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Abstract

The extent to which equality in accessing and financing health care reduces inequalities in health is a key policy question for health-care reform. Cross-country studies, when they exist, suffer from marked comparability limitations due to data heterogeneity and differences between organisational and financing systems. The Spanish devolved national health system offers a "unique field" for exploring these issues, and also for testing the effects of institutional reform, in the context of political decentralisation. This study uses data from 2001, the last year before decentralisation was extended to all regional governments or Autonomous Communities (ACs) in Spain. This Working Paper contributes to the literature by examining two questions. First, we evaluate the heterogeneity within regional inequalities in health, health-care access and health financing and examine whether these are associated with the political decentralisation of health care responsibilities. Second, we explore whether inequalities in health care between regional health services can be explained by inequalities in health-care use and health-care financing, using cross-correlation analysis along with other relevant variables. The results of the study suggest that inequalities in health are not associated with the regional uptake of health-care responsibilities. Instead they appear to be driven by income inequalities and regional health care capacity whilst the influence of inequalities in health-care use depends on quality of life adjustments.

Keywords: health inequality, inequalities in access to health care, inequalities in health care financing, decentralisation, Spain.

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Contents

1. Introduction

A widely accepted governmental goal in western countries that organise their health systems along the lines of publicly financed health care - and of national health services (NHS) in particular - is to improve "equality of opportunities". This takes place by lowering and ideally removing barriers to health care access. Since health equity is at the core of the health-policy agenda, it is possible to evaluate health-policy achievements by the extent to which they attain this goal. Improvements in the degree of equity in the production and maintenance of good health, in the use of different health services and in their financing are normally taken as main outcomes in evaluating the performance of a health system. Moreover, the World Health Organization (WHO) performance index draws upon a measure of social inequality in health along with a measure of fairness in health-care financing (WHO, 2000). Other things being equal, the lower the "avoidable" inequalities (ie. the higher the equity in health), the better a health system will perform. Therefore, it is possible to circumscribe that *ceteris paribus,* a health system performs better the lower its "avoidable" inequalities in health.

To achieve health equity goals, health systems typically design a set or programs that are intended to curtail existing barriers to both financing of and access to health care. Fairness in health financing is addressed by providing comprehensive coverage and limiting the use of direct payments. Barriers to health care access are normally tackled through programs that improve the delivery of health care and prevention. However, public programs are not always capable of curtailing pre-existing unequal conditions. Still, significant inequalities in health prevail, and "better health amongst the better off" is found in spite of public coverage. Among the explanations for the emergence of inequalities in health are the "absolute income" hypotheses. These take a materialistic approach, suggesting that the origin of health inequalities lies in the position of individuals in the hierarchy of distribution of goods and services (Marmot, 2000, Wagstaff and van Doorslaer, 2000)[1]. Therefore, policies that improve the distribution of material conditions would translate into a fairer distribution of health. Another, somewhat competing, explanation known as the "relative income" hypotheses, suggest a psycho-social explanation. Social inequalities are responsible for stress (Cohen *et al.*, 1997) and anxiety (Wilkinson, 1996) which in turn cause poor health in individuals at the bottom of the income distribution (Wilkinson, 1997, 1998). Even though longitudinal studies seem to point towards evidence

[1] Marmot (2002) also puts forward the social participation argument (e.g., enjoying leisure time), according to which people who are poor may enjoy good health if their social participation level is high, and the other way around.

for the "absolute-income hypothesis" (Gerdtham and Johannesson, 2004), these explanations are not mutually exclusive. To reduce inequalities in health, it may be important to design interventions that address both psychosocial along with purely material health production determinants.

To ascertain whether these theories are empirically sound, an important yet still unresolved question in the literature is whether health inequalities are just affected by income inequalities, or also by access to health care, and the progressivity of health care financing. This stems from the acceptance that institutional responses to curtail health inequalities are also important, since these are not only determined by socio-economic position (LeGrand, 1987). It is important to note that not all of the causes of social inequalities in health can be "avoided" by (usually short-term) public-policy interventions in individual health-production processes. Some inequalities are not under the control of individuals or public authorities; for instance, those resulting from the depreciation of health capital over time, biologically driven gender differences in health[2] (Wagstaff *et al*, 1991), environmental or genetic features. Accordingly, some research has addressed the measurement of "avoidable" inequalities in health (Wagstaff *et al*, 1989, 1999)[3]. Decomposition approaches are used to disentangle the contribution made by different health-production determinants to the health-inequality indicator.

Currently, little is known about the underlying reasons behind the emergence of health inequalities. This feature calls for a better understanding of the underlying causes of health inequalities to design adequate policy and to better evaluate health systems, and their institutional structure. An important aspect of a health system's institutional structure is the processes of devolution. Devolution or governmental political decentralisation gives rise to the inclusion of local knowledge to tailor health polices to local needs. Some argue that devolution might affect equity; however, very limited evidence exists to support such an effect. The aim of this Working Paper is to examine whether inequalities in access to health care, it's financing or its outcomes are affected by government decentralisation.

Spain stands as one of the most suitable institutional settings for examining regional inequalities. Globally, Spain ranks 11th out of 191 countries in attainment of equity in health, 26th out of 191 in fairness in financing, and overall 19th in goal attainment (WHO, 2000). This study attempts to go one

[2] This does not include environmentally determinant inequalities that might be gender dependent, such as gender differences in the access to certain health inputs, which could be context dependent.
[3] Which are clearly distinguished from preference-based measures of altruism (Wagstaff and Van Doorslaer, 2000)

step further than previous studies, by taking into account the decentralised institutional structure in Spain and examining the evidence from the 17 regional health services in order to explore potential links between structural determinants (absolute income, income inequality etc.) and procedural ones (access to health inputs, etc.) in influencing inequalities in health. This study makes use of the decentralised structure of the Spanish national health system to examine data on existing inequalities inside each regional health service. Previous studies have mostly dealt with inter-regional inequalities (López-Casasnovas *et al.*, 2005) and only one study has addressed intraregional inequalities in health (Costa-Font, 2005) but not in health care and health financing.

Therefore, the objectives of this paper are twofold. First, we explore whether decentralization has had an effect on inequalities in health, access to health care and health care financing within Spanish regions states (**RQ1**). A recent study found that inequalities in health were mainly explained within regions, and that the degree of decentralisation had no effect on the generation of health inequalities (Jiménez-Rubio et al, 2007). Second, in light of these results, we try to disentangle the role of various determinants of health inequalities such as income inequality and the health care resources available in each region (**RQ2**), and to explain these differences in health inequalities.

