relatively better health outcomes for foreign immigrants on indicators such as mortality, chronic conditions or impaired activity than with self-rated health (Jolivet et al. 2012, Leung et al. 2007, Lu 2008, Vissandjee et al. 2004), as we also showed in our supplementary analyses: we attribute this to the fact that health selection is stronger for chronic and severe conditions, and self-rated health may therefore be considered (together with mental health) as a sensitive and precocious marker of health deterioration among immigrants. This implies that future validation studies can't be based on comparing the consistence of self-rated health with other specific measures of morbidity – as we did for gender in “Perception or real illness” – but should probably recur to other techniques such as that of anchoring vignettes (Bago d'Uva et al. 2008).

Mediation and intersections: the way beyond

The calculation of the percentual change in the strength of association between models with and without one or more intermediary variables was our method of choice for estimating the contribution of mediators (in “Material determinants”) and health problems (in “Perception or real illness”), following a large body of existing epidemiological literature. One of the critiques that can be moved to this approach is the production of a point estimation without confidence intervals or statistical tests for significance of the mediation: at this regard, methods for calculating the standard error of the indirect effect have been proposed that can be applied to path analyses using linear regression models, such as the Sobel's

test (Baron and Kenny 1986) or, more recently, bootstrapping methods (Amone-P'Olak et al. 2009, Miura et al. 2011).

However, I would move the critique a little further, noting that it can be useless to compute confidence interval when the very point estimate has to be interpreted with caution: the percentages of contribution to inequalities of single determinants or conditions are probably subjected to biases, both for the high level of correlation between different factors (implying overestimation when a single factor is included), and for the cross-sectional measurement. Therefore, more than an exact estimation of the ‘causal fraction’, these percentages are useful to approximate the relative importance of one factor over the other. Structural equation models should probably be the method of choice for the joint examination of multiple chained relationships: I already pointed out in the Introduction the unfeasibility to use them across multiple intersections, even if in “Material determinants” I ultimately ended up restricting to two dimensions; in any case, future studies centered on a smaller set of comparisons and variables will still have to address adequately all the assumptions and restrictions of these models (such as the problematic inclusion and interpretation of categorical variables).

In a similar way, in the description of health outcomes in the intersections of three social dimensions in “Migration-related health inequalities”, we did not report confidence intervals or significance tests, considering that the significance of differences between each category and the reference group in the models constructed for obtaining age-adjusted prevalences (native non-manual men) was of

little information, opting instead, as discussed above, for the comparison of health and socio-economic outcomes and of the two surveys. In the future, we should integrate our approach with the methods proposed by Sen and Iyer parallel to this dissertation, such as carrying out pair-wise chi-square tests for differences between any pair of group (Sen et al. 2009); comparing so-called “middle groups”, for example in the case of gender and class, poor men with non-poor women, to determine which of the two dimensions is more important (Sen et al. 2009) – although this kind of “oppression olympics” does not go with the tenets of intersectionality (Hankivsky 2012); and disclosing differential mechanisms for disadvantage in middle groups (Sen and Iyer 2012).

CONCLUSIONS AND RECOMMENDATIONS

The **conclusions** that emerge from the studies reported in this dissertation are the following:

- Inequalities in self-rated health by gender, social class and migrant status coexist in Catalonia.
 - o In addition to and interacting with gender and social class, internal and international migration from poor areas emerges as a health inequality dimension, reflecting existing geographical inequities.
 - o Inequalities affecting long-settled immigrants from Spain highlight the transiency of the ‘healthy immigrant effect’ partially observed in foreign immigrants.
- Material and economic resources make major contributions to health inequalities in all these three social dimensions studied, with slightly different pathways:
 - o for gender inequalities, it is most of all individual income;
 - o for social class, household economic conditions and individual income are the most important;
 - o for migrant status, household economic conditions and social class itself are the main factors.
- Poorer self-rated health of women is a reflection of the higher burden of chronic conditions they suffer compared to men.
 - o Reporting bias is not an explanation for gender differences in self-rated health.

- The concrete conditions accounting most for this excess of poor health include some musculoskeletal, mental and other pain disorders: a range of non-fatal problems which have been shown to heavily affect quality of life both at the individual and population level.
- Intersections between axes or dimensions of inequality create complex social locations with specific consequences on health.
 - Inequalities according to migrant status were stronger among women and in manual social classes.
 - A wider set of factors besides individual income accounted for gender inequalities among non-manual classes.

In light of these conclusions, I propose the following **recommendations**:

- Future studies on health inequalities should develop new methods to engage with an intersectional perspective in the analysis of gender, social class, age, territory of origin and residence, among other inequality dimensions.
- Future research and policies on the health of immigrants should take into account social class, gender and territorial inequality and the health trajectory perspective.
- Public health authorities should make surveillance of the social distribution of material and economic conditions as a predictor of future health and a target for health equity policies.
- Policies to reduce social inequalities in income and material resources (such as progressive taxation, income support, or

policies to overcome the ‘gender pay gap’) should be prioritised to address different axes of health inequalities.

- Research and policy on gender equity in health care should go beyond the issue of inequalities in the quality of care to include the prioritisation of health problems based on their impact on gender inequalities and population quality of life.
- A health system responsive to gender inequalities should increase its efforts in preventing, addressing and resolving musculoskeletal, mental and other pain disorders.

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