The importance of the health inequality measure in international comparisons: A comparison of Australia and Sweden using the SF-36.

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ABSTRACT

In recent work on international comparisons of socio-economic inequalities in health the concentration index has been used as the measure of health inequality. A drawback of this measure is that it is sensitive to whether it is estimated with respect to health or morbidity. An alternative would be to use the generalized concentration index that is based on absolute rather than relative health differences. In this methodological paper we explore the importance of the choice of health inequality measure by comparing the income-related inequality in health status and morbidity between Sweden and Australia using both the concentration index and the generalized concentration index. As the measure of health we use the SF-36 that measures health in terms of an eight-scale profile of different aspects of health. Our results show that whether the concentration index is estimated with respect to health or morbidity has a large impact on the results, the ranking between the two countries is reversed for six of the eight dimensions of SF-36. Irrespectively of if the concentration index is estimated with respect to health or morbidity it also yields different results differ from the generalized concentration index.

Key words: Health inequality, Concentration index, International comparisons.

INTRODUCTION

The measurement of socio-economic inequalities in health has become an important field in health economics (Wagstaff et. al. 1991; Wagstaff and van Doorslaer 2000). In a recent contribution Van Doorslaer et al. (1997) for instance estimated income-related inequalities in health for nine industrialized countries. According to their results the inequalities in health significantly favored higher income groups in all countries. Van Doorslaer et al. (1997) used the concentration index as the measure of inequality and used self assessed overall health status as the measure of health. The concentration index was, however, estimated with respect to morbidity (ill health, i.e. the deviation from full health) rather than health. In a subsequent contribution Gerdtham and Johannesson (2000) estimated concentration indices with respect to both morbidity and health in different age-groups in Sweden. They noted that the age pattern differed depending on whether the concentration indices were estimated with respect to measures of health or morbidity and that this implies that the inequality ranking between countries may differ depending on if health or morbidity is used. The main purpose of this methodological paper is to explore why this is the case by comparing the income-related inequality in health status and morbidity between Sweden and Australia.

In this study we employ the SF-36 as the measure of health status. The SF-36 measures health in terms of an eight-scale profile of different aspects of health. The eight scales are constructed by combining the scores from different items in the survey. The multi-dimensional nature of SF-36 facilitates a detailed examination of how inequality affects different aspects of health. A secondary purpose of this study is therefore to explore the contribution of different aspects of health to the income related inequality in health. Further, since the scales are themselves derived from different health related questions, we examine ways of decomposing concentration indexes to understand the degree to which different questions contribute to overall inequality. In the methods section below we give an overview of the methodological issues involved in the measurement of socio-economic inequalities in health and outline the data used. We then present results based on data from recent population health surveys in Sweden and Australia. A discussion of these results is contained in the final section.

METHODS

Measurement of health status

A number of different health measures have been employed in previous work on the measurement of socio-economic inequalities in health. In the international comparisons work of Van Doorslaer et al. (1997) a categorical measure of the self-rated health status was converted into a continuous health measure. Gerdtham et al. (1999) used a continuous health measure on the scale 0 (death) to 1 (full health) measured by the rating scale method and the time trade-off method. These health measures are used to construct quality-adjusted life-years (QALYs) commonly used as an outcome measure in cost-effectiveness analysis. QALYs and life-years were also used as the health measure in the study by Gerdtham and Johannesson (2000) and several previous studies have also focused on inequalities in mortality (Le Grand 1987, 1989; Kunst and Mackenbach 1992, 1994; Valkonen 1989).

The last few years has witnessed the development of standardized surveys for measuring health status. A prime example being the SF-36 health survey that has been translated and studied in over 40 countries and has been included in surveys of the general population in the US, UK, and Australia (Ware and Gandek 1998; ABS 1996). The SF-36 survey is a 36 item questionnaire that measures health in terms of eight multi-item scales: physical functioning (PF), role limitations due to physical problems (RP), role limitations due to emotional problems (RE), social functioning (SF), mental health (MH), energy/vitality (EV), bodily pain (BP) and general health perception (GH) (Ware and Gandek 1998). For each scale the relevant item scores are coded, summed and transformed on to a scale from 0 (worst possible health state measured by the questionnaire) to 100 (best possible health state) The developers claim the scales of the SF-36 can be interpreted as "quasi-interval measurement scales" (Ware and Gandek 1998) suggesting that such scales are not only able to consistently rank health states, but the ratio of differences between scores has meaning. While such a claim is open to debate, it is important to note that most techniques to quantify inequality require measures which have at least these measurement properties. Table 1 provides summary information on the eight scales of SF-36.