Only few previous studies that have addressed some of these issues. Primarily Doorslaer *et al.* (1997) focus exclusively on country-based data drawn from different surveys that have substantially different wording. They deal mainly with inequalities in health, leaving open the question of whether inequalities in health result from other inequalities in financing or health care-delivery. Some studies take this association for granted, although there is no reason for such an assumption. Spain is an interesting case, making it possible to examine whether changes in the financing and/or organisation of the health system affect the development of inequalities in health. In Spain the General Health Bill (1986) defined the "equal access to equal need" principle behind the organisation of the Spanish health service, and the Cohesion and Quality Act (2003) reinforced this equity principle, (López-Casasnovas *et al* 2004).

In this Working Paper, Section 2 discusses the underlying determinants of health and health inequalities in the light of existing literature, and describes the data limitations and the institutional

setting in Spain. Section 3 briefly presents the data and the empirical methodology while Section 4 reports the results. Section 5 lists and discusses the conclusions.

2. Background

2.1 Pathways to Health Inequalities

This study conceptualises the existence of inequalities in health as the results of inequalities in the structure of, and access to, the health-production process. Indeed, inequalities in health $D(H_t)$ result from:

$$D(H_t) = f(D(P_t), D(U_t)D(F_t), A_t, Y_t, D(Y_t), G_t) \quad (1)$$

where [D(P)] are inequalities in health prevention related inputs [D(U)] inequalities in access/ utilisation of health-care services, [D(F)] inequalities in financing, [(A)] represents differences in demographic composition, [(Y)] the distribution of goods and services, [D(Y)] differences in the disposal of goods and services , and [G] is gender.

The importance of a fair distribution in the way health care is financed stems from the fact that it may contribute to better health by reducing the barriers of people who need care that otherwise would not be able to obtaining it due to its high costs, or paying for health care might lead them impoverished and exposed to more health problems (WHO, 2000).

2.2 The Institutional Setting

The Spanish institutional setting is such that since 2002 the organisation of health care has been totally devolved to the 17 different Autonomous Communities (ACs). These have responsibility for health-care delivery, while financing is still mainly in the hands of the central government. However, ACs differ in several ways with regard to the delivery of care, including the role of the private sector (e.g., in Catalonia 70% of hospitals are privately owned); culture and political preferences (e.g. the priority given to equity); supplementary health insurance (e.g., more than 20% of the population purchases

private health insurance (PHI) in Catalonia, the Balearic Islands and Madrid)[4]; and the organisation of health care. Moreover, territorial health-care financing follows the lines of capitation formulae that does without risk-sharing adjustments (López *et al.*, 2004). Therefore, some ACs might be better prepared to undertake *pro-poor* health policies than others.

Although the possibility of introducing mild co-payments has been discussed in some ACs, visits to GPs and specialists are still free at the point of delivery everywhere. As GPs act as gatekeepers to health-care access, it is likely that some inequalities are the result of accessing a health-care layer. Recent studies have examined horizontal inequalities in the use of health care in Spain (Urbanos, 2001, Abásolo *et al.*, 2000), but none of these have analysed the role of the different ACs. Due to the decentralisation process that has taken place, the question of whether different ACs are equally successful in eradicating inequalities has become a key policy issue.

3. Data and Methods

3.1 Data

The calculation of income-related inequalities in health status and health-care access is based on the Spanish National Health Survey 2001 (hereafter SNHS) drawn up by the Ministry of Health and Consumption. The survey, which consists of 21,120 interviews undertaking during May and June 2001, has been widely used and is fully representative of each AC. The SNHS follows a multi-stage, stratified sampling system, with the basic sampling units being urban districts. It contains the information needed to elicit inequality indexes for the relevant variables, namely access and the final outcome, health status.

The health status variables were built by using the following self-assessed health status question:

"Let us talk about your health status; in the last 12 months, would you say your health status could be defined as very good, good, fair, bad or very bad?".

These five categories were then sub-grouped into three main categories: 1) "excellent" and "very good", 2) fair, 3) "bad" and "very bad" (see Table A1). The aim was to use these categories measure

[4] People with PHI might not support policies expanding access to primary and specialist care that is already covered by PHI.

health combining not only a purely qualitative scale, but to add some difference sin the intensity of self reported health so as to obtain a cardinal measure of health.An interval regression (Fonseca and Jones, 2003) was estimated, making use of the visual analogue scale (VAS) categorisation og health status collected in the Catalan Health Survey 2002, the onely one available at the time of the study that would contain income information.

Besides this, the health-production determinants used by the study in the regression model included income, professional status, educational attainment (as conveying positive effects on health production), civil status (to cover the personal-interaction effects arising from marriage), and AC. Age and gender were included to account for specific effects that cannot be modified, (known as unavoidable inequalities). Income was measured as a cardinal variable from interval regression specifications and was compared to the average income obtained from the Spanish Household Budget Continuous Survey.

To examine inequalities in health-service the following question used was:

"Have you visited a physician for any health problem or illness in the last couple of weeks?".

Table 1 suggests the existence of significant differences in self-reported health status (SRHS) between ACs. Indeed, after transforming SRHS using the VAS, very small differences were observed in the order: the Spearman rank correlation was above 0.9, and it did not modify the position of the ACs at the ends of the distribution. The correlation with income improved after this transformation, which possibly indicates that income is correlated with health-related quality of life. Finally, the correlation between the predictions of an ordered probit model and an interval-regression model was approximately 0.7. Therefore, this provides some initial confirmation that the methodology pursuing is valid.

Table 1. Self-reported Health Status and VAS level by AC

		SRHS		VAS	
	N	**Mean**	**s.e**	**Mean**	**s.e**
Andalusia	2473	2.13	0.02	0.781	0.001
Aragon	1211	2.04	0.02	0.788	0.001
Asturias	993	2.05	0.03	0.790	0.001
Balearic Islands	994	2.11	0.03	0.788	0.001
Canary Islands	1211	2.15	0.02	0.778	0.001
Cantabria	985	2.02	0.02	0.792	0.001
Castile la Mancha	1242	2.13	0.02	0.778	0.001
Castile Leon	1851	2.11	0.02	0.786	0.001
Catalonia	2451	2.14	0.02	0.793	0.001
Valencia	1869	2.08	0.02	0.782	0.001
Extremadura	1240	2.10	0.02	0.770	0.001
Galicia	1838	2.28	0.02	0.775	0.001
Madrid	2457	2.09	0.01	0.793	0.001
Murcia	983	2.01	0.03	0.781	0.002
Navarre	994	1.90	0.02	0.799	0.001
Basque Country	1845	2.04	0.02	0.797	0.001
La Rioja	979	2.00	0.02	0.791	0.001
Coef. variation		0.04		0.01	

Note: SRHS=Self-reported health status. The best SRHS ('very good') takes value 1 and the worst one ('very bad') takes value 5. VAS=Visual analogue scale, which is computed from the predictions of an interval regression against a set of independent variables (age, gender, income, educational level and cohabitation).

Finally, to examine inequalities in financing two types of data are required in these calculations. On the one hand, individual-level data are needed to calculate individual health-care payments and, on the other hand, macroeconomic data are required to find out the weights to be assigned to each kind of payment. Although other micro-data sets (e.g., the European Union Household Panel) were available, and contained more complete income information, this study finally opted for the Spanish Household Budget Continuous Survey 2000 (HBCS) carried out by the Spanish National Statistics Institute (INE)[5] since it offered a great deal of information on household-consumption expenditures including indirect-tax payments.

[5] The survey methodology is available at the site: http://www.ine.es/en/daco/daco43/notecpf8597_en.htm

3.2 Inequalities in Health Methods

Researching horizontal equity in health involves examining whether the income distribution of health care compares to that of need. As in previous studies, need was examined using variables from the SRHS as well as other variables such as disability and morbidity which are commonly available in health surveys such as the one employed in this study.[6] Previous studies exploring inequalities in health confirm that indeed there are significant inequalities in health (Urbanos, 2000; Abasolo *et al.*, 2001). However, more recent studies employ different methodologies and raise some methodological questions (García and López, 2004a, 2004b and Costa-Font, 2005) such as the need to obtain a cardinal measure of health to examine inequalities further. Indeed, recent research proposes cardinalising the SRHS by applying the *Health-Related Quality of Life* (HRQoL) values used by van Doorslaer and Jones (2003), Jones and Fonseca (2004). Following van Doorslaer and Jones (2003), the equivalent cardinal value of the cut-off point of each response to the ordinal question was obtained so as to estimate the cardinal value of self-reported health using an interval-regression approach.

As mentioned previously, this study used VAS values taken from the Catalan Health Survey which were attributed to the other ACs. Ideally a cardinal measure of health should be obtained for each region, but this information was not available. On the other hand, unlike it is found in studies with cross country heterogeneity, one should not expect large within country difference sin how people value similar health states Indeed, some studies simply attribute the values found in a survey from British Columbia in Canada or other *Health-Related Quality of Life* (HRQoL) . We estimate health status using a linear index based on rescaling the ordered variable to obtain a normalised health index, as in Cutler and Richardson (1997). However, this still implies accepting some arbitrary assumptions on the value and distribution of individual health status[7]. On the other hand, social position can be

[6] Self-reported variables are considered to be suitable because they correlate with measures of morbidity and health-care use (Idler y Benyamini, 1997). Although the existence of potential biases in individual perceptions of own health status is well known, they reflect aspects of health that might not be immediately observable using measures of physical health.

[7] The underlying reasons for an individual categorisation into a specific health scale are still not accounted for. Therefore, some research claims that SRHS can be interpreted instead as individual categorisation into an interval, which can be ascertained by finding a link between self-reported measures of health and some health-utility indexes (van Doorslaer and Jones, 2003). This allows the use of interval regression so as to generate a continuous measure of self-reported health. In the Spanish case, the only possible measure of such an index was the VAS, used in the Catalan Health Survey, in order to obtain the inferior and superior intervals for each self-reported health response (see Appendix).

measured in a rank drawn from a socio-economic reference variable, namely individual income.[8] The method of estimating the inequalities in health follows the standard decomposition methodologies described in the next section.

3.3 Inequalities in Access Methods

Health-care-utilisation data such as visits to the doctor are known to have a highly-skewed distribution; the majority of survey respondents report no visits or very few visits, and only a very small proportion of individuals report frequent use. The negative binomial model, which allows for over-dispersion, has often been shown to be an adequate choice in studies of health-care utilisation (see Urbanos, 2001, for an examination of health inequalities in the Spanish context.) The present study used a conservative estimate of health care access by defining it as access to any physician regardless of being GP and/or specialist visit (as in Atella *et al.*, 2004) and used the same methodology as van Doorslaer *et al.* (2004). The underlying hypothesis was that use or access (U) depends on need (H), income (Y) and other variables (X) as follows:

$$U_i = f(Y_i, H_i, X_i) \qquad (4)$$

so that a health system can be evaluated by the extent to which patients have equal access for equal need. This implies observing a measure of access, through a probit or a linear probability model, and decomposing inequalities as required. Indeed, after estimating the utilisation specification, following a decomposition method using a linear-regression model, linking the variable of interest to a set of *k* exogenous determinants is used:

$$y_i = \alpha + \sum_k \beta_k x_{ki} + \varepsilon_i \qquad (5)$$

it is possible to apply Rao's theorem for income inequality, so that the concentration index (CI) of the probability of visiting a doctor can be decomposed by factors:

[8] It is assumed that income is well measured and adequately proxies permanent and absolute income, and is associated with other proxies of socio-economic status including individual and family wealth. The extent to which this holds or whether the introduction of additional controls available in the databases makes any difference to the estimates is a matter of future research.

$$CI = \sum_k \left(\frac{\beta_k \mu_k}{\mu} \right) CI_k + \frac{GC_\varepsilon}{\mu} \qquad (6)$$

where μ_k is the mean of the k variable, CI_k is the concentration index of the k variable and the last term is a generalised concentration index for the residuals. Equation (6) shows that the CI of the probability of contacting a physician can be thought of as the sum of two components. The first term is the deterministic component, equal to a weighted sum of the concentration indexes of the k repressors, where the weights are the elasticities of y (excluding the constant) with respect to each variable x_k, evaluated at the sample mean. The second term is a residual component that reflects the inequality in utilisation of health care that cannot be explained by systematic variation across income groups in the x_k. The main drawback of the decomposition method is the requirement of a linear-regression model and the need to rely on the fact that y is additive in its components. Van Doorslaer, Koolman and Jones (2004) propose an approximation based on the partial effects representation for the decomposition analysis, which has the advantage of being a linear additive model of utilisation assuming a linear model or an equivalent transformation. Once total inequality has been broken down into components, the inequity index can be calculated by the difference between the actual utilisation inequality and the estimated income-inequalities of certain variables that are considered unavoidable, such as those measuring needs, namely age and gender:

$$HI = \hat{C}I \text{ actual} - \sum_n \hat{C}I \text{ need} \qquad (7)$$

Hence, to obtain a measure of inequity rather than inequality, it is common practice to subtract unavoidable components, such as gender and age (CI^*) from the inequality measure.

3.4 Inequalities in Financing Methods

The purpose of this section is to analyse the extent to which individual public and/or private payments to finance health-care services in each Spanish AC are related to ability to pay. In other words, to quantify whether this relationship is proportional, progressive or, alternatively, regressive. A financing scheme is said to be "progressive" when the ratio of health payments to income increases as income grows. It is considered "regressive" when the opposite is true and "proportional" when the ratio is constant through all income levels. In a markedly progressive financing scheme the proportion of the financial burden of health-care payments borne by the lowest income group is lower than its total income share, while the reverse is true for the richest part of the society. This study made use of progressivity indices, particularly the *Kakwani index* (Kakwani, 1977), to measure the degree to which the different health-care financing payments in each AC are progressive.