The SF-36 is used as the measure of health status in this study. There are at least two advantages of using a generic health status instrument such as the SF-36 to compare the distribution of health across different countries. Firstly, considerable effort has been expended on its translation and cultural adaptation for use on different populations. Secondly, its multi-dimensional nature facilitates a detailed examination of how inequality affects different aspects of health. In this way, it is likely to provide greater insight into the nature of social gradient than can be obtained from the analysis of a single health related question. While several of the SF-36 scales have been shown to display a gradient indicating the presence of health inequality by type of employment (Hemingway et. al. 1997) and educational level (Regidor et. al. 1999) it has not previously been used to compare health inequality across different populations.

Measurement of Inequality

While many techniques for quantifying the degree of health inequality have been developed, few meet the three desirable criteria identified by Wagstaff et.al. (1991) of capturing the socioeconomic dimensions of health inequality, reflecting the experiences of the entire population, and being influenced by changes in the distribution of the population across different socioeconomic groups. A measure that fulfils these criteria is the concentration index. To illustrate how the concentration index can be applied to the SF-36 consider a population that is divided into n groups which are ranked from lowest to highest according to income. Let h_i denote the total mean raw score of a scale of the SF-36 for income group i $(i = 1, 2, ..., n)$ and $\bar{h}$ the mean score for the entire population.

This can be regarded as a measure of 'good health' in that higher values indicate better health status on that scale. It is also possible to transform these raw scores by deducting them from the ceiling or highest value to generate a measure of morbidity. On the transformed scale higher values indicate poorer health status. In regard to the SF-36 each h_i can be deduced from the ceiling value of 100 to generate such a measure which we denote as m_i and $\bar{m}$ is the corresponding mean morbidity score for the population. To illustrate the various measures of inequality in this section we employ a hypothetical population consisting of five income groups of equal size, where h_1 to h_5, for the income groups ranked from lowest to highest, is 55, 65, 75, 85 and 95 and hence $\bar{h}$ is 75.

Inequality can be measured in two different ways depending on whether one is concerned with measuring the relative or absolute distribution of health (or morbidity) across these income groups. Turning first to relative measures, as Wagstaff et. al. (1991) illustrate a concentration index can be measured by plotting a health concentration curve $L(s^H)$ which represents the cumulative proportion of the population ranked by income, starting with the lowest income group against cumulative proportions of h_i (see Figure 1 which illustrates the health concentration curve for the health distribution for the hypothetical population). If the scores are evenly distributed among the different income groups the concentration curve coincides with the diagonal. In contrast if health inequalities are present the concentration curve will lie below the diagonal and the farther it lies from the diagonal the greater the degree of inequality. The health concentration index CI_H is defined as twice the area between the concentration curve and the diagonal and this ranges from –1 to +1 and measure the distribution of health across the population. In practice concentration indexes are often calculated using regression based methods which also facilitate the use of statistical inference when appropriate standard errors are calculated (Kakwani et.al. 1997). When statistical inference is not required an easier formula for calculating concentration index is outlined in Yao (1999) and employing this method we denote p_i as the relative population frequency of group i, and $w_i = p_i h_i / \bar{h}$, then:

$$CI_H = 1 - \sum_{i=1}^{n} p_i (2 s_i^H - w_i) \qquad (1.)$$

Where

$$s_i^H = \sum_{k=1}^{i} w_i$$

is the cumulative share of health up to i. Eq (1.) should be applied after the groups have been ranked from lowest to highest in terms of an indicator of socioeconomic status (eg income). The sums of p_i and w_i are both equal to unity. Applying Equation 1 to the hypothetical population CI_H is equal to 0.11. In this context, a positive value signifies income related health inequality, with CI_H attaining its maximum value of +1 when all health is concentrated in the highest income group. Alternatively, the morbidity concentration index CI_M can be applied to quantify the distribution of morbidity by plotting a concentration curve $L(s^M)$ which represent cumulative proportions of the population against cumulative proportions of m_i (also see Figure 1). For any given distribution of health CI_M has the opposite sign to CI_H in that a negative (positive) morbidity concentration index indicates inequality favoring higher (lower) socioeconomic groups. As is visually apparent in Figure 1, $L(s^M)$ is further from the diagonal than $L(s^H)$ and CI_M is equal to –0.32 indicating greater relative differences in the measure of morbidity than in health.