This study followed a two-stage procedure. Firstly, the degree of progressivity with respect to each particular kind of payment is scrutinised and, secondly, overall progressivity is assessed by weighting the Kakwani indices calculated for each type of health-care payment. To that end it is necessary to examine all the different kinds of payments (public and private) used by individuals to buy health services. This means considering not just direct or "out-of-pocket" payments but also private medical-insurance premiums and direct and indirect taxes, given that the Spanish national health system is financed through general taxation. In practice, in order to derive Kakwani indices for each payment source and AC, before-tax Gini coefficients and Concentration indices were computed for all payments by using micro-data and what is known as the "convenient covariance method" (Jenkins, 1988).

3.5 Health Care Payments and Weights

The study used the HBCS 2000 to derive public and private payments such as income taxes, VAT taxes, excise taxes, property taxes, out-of-pocket payments and private medical-insurance premiums. However, before calculating income taxes it was necessary to transform the income variable that in the HBCS was measured as household earnings, net of taxes and in interval terms. Therefore, firstly a continuous measure was derived by performing an interval regression model and using the characteristics of the head of household. Secondly, equalised net income was found by applying the

modified OECD equivalence scale. Finally, gross annual equalised income was deduced after adjusting the effective income-tax rates by income brackets which were obtained from the Spanish Tax Administration (AEAT, 1999). From this earnings measure, individual income taxes were easily computed by applying the effective tax rates.

For VAT payments we grouped goods and services subjected to the indirect tax into three categories, given the three legal VAT tax rates in Spain (4, 7 and 16%). Individual payments were then derived by using VAT tax rates and the above mentioned equivalence scale.[9] Hence, we implicitly assume that the tax changes lead to equivalent market price changes. To calculate excise taxes or duties, we followed admittedly simplistic imputation methods given the lack of sufficient information. For beer, alcohol and alcoholic beverages (wine, spirits, liquors, cava, "sherry"…) tax payments were deduced applying to equalized consumption the share of total revenues in 2000 (taken from official statistics as MAT/AEAT, 2000) to total aggregate consumption from the Survey. However, tobacco taxation was imputed differently: cigarettes and cigar spending (at market prices) were assimilated to the tax base and after deflating these amounts by their duty rates (54% for cigarettes and 12.5% for cigars) individual tobacco payments were calculated.[10] Finally, we also assigned individual payments for the energy excise tax which represents the most important duty tax in Spain. Although the fiscal tax base is determined in physical units, from declared spending on petrol (leaded and unleaded gasoline, gas-oil….) and liquid combustibles for housing (gas-oil, fuel-oil…) we applied a weighted tax duty rates for petrol (41%) and combustible liquid (9.84%) to derive individual payments.[11] As for the local property tax, the imputation was easier since the CHBS includes one question regarding this type of payment. Household payments for both the principal and secondary house (if any) were simply transformed into individual tax payments.

Hence, we could impute up to four classes of public payment (income, VAT, excise and local-property taxes) at the individual level. As Table 2 reports, these taxes represented 71.4% of the total tax

[9] We took into account that consumption spending is measured at market prices, that is, VAT and, in some cases, special taxes are included.
[10] Other smoking tobaccos were excluded from the estimations.
[11] From information on i) average monthly sell retailing prices of different energy products in the year 2000 −disentangling between price before taxes, VAT and excise taxes− offered by the "Oil Bulletin. Year 2000-2001", European Commission (http://europa.eu.int/comm/energy/en/oil/bulletin_en.html#Monthly%20Prices%202000) and ii) aggregate consumption of petrol products in Spain (Energy national Committee, http://www.cne.es/mercados.html) we constructed the above mentioned weighted average energy duty rates as the share of excise duties to selling prices.

revenues collected by government bodies in Spain in 2000. Table 2 also compares allocated taxes vs. revenues collected; making it possible to know to what extent the public payments assigned to individuals in the sample are representative. Although VAT payments were quite satisfactorily assigned, since almost 70% of total VAT revenues were allocated to individuals, unfortunately duties and local property taxes were poorly imputed (20% and 11%, respectively). The imputation of income tax is, certainly, poor. However, since almost 80% of total income-tax revenues in Spain are attributed to labour income and almost all incomes in the HBCS-2000 are of the same nature (capital incomes are very poorly measured), income payments allocated in our sample represented 40% of total labour income-tax revenues. This indirectly demonstrates the existence of large-scale income sub-reporting in the HBCS, even when information is only declared through income intervals.

Table 2: Macroeconomic Aggregates and Tax Payment Imputations (in millions of pesetas)

Tax Payments	Imputation According to HBCS(**) 2000	Revenues Collected in 2000	Per Cent
1. Income tax	2.18 E+6	6.78 E+6	32.2%
2. Local property tax	1.37 E+6	6.98 E+5	19.6%
3. VAT tax	3.97 E+6	5.78 E+6	68.7%
4. Excise taxes (*)	2.74 E+6	2.58 E+6	10.6%
Direct Taxes		10.62 E+6	
Taxes: 1+2+3+4		16.19 E+6	
Total Taxation		22.76 E+6	

Note: 1. The revenue figures were obtained from "Cuentas Consolidadas de las Administraciones Públicas, Año 2000" computed according to the European system of national and regional accounts (ESA-95). 2. Total taxation refers to national accounts of a) import and production taxes and b) wealth and income taxes. (*) Fiscal revenues do not include taxes on some types of transport and minor taxes. Source: own elaboration.
(**) HBCS = Household Budget Continuous Survey

Table 3: Structure of Health-Care Payments

Health Financing Payments	Per Cent
1. Income Tax	31.89
2. Local Property Tax	3.28
3. VAT	27.18
4. Excise Taxes	13.75
5. Public or Tax Payments ([1]+[2]+[3]+[4])	76.10
6. Direct (Out-of-Pocket) Private Payments	19.71
7. Private Health Insurance Payments	4.19
8. Private Payments ([6]+[7])	23.90
9. Total Payments ([5]+[8])	100

Source: Own elaboration.

In addition, two types of private health-care service acquisition payments were considered.[12] On the one hand out-of-pocket payments for medical services, paramedical services, hospitalisation care, drugs, therapeutic material and devices, and, on the other hand, private medical-insurance premiums.