These concentration indices provide a measure of the relative differences between different socioeconomic groups and have two important properties regarding the nature of inequality they are measuring. They provide a measure that is independent of the scale on which h_i or m_i is measured. This means that an equi-proportional increase or decrease in scores across all income groups does not affect the inequality measure Hence, if h_i was uniformly increased 10% across all groups- the concentration index would not change. However, a concentration index is not invariant to a transformation such as deducting h_i from the ceiling value of 100 to generate m_i. For any given set of differences between socioeconomic groups, the higher $\bar{h}$ the smaller will be the absolute magnitude of CI_H. At the same time a higher $\bar{h}$ results in CI_M increasing in magnitude, because $\bar{m}$ must decline leading to greater relative differences between groups (Cowell, 1999). Hence in our hypothetical population the concentration index when measured in terms of morbidity is three times greater than the concentration index when it is measured in terms of a measure of health.

An alternative approach to measuring inequality is the generalized concentration index, Wagstaff et. al. (1991) derive such an index by multiplying the relative health (morbidity) concentration curve by $\bar{h}$ ($\bar{m}$). The generalized health concentration curve $L(a^H)$ shows the cumulative percentage of the population graphed against the cumulative *amount* of h_i. Figure 2a shows such a curve applied to the hypothetical population. Similarly a generalized morbidity concentration curve $L(a^M)$ can be derived by graphing cumulative percentage of the population graphed against the cumulative *amount* of m_i (See Figure 2b). The generalized concentration indexes for health and morbidity, which we denote as CI'_H and CI'_M, are defined as twice the area between the respective concentration curve and the diagonal. The generalized equivalent of Equation 1 is:

$$CI'_H = \bar{h} - \sum_{i=1}^{n} p_i (2a_i^H - p_i h_i) \qquad (2.)$$

where

$$a_i^H = \sum_{K=1}^{i} p_i h_i$$

The CI'_H based on Figure 2a is equal to 8. Similarly CI'_M can be calculated for the same population and is equal to –8. The generalized concentration index is not independent of scale, but has the property of *translation independence* in that the measure of inequality is unaffected by a fixed score being added or subtracted from each group, or in this case the score from each group being deducted from a fixed score (Cowell 1999). This property means the absolute size of the concentration index is invariant to whether it is measured in terms of health or morbidity. That the generalized concentration index is not independent of scale means that the absolute size of the index will vary with the scaling of the health measure, i.e. a health measure from 0-100 yields a different index value than a health measure from 0-1. However, this is unlikely to be an important limitation since as long as the same health measure is used in different countries the ranking of the countries will always be the same irrespective of the scaling of the health measure. To compare the generalized concentration index between countries when the scaling of the health measure differs will, however, not be meaningful.

Decomposition of the concentration index

An important aspect of the eight SF-36 scales is that they are constructed by combining scores from several different items. For example, the RE scale is based on the three items (Q5a,Q5b and Q5c) relating to questions regarding whether emotional problems have lead to: reductions in the amount of time spent on work or other activities; accomplishing less than they would like; and not undertaking work or other activities as carefully as usual. Responses to each item are scored as zero for a 'yes' response and one for a 'no' response. The score for the RE scale is obtained by adding together the individual item scores, dividing the total by three and multiplying by 100 to obtain a score that ranges between zero and 100. While it is possible to measure the degree of inequality in the RE score, it would be also useful to examine to what degree individual items contribute to overall inequality. A useful property of the concentration index is that it can be decomposed into its constituent items, making it possible to examine whether some items are more responsible than others for the degree of inequality in a particular scale.

If a scale of the SF-36 is based on the scores of F items, then following Yao (1999) the concentration index for the scale can be exactly decomposed into its F components. Let CI_{H_f} be the concentration index for each item $f\,(f = 1, 2, ..., F)$, $\bar{h}_f$ the mean of the item score, and $w_f = \bar{h}_f / \bar{h}$ the share the item score represents in the total scale score. It can then be shown that:

$$CI_H = \sum_{f=1}^{F} w_f CI_{H_f} \tag{3.}$$

In other words the overall health concentration index is a weighted average of the concentration indices of the item scores on which it is based.

Accounting for demographic influences

When calculating concentration indexes it is important to age-sex standardize the data, because these demographic factors influence both health status and income. When conducting comparisons of inequality across countries it is necessary to apply the same population structure when standardizing indicators of morbidity to avoid the problem of confounding that arises when countries have different demographic structures. Since the scores of the SF-36 can take on multiple values, the response rates for the levels of each scale must be standardized before calculating the mean standardized level of morbidity by income group (Wagstaff and van Doorslaer 1994). In this study we directly standardize the scores for each income group in Sweden and Australian to a standard European population (Waterhouse, 1976). The age-sex specific response rates of each income group are applied to this population to yield a distribution of illness by income group that applies if all income groups had the same age-sex composition.

Data sources and study population

The primary data sources are health surveys of the general population in Australia and Sweden that incorporated the SF-36. In Australia the SF-36 was administered as part of the 1995 *National Health Survey* (ABS 1996) to 19,785 persons aged over 18 years in all States and Territories. All eligible persons in selected households completed a written version of the SF-36 prior to the main survey (ABS 1996). In all, data on 19,301 persons who completed part or all of the SF-36 were made available to researchers in the confidential unit record file. The high response rate is in part due to the extensive work undertaken by the Australian Bureau of Statistics to encourage respondent cooperation. This unit record data file contained information on the individual's age (in five year age groups), sex and gross annual income from all sources (wages, interest, profits etc) which is reported in $5000 income groups (e.g.$0-$5000, $5000-$10000 etc) up to $75000 with higher incomes reported in an open-ended category(ABS 1997). Since the number and relative size of groups (in terms of population share) affect the concentration index income was aggregated into six categories (<$5000, $5000-$14999, $15000-$29999, $30000-$44999, $45000-$69999, $70000+) to match the number and size of the income categories used in the Swedish data set. After excluding item non-response for all the relevant questions there were 12,877 persons aged between 18 and 80 years in the Australian sample.

The Swedish data were collected in Uppsala County, situated in mid-eastern Sweden north of Stockholm. The county is dominated by some larger towns, a couple of smaller towns and the rural areas. The chief town, Uppsala, is one of Sweden's largest university towns. Uppsala County had 288,475 inhabitants in 1995, of which 49% were men and 51% were women, which exactly matches the proportion of men and women in

Sweden as a whole. The age distribution is somewhat different from the rest of Sweden with more younger and less older inhabitants. In Uppsala 22% are younger than 30 years and 7% older than 75 years, compared to 18% and 9% for Sweden as a whole. The difference in age and the fact that Uppsala is a university town leads to a population with more unmarried and more well educated inhabitants compared to Sweden as a whole.

The data are based on a self-administered postal questionnaire that, after piloting, was sent to a random sample of 8000 inhabitants aged 20-84 years in Uppsala County in Sweden during October 1995. The questionnaire was designed to elicit information about the general population's health, health care utilisation, quality of life, attitudes, etc. Two remainder mailings were made and of the total 8000 questionnaires 5404 were returned, giving a response rate of 68%. The majority of non-respondents did not give any reason for their failure to respond (n=2274); a smaller group stated that they did not want to participate (n=132). For reasons of anonymity, no sample information was kept after posting the questionnaires. Therefore a strict dropout analysis could not be conducted. However, respondents did not differ significantly from the county population as whole with regard to such socio-economic factors as gender, age, marital status and education level.