According to the Spanish Ministry of Health and Consumption[13] total public health-care expenditure in the year 2000 amounted to €32,671m, or 5.7% of the GDP. It is estimated that 76.1% of total health-care expenditure corresponds to the NHS, while the remaining 23.9% (1.7% of GDP) corresponds to the private health-care sector.[14] This macroeconomic evidence together with the information in Table 2 made it possible to calculate the "macroeconomic weights" (Table 3), which are used to aggregate health-care payments. Under the rubric of "Public or Tax Payments" the study aggregated income, VAT, excise and local property taxes. In addition, under the heading of "Private Payments" it grouped all direct and indirect payments devoted to financing private health care services. Hence, "Total Payments" was calculated by summing up public and private payments.

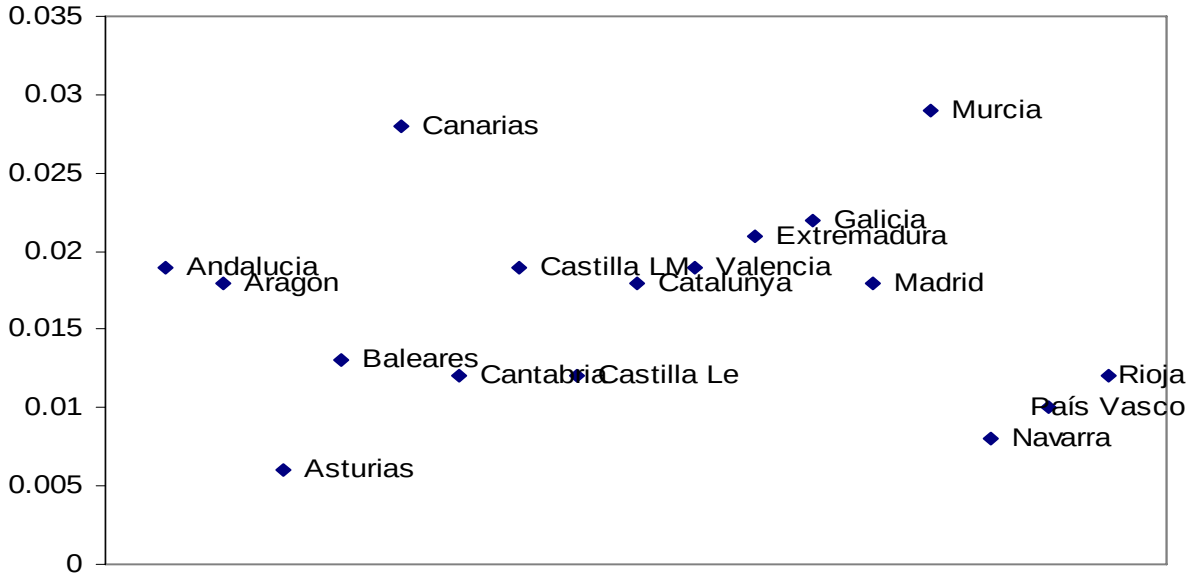
[12] The survey collects information on effective health spending incurred by households and excludes any imputed spending by use of public health care services.
[13] "Estadística del Gasto Sanitario Público" del Ministerio de Sanidad y Consumo
[14] Out-of-pocket payments represent approximately 82.5% of total private-health spending, while insurance payments amount to 17.5% (Gil, 2004).

4. Empirical Results

4.1 Income-related Inequities in Health

From the different specifications of health production in Spain the study found that income-related inequalities in health were moderate: CI was 0.017 and the inequity index was 0.016, all leading to significant inequity coefficients by ACs after bootstrapping standard errors (Figure 1). These results are consistent with the view that the Spanish health care system exhibits non pervasive health inequalities, most likely due to its equal access for equal need as some studies predict (Lahelma *et al.*, 2002). The Canary Islands, Murcia, Galicia and Extremadura displayed the most inequality and inequity, and Asturias, Navarre, the Basque Country and Castile-Leon the least. It was therefore not possible to conclude that the ACs with health-care responsibilities exhibited higher inequalities in health. Interestingly, by grouping inequalities by regions with decentralised responsibilities in 2001 the study found an inequity coefficient of 0.015 even though *a larger inequality coefficient (0.018) was found in regions with centralised health care responsibilities than in those with transferred health-care responsibilities (0.016).*

Figure 1. Income-related Inequities in Health by AC



Navarra=Navarre, País Vasco= the Basque country, Castilla Le=Castile Leon, Baleares=the Balearic Islands, Catalunya= Catalonia, Castilla LM=Castile la Mancha, Andalucia=Andalusia, Canarias=the Canary Islands,

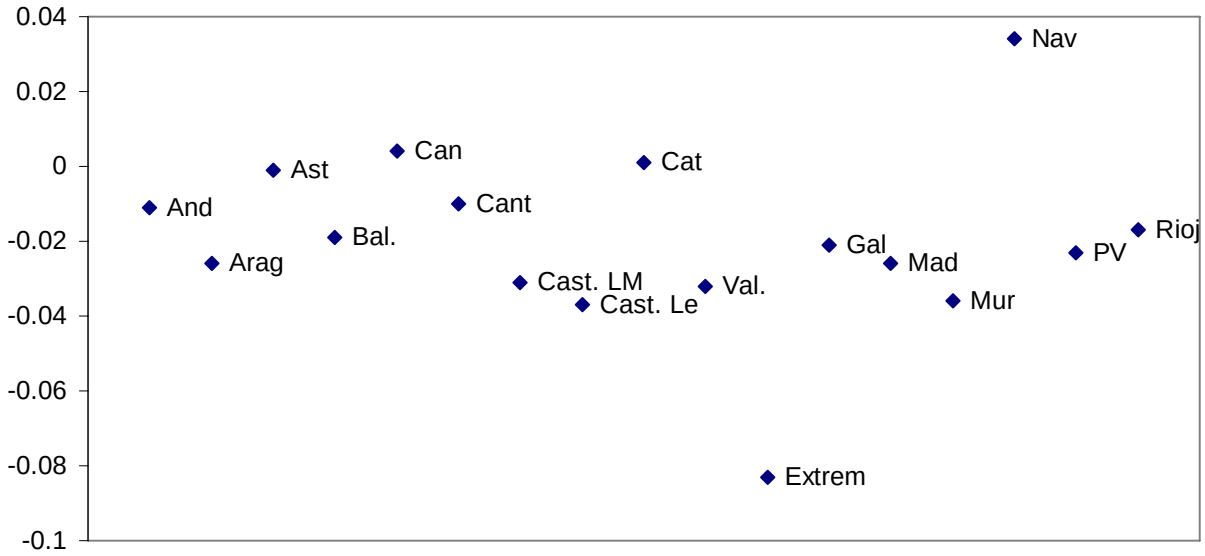
4.2 Income-related Inequities in Access to Health Care

As Table 4 reveals, the probability of a medical visit varied from a high 30% in Madrid to a moderate 13% in Navarre. There was also significant variability between regions that were subject to a common healthcare-management system. The estimation of inequity indices in Figure 2 mostly exhibited a negative coefficient although there were marked differences between them. Hence, inequities in the probability of access to health care were actually pro-poor, showing that individuals with lower incomes use the health system more. Interestingly, some figures were very close to zero and, except in the case of Navarre, no ACs exhibited statistically significant inequalities. These results are consistent with previous work (García and López, 2004), especially when a decision variable such as the purchase of PHI is not included. Indeed, our results was not dependent on the type GP or specialist visit, but on the underlying controls for socio-economic position.