The SF-36 was part of the Uppsala County questionnaire and this data is used in the present analysis. From the questionnaire we also used information about age, gender and gross personal income (which was the only information on income collected in the survey). The income data is based on a question in the questionnaire that divided gross monthly personal income in six categories: <5000, 5000-9999, 10000-14999, 15000-19999, 20000-29999, >30000. All incomes are given in Swedish Crowns (SEK). We exclude all observations with missing values on any of the SF-36 items or the socio-economic variables, leaving 4287 observations for the analysis. Since the data is from Uppsala County rather than Sweden it is important to note that the data and results cannot be assumed to be representative of Sweden as a whole. For this study this is, however, not an important limitation since we are interested in methodological issues rather than the actual differences in social inequalities in health between Sweden and Australia. For ease of interpretation we below refer to the results for Uppsala County as the results for Sweden.

Analysis

After calculating descriptive statistics for both samples two types of analysis were undertaken. Firstly, the relative and generalized concentration indexes for each of the eight scales in terms of measures of health (i.e. using raw scores) and morbidity (transformed scores) were calculated. These measures of inequality were compared and Spearman rank order correlation coefficient used to determine differences in the ranking between measures. Secondly, to illustrate the insights decomposition can provide the relative health concentration indexes for each scale was decomposed to determine the relative contributions of each item to inequality.

RESULTS

Table 2 is divided into two sections. The first section contains information on each samples socioeconomic characteristics. In regard to demographic variables the mean age of individuals and the proportion of men in the two samples is similar. The Swedish sample had a higher absolute average income based on the exchange rates in November 2000 (1 $AUS =5.2 SEK). The second section provides summary statistics for each scale of SF-36 surveys by country. With the exception of BP the mean scores in the Swedish sample were significantly higher than those reported in the Australian sample.

The relative concentration indexes for health and morbidity scores by scale are reported in Table 3. In terms of health the concentration indexes are all positive and significant indicating income related health inequality pervade all aspects of health in both countries. In both Australia and Sweden the highest degree of inequality was in RP with 0.033 and 0.026 respectively. The lowest degree of inequality was in MH for Australia (0.016) and in SF for Sweden (0.010). The relative concentration indexes in terms of morbidity were negative and larger in absolute terms reflecting the greater relative inequality across incomes groups in the measure of morbidity than the measure of health. The highest degree of inequality was in RE for Australia (-0.145) and in PF for Sweden (-0.176). The lowest degree of inequality was in EV for both Australia (-0.036) and Sweden (-0.045).

Interestingly, measuring inequality in terms of morbidity produces a different ranking between the countries. The morbidity concentration indices were higher in absolute terms in Sweden than in Australia for seven of the eight scales, whereas the health concentration indices were higher in Australia than Sweden for seven of the eight scales. For six of the eight scales the ranking of the two countries differed depending on if the concentration index were estimated with respect to morbidity or health. The ranking between the SF-36 dimensions also differed depending on if the concentration index were estimated with respect to morbidity or health. The Spearman rank order correlation coefficient between the concentration indices for health and morbidity was 0.252 (p=0.548) for Sweden and 0.723 (p=0.043) for Australia.

Table 4 lists the generalised health concentration indexes. It is not necessary to also report the generalised morbidity concentration index since these would be of the same magnitude and simply have the opposite sign. In Sweden the highest level of absolute inequality were on the scale RE (3.761), while in Australia it was in the scale RP (2.650). The lowest level of inequality was in EV for Sweden (1.957) and MH for Australia (1.24). The generalized concentration indices were higher in Sweden than in Australia for all the eight dimensions. The ranking between the SF-36 dimensions differed compared to the concentration indices for both health and morbidity. The Spearman rank order correlation coefficient between the generalized concentration indices and the concentration indices for health was 0.826 (p=0.011) for Sweden and 0.952 (p=0.000) for Australia. The corresponding correlation coefficients between the generalized concentration indices and the concentration indices for morbidity was 0.333 (p=0.420) for Sweden and 0.857 (p=0.007) for Australia.

Finally, Table 5 show the proportion each item contributes to the respective scales by country. For example, in Australia item 5a and 5b both contribute 37% to overall inequality on the RE scale with the remaining item (5c) only contributing 25%. In the Swedish sample decomposition reveals that the relative contributions to the RE scale are more even, with 5c contributing more and 5a and 5b less to inequality. Overall the impression of the results in Table 5 is that the contribution of the different items to the inequality within a dimension is relatively even for most dimensions.