Table 4: Probability of a visit to a physician across ACs

	N	Mean	Std. Dev
Andalusia	2473	0.23	0.42
Aragon	1211	0.21	0.41
Asturias	993	0.24	0.43
Balearic Islands	994	0.20	0.40
Canary Islands	1211	0.22	0.42
Cantabria	985	0.18	0.39
Castile la Mancha	1242	0.24	0.42
Castile Leon	1851	0.24	0.43
Catalonia	2451	0.25	0.43
Valencia	1869	0.28	0.45
Extremadura	1240	0.28	0.45
Galicia	1838	0.19	0.40
Madrid	2457	0.30	0.46
Murcia	983	0.21	0.41
Navarre	994	0.13	0.34
Basque Country	1845	0.21	0.41
La Rioja	979	0.24	0.43
Coef. variation		0.18	

Figure 2. Income-related Inequities in Access to Health Care



And=Andalusia, Arag=Aragon, Ast=Asturias, Can=Canary Islands, Cant=Cantabria, Cast LM= Castile la Mancha, Cast Le=Castile Leon, Cat=Catalonia, Val.=Valencia, Extrem=Extremadura, Gal=Galicia, Mad=Madrid, Mur=Murcia, Nav=Navarra, PV=Basque Country, Rioj=La Rioja.

4.3 Progressivity in Health-Care Financing

According to Rodríguez *et al.* (1993) in the 1980s the Spanish health-care financing system was regressive, with a negative Kakwani index for total payments of −0.023 (and a Suits index of −0.036). Similar results were found by van Doorslaer *et al.* (1993). This finding is not strange given that most health-financing resources came from social security contributions (61.7% of total payments), while general taxation barely covered 14% (direct taxes: 7.6% and indirect taxes: 6.4%). However, at the beginning of the 1990s there were some advances towards a more progressive heath-financing system. For instance, Wagstaff *et al.* (1999) found a proportional financing scheme with a Kakwani index for total payments of 0.0004, with public payments (78.3% of total payments) slightly progressive (0.0509) but private payments clearly regressive (−0.1627). The key element behind this change in pattern was the creation of a National Health Service in 1986, which ultimately meant a change in the composition of the financing sources; while social security contributions lost their preponderant role (from 62% in 1980 to 22% in 1990), general taxation increased its contribution (from 14% in 1980 to 56.3% in 1990). Income tax doubled its contribution to total-system progressivity and increased its share in total financing (31% in 1990) but a similar trend was observed in the case of indirect taxation

(from 6.4% in 1980 to 25.5% in 1990) especially when Spain introduced VAT after joining the European Community in 1986.

Table 5: Gini and Kakwani Indices for Health-Care Payments (2000)

		Kakwani Indices				
	Gini Index (Gross Equiv. Income)	**Income Tax Payments**	**Indirect Tax Payments**	**Public Payments**	**Private Payments**	**Total Payments**
Spain	**0.3089**	**0.3811**	**-0.1024**	**0.0429**	**-0.0922**	**0.0337**
Andalusia	**0.3142**	**0.4447**	**-0.0792**	**0.0486**	-0.0487	**0.0412**
Aragon	**0.3338**	**0.3729**	**-0.2014**	-0.0305	**-0.1842**	-0.0379
Asturias	**0.2771**	**0.3427**	**-0.1076**	**0.0520**	-0.1267	*0.0397*
Balearic Islands	**0.2878**	**0.3196**	**-0.0686**	**0.0503**	-0.0989	*0.0382*
Canary Islands.	**0.3407**	**0.4216**	**-0.1038**	**0.0430**	*-0.0923*	0.0293
Cantabria	**0.2681**	**0.3741**	-0.0730	0.0175	**-0.1811**	0.008
Castile Leon	**0.2923**	**0.3839**	**-0.0921**	**0.0467**	-0.0965	**0.0382**
Castile la Mancha	**0.2656**	**0.4344**	**-0.0857**	0.0342	0.0180	0.0330
Catalonia	**0.2917**	**0.3407**	**-0.1228**	**0.0395**	**-0.1191**	**0.0287**
Valencia	**0.2956**	**0.3977**	**-0.0906**	**0.0602**	**-0.1240**	**0.0465**
Extremadura	**0.3463**	**0.4860**	**-0.1319**	*0.0649*	*-0.2005*	0.0447
Galicia	**0.2895**	**0.4137**	**-0.0699**	**0.0458**	-0.0422	**0.0396**
Madrid	**0.3003**	**0.3346**	**-0.1224**	*0.0274*	-0.0824	0.0205
Murcia	**0.3033**	**0.4601**	**-0.1087**	0.0006	-0.0955	-0.0051
Navarre	**0.2763**	**0.3108**	*-0.0699*	**0.0538**	**-0.1708**	*0.0436*
Basque Country	**0.2875**	**0.3370**	**-0.1209**	0.0243	**-0.1543**	0.0148
La Rioja	**0.2778**	**0.3709**	**-0.1083**	0.0260	0.0238	0.0258

Note: Robust standard errors were computed for the statistical inference analysis. Coefficients statistically significant at 5% (10%) are in bold (italic) typeface.

Table 5 reports the Gini and Kakwani indices computed. The first row presents the results for the whole country. The Gini index for Spain in 2000 was 0.3089, indicating significant inequality in the distribution of equivalent gross income, which arguably justified public intervention. For instance, the top decile received almost eight times more income than the bottom one. By contrast, income (labour) taxes were highly progressive (Kakwani index: 0.3811) with the eighth, ninth and, especially, the tenth deciles being the only ones that contributed more than their income share. In fact, several studies indicated that the interplay of the personal and family tax-relief thresholds and labour-income deductions were key elements behind the highly progressive and re-distributive structure of Spanish

income tax (Onrubia and Rodado, 2003). As expected, the structure of indirect taxation (VAT and excise taxes) was regressive with a Kakwani figure of −0.1024. Consequently, the Kakwani index for public payments was positive and statistically significant (0.0429). This finding was crucial given that public payments represented 76.1% of total payments. Private health expenditure appeared to be regressive, although this result was the combination of regressive out-of-pocket payments and progressive private-insurance premiums. When the public and private financing sources are added together, the system was slightly progressive with a Kakwani index of 0.0337. Again, the top three deciles were the only ones that paid more than their income-share. Thus, over the last two decades, the Spanish health-care system has gained in terms of vertical equity and in the reduction of inequalities in the allocation of the financial burden, moving from a regressive framework in the 1980s to a more progressive system at the beginning of the 21st century.

Table 5 contains another important piece of information. It shows the degree to which each financing source in each AC was progressive or regressive. Great variability in the degree of gross-equivalent-income inequality was observed at the regional level. According to the study's micro-data, the Gini index ranged from relatively high values, such as 0.3463 (Extremadura), 0.3407 (Canary Islands.) or 0.3338 (Aragon), to low values, such as 0.2656 (Castile-La Mancha), 0.2681 (Cantabria) or 0.2763 (Navarre). Interestingly, the data revealed a non-statistically significant correlation between income inequality and average annual equivalent regional income. Not surprisingly Kakwani indices for income (labour) taxes were positive and significant, indicating a high degree of progressivity in all ACs, although there was noticeable regional disparity. Hence, income taxes contributed to achieving a more even income distribution at regional level, since higher income deciles paid a relatively larger proportion of income tax. As expected, the distribution of indirect tax revenues in relation to income resulted in a negative and significant value for the Kakwani index in all ACs with the exception of Cantabria, conveying a high degree of regressivity for these payments at regional level. Consequently, given the relative share of each financing source the present study found that the public financing of health-care services was progressive in most of the Spanish ACs and proportional in the rest. Interestingly, regarding private health payments (out-of pocket payments and insurance premiums) the results were very mixed: in some ACs they were highly regressive (-0.2005 in Extremadura; -0.1842 in Aragon; -0.1811 in Cantabria; -0.1708 in Navarre; -0.1543 in the Basque Country) but in others there was evidence of proportionality.

The last column of Table 5 shows the overall progressivity of the financing system in each AC, computed by taking a weighted average of the progressivity indices for each individual financing source. The estimated overall Kakwani indices suggested that in 8 of the 17 ACs health-care finance was only modestly progressive: 0.0465 (Valencia), 0.0436 (Navarre), 0.0412 (Andalusia), 0.0397 (Asturias), 0.0396 (Galicia), 0.0382 (Castile-Leon), 0.0382 (Balearic Islands) and 0.0287 (Catalonia). In other words, all the ACs that had assumed health-care responsibilities over the last ten or twenty years (with the exception of the Basque Country) exhibited moderate progressivity in their health-care financing schemes.

4.4 Determinants of Inequalities: a Cross-Correlation Approach

The main reason for undertaking the present study was to identify the correlation between the different variables that explain inequalities (see Wagstaff *et al.*, 1997). To explore this question, we undertook both cross-correlation and regression analyses to search for associations between measures of inequality in health, in access, and in financing in order to explain their potential determinants.

Simple correlation analysis among all possible variables suggested that inequalities in health were positively and significantly associated with gross-income inequalities at the regional level (0.672, $p<0.05$). A positive correlation was also found between inequities in health and income inequalities (0.675, $p<0.05$). Interestingly, an even a stronger association was found for the ACs with health-care responsibilities (0.810, $p<0.05$ and 0.805, $p<0.05$, respectively). On the other hand, there was evidence of a negative association between inequalities in the probability of access to health care and gross-equalised-income inequalities (-0.601, $p<0.05$), although this pattern was only observed in those AC with health-care responsibilities centralised at national level (0.720, $p<0.05$). A negative association between inequities in the probability of use and income inequality was also found for these ACs (-0.698, $p<0.05$). Finally, no association was found between total progressivity in health financing and inequalities and inequities in health status and access to health care.

4.5 The Determinants of Health Inequalities Using Regression Methods

In Table 6 we report the results of a set of regressions exploring the determinants of the income-related inequalities and inequities in health status among Spanish ACs. A set of possible explanatory variables taken from theoretical debates were considered, including financing progressivity, inequalities in use, income inequalities, health-care spending, and number of physicians. For obvious colliniarity issues, the entire set of variables could not be included in the same equation, particularly those referring to inequalities/inequities in the probability of use and income inequality. Results suggested that inequalities (inequities) in health status among ACs were explained by income inequalities, consistent with the absolute-income-hypothesis approach. As expected, when income inequality was excluded the impact of inequalities in the probability of health-care use was negative and statistically significant; suggesting that improving the pro-poor access inequality would result in a fairer distribution in the level of health. Finally, the number of available physicians let to a statistically significant reduction in health inequalities (inequities) which would mean that health inequalities (inequities) are, at least to some extent, a problem of heath-care resources.

Table 6: Ordinary Least Square estimation of Health Inequality and Inequity by AC

	Health Inequality			**Health Inequity**		
	Eq. [1]	**Eq. [2]**	**Eq. [3]**	**Eq. [1]**	**Eq. [2]**	**Eq. [3]**
Constant	-0.0094	0.0740	0.0219	-0.0164	0.0986	**0.0333**
Total payment progressivity	-0.0130	-0.0388	-0.0061	-0.0002	-0.0302	-0.0318
Inequality in use	----	----	**-0.0832**	----	----	----
Inequity in use	----	----	----	----	----	-0.0413
Income inequality	**0.1557**	**0.1573**	----	**0.1685**	**0.1667**	----
Health-care spending	----	-0.0152	----	----	-0.0194	----
Number of physicians	**-0.0043**	----	-0.0025	**-0.1639**	----	-0.0038
N	17	17	17	17	17	17
F test	12.61	8.71	6.53	7.64	8.13	2.04
R-squared	0.688	0.495	0.542	0.630	0.515	0.275

Note: Robust standard errors were computed for the inference analysis. Coefficients statistical significant at 5% (10%) are in bold (italic) typeface. Overall health-care financing progressivity is assessed through the Kakwani index. Inequality in use is measured as the inequality in the probability of visiting a physician. The Gini coefficient is used to measure equivalent gross-income inequality. Health-care spending is measured as the log of average spending per capita in each AC, and the number of physicians is expressed per 1000 inhabitants.

5. Discussion

This paper attempted first to obtain an empirical estimate of the extent to which different regional health systems in Spain exhibit inequalities in health, health-care access and financing and the extent to which regional governments that possessed health care responsibilities exhibit higher inequalities in health. This was done using representative data at AC level for 2001 when seven regions possessed health responsibilities whilst the remaining ten did not. Secondly, we used the estimated coefficients to examine the connection between income-related inequalities in health, health care access and health financing by using cross-correlation analysis from homogeneous units to provide further insights. A previous study by van Doorslaer *et al.* (1997) employed country-based data from different surveys, but that suffered from significant institutional and survey-specific heterogeneity. This evidence allows us to examine whether inequalities in financing and in the use of health care explain inequalities in health. Unlike previous studies this research covered health-related inequalities in the whole of Spain, using region state data for all the different types of inequalities.

The study found evidence of some intra-territorial income-related inequalities (inequities) in Spain, and consistent with other studies that examine Canadian data (Jimenez-Rubio *et al.*, 2007) we found that decentralisation did not appear to be the variable that accounted for the rise of inequalities in health or in health care access; if anything it seemed to curtail health inequalities (**RQ1**). Inequities in the probability of access were very slight and the study found overall health financing to be progressive and equitable. With the remarkable exception of the Basque Country and Madrid, most of the remaining ACs showed moderate levels of progressivity in their health financing schemes, suggesting that financing followed equitable patterns. Income inequalities were the main variable explaining both income-related inequalities and inequities in health along with health care capacity. It was also found that (pro-poor) inequalities in access had a statistical negative impact on health inequality, showing that enhancing the access of poorer people to health services would mean a fairer distribution of health. This explains why inequalities in access are connected to inequalities in health (**RQ2**).

The relevance of this study lies in that unlike other goods, health care cannot be distributed directly (Hausman *et al*, 2002). Health equity can mainly be indirectly promoted through few health and social

policies but primarily with fiscal instruments that transfer income from the relatively affluent to the relatively poor, policies to invest in poor neighbourhoods and that improve environmental determinants behind health production. This is usually combined with long-term policies to cut down inequalities in health such as education programmes to ensure that children receive adequate health information and lead healthy lifestyles regardless of the socio-economic status of their parents. On the other hand, in the case of inequalities in access to health care, policies can be introduced to improve the conditions of care delivery, or to make the financing more pro-poor. However, in undertaking active social policies it is important to remember that a pro-poor distribution of income that does not reduce inequalities in health is not necessarily welfare-improving (Contoyannis and Forster, 1999). This is due to the fact that some allocation alternatives make better use of existing resources and therefore greater improvements in welfare.

Some of the areas not covered in this study are the extent to which inequalities in health are explained by factors such as inequalities in the access to drugs (in Spain drugs are one of the few health-care inputs that are subject to cost sharing). The main caveats of this study are that it only examines a cross-section. Longitudinal data is gradually being made available to examine changes in health inequalities over time, which could enable researchers to obtain further insights into what lies behind them. Deaton (2002) found that societies with lesser income inequalities were also those with lesser health inequalities. However, it is important to focus on specific studies of individual conditions, given that evidence at the individual and at the aggregate level might be significantly different (Evans, 2002). Indeed, it is necessary to include individual heterogeneity when looking for explanations for health inequalities. This can be done by exploring longitudinal databases and including the environmental factors underlying health-production determinants.

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Table A1. Matching the ESCA(*) and the Spanish National Health Survey 2001

	N	%	Mean VAS (**)	St.d. VAS
Very good	2734	32.57	86.736	11.501
Good	3858	46.01	75.496	13.622
Fair	1437	17.17	56.924	15.764
Bad	355	4.25	38.149	19.026

Source: Encuesta de Salud de Catalunya (ESCA), 2002.
* The Catalan Health Survey (ESCA)
** Visual Analogue Scale

Table A2. Descriptive statistics

	Total		Transferred management		Insalud*	
Variable	Mean	Std. Err.	Mean	Std. Err.	Mean	Std. Err.
Health	0.773	0.000	0.774	0.000	0.772	0.0005
Log_income	11.80	0.003	11.74	0.005	11.86	0.0046
Age2m	0.109	0.002	0.110	0.003	0.108	0.0027
Age3m	0.104	0.002	0.104	0.003	0.103	0.0027
Age4m	0.107	0.002	0.106	0.003	0.108	0.0027
age2f	0.113	0.002	0.113	0.003	0.113	0.0028
age3f	0.109	0.002	0.110	0.003	0.108	0.0027
age4f	0.257	0.003	0.250	0.004	0.264	0.0039
ed1	0.107	0.002	0.109	0.003	0.106	0.0027
Cohabit	0.839	0.010	0.894	0.015	0.785	0.0122
reg1	0.097	0.002	-	-	-	-
reg2	0.047	0.001	-	-	-	-
reg3	0.039	0.001	-	-	-	-
reg4	0.039	0.001	-	-	-	-
reg5	0.047	0.001	-	-	-	-
reg6	0.038	0.001	-	-	-	-
reg7	0.048	0.001	-	-	-	-
reg8	0.072	0.002	-	-	-	-
reg9	0.096	0.002	-	-	-	-
reg10	0.073	0.002	-	-	-	-
reg11	0.048	0.001	-	-	-	-
reg12	0.072	0.002	-	-	-	-
reg13	0.096	0.002	-	-	-	-
reg14	0.038	0.001	-	-	-	-
reg15	0.039	0.001	-	-	-	-
reg16	0.072	0.002	-	-	-	-

* National Institute of Public Health Care (Spain)

Table A3 Specification and Decomposition of Health Inequalities

	$\hat{\beta}_k$	$\bar{x}_k$	$\hat{C}_k$	$C = \Sigma_k \hat{C}_k \hat{\eta}_k$	$I^* = C - C^*$
$\hat{h}$		0.787	0.017	0.0175	0.0165
Income	0.073	11.807	0.013	0.01416	0.01416
age2m	-0.035	0.109	0.347	-0.00171	-
age3m	-0.063	0.104	0.071	-0.00059	-
age4m	-0.055	0.107	-0.192	0.00143	-
age2f	-0.051	0.113	0.263	-0.00193	-
age3f	-0.079	0.109	-0.210	0.00230	-
age4f	-0.031	0.257	-0.140	0.00143	-
Cohabit	0.019	0.673	0.005	0.00008	0.00008
ed1	-0.060	0.107	-0.789	0.00646	0.00646
Reg*1	-0.014	0.097	-0.276	0.00046	0.00046
reg2	-0.018	0.047	0.266	-0.00029	-0.00029
reg3	-0.041	0.039	0.798	-0.00162	-0.00162
reg4	-0.043	0.039	0.562	-0.00119	-0.00119
reg5	-0.029	0.047	0.005	-0.00001	-0.00001
reg6	-0.007	0.038	-0.146	0.00005	0.00005
reg7	-0.017	0.048	-0.048	0.00005	0.00005
reg8	-0.013	0.072	-0.197	0.00023	0.00023
reg9	-0.029	0.096	0.009	-0.00003	-0.00003
reg10	-0.020	0.073	0.145	-0.00027	-0.00027
reg11	-0.007	0.048	-0.303	0.00014	0.00014
reg12	-0.032	0.072	-0.137	0.00040	0.00040
reg13	-0.034	0.096	0.378	-0.00157	-0.00157
reg14	-0.012	0.038	0.081	-0.00005	-0.00005
reg15	0.020	0.039	-0.349	-0.00034	-0.00034
reg16	0.004	0.072	-0.319	-0.00012	-0.00012
Intercept	-0.023	-	-	-	-

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