DISCUSSION

The concentration index has been used in comparisons of the income-related inequality between countries (Van Doorslaer et al. 1997). Our results show that whether the concentration index is defined with respect to morbidity or health can greatly affect the ranking between countries. For only two of the eight scales of SF-36 was the ranking between Australia and Sweden the same for health and morbidity. The reason for this problem is that the concentration index measures the relative difference between socio-economic groups and the relative difference will depend on if the concentration index is defined with respect to morbidity or health.

One way to overcome this problem is to use the generalized concentration index instead that measure the absolute difference in health between socio-economic groups. We estimated generalized concentration indices as well in our data set. This yielded a third ranking between Australia and Sweden. According to the generalized concentration indexes the income related inequality was higher in Sweden than Australia for all the eight scales of SF-36. This ranking between the countries was similar to the concentration index for morbidity that was higher in absolute terms in Sweden for seven of the eight scales. The ranking between the SF-36 dimensions within a country was, however, closer to the ranking for the concentration indices for health for both Sweden and Australia.

A priori one cannot determine which of the three health inequality measures used in this paper is most appropriate. An advantage of the generalized concentration index is that it is not affected by whether it is measured with respect to health or morbidity. On the other hand the standard in for instance the income inequality field is to focus on relative differences in income, as measured by the Gini coefficient. On the choice between health and morbidity often indicators of morbidity are used to measure health inequality (eg whether an individual has a chronic illness) when indicators of health could equally be used (eg whether an individual is free from any chronic illnesses). However, estimating concentration indices with respect to ill-health (morbidity) is more problematic when a more comprehensive health measure such as quality-adjusted life-years is used (Gerdtham and Johannesson 2000). In such a case there is no obvious upper bound on the maximum health needed to define ill-health (i.e. it is necessary to define an upper limit on the number of life-years so that the loss of life-years can be estimated with respect to this upper limit.)

Our results demonstrates that the ranking of income-related inequality in health between countries (and dimensions of health) is sensitive to whether the concentration index or the generalized concentration index is used, i.e. whether the inequality is measured as relative or absolute differences between income groups. Furthermore if the inequality is measured as relative differences, as has been the standard approach in the recent comparisons, the ranking is sensitive to whether the concentration index is measured with respect to health or morbidity. In the study by Van Doorslaer et al (1997) comparing nine countries the concentration indices were estimated with respect to morbidity. If measures of health were used instead the ranking between countries may well change.

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Table 1: Summary information on the SF-36 scales and physical and mental component summary scores

	Number of		Items	Definition	
	Items	Levels		Lowest possible score(0)	Highest possible score (100)
Physical functioning (PF)	10	21	3a-3j	Very limited in performing all activities including bathing and dessing	Performs all types of physical activities including the most vigorous without limitations due to health
Role-physical (RP)	4	5	4a-4d	Problems with work or other daily activities as a result of physical health	No problems with work or other daily activities
Bodily pain(BP)	2	11	7,8	Very severe and extremely limiting pain	No pain or limitation due to pain
General Health (GH)	5	21	1,11a-11d	Evaluates personal health as poor and likely to get worse	Evaluate personal health as excellent
Energy(EV)	4	21	9a,9e,9g,9i	Fells tired and worn out all of the time	Feels full of energy
Social functioning(SF)	2	9	6,10	Extreme and frequent interference with normal social activities due to physical and emotional problems	Performs normal social activities without interference due to physical or emotional problems
Role-Emotional(RE)	3	4	5a,5b,5c	Problems with work or other daily activities as the result of emotional problems	No problems with work or other daily activities
Mental health(MH)	5	26	9b,9c,9d,9f,9h	Feelings of nervousness and depression all of the time	Feels peaceful happy and calm all of the time

Adapted from Ware and Gandek (1998)

Table 2 Sample descriptives

Variable	Mean (Standard deviation)	
	Swedish survey (*n*=4,287)	**Australian National Health Survey** (*n*=12,877)
Socioeconomic variables		
Age (years)	43.12	42.68
Proportion of men	0.47	0.48
Individual income (p.a)	SEK 161,292	$24,268.7
Sf-36 Domain Scores		
PF	89.98 (17.52)	85.14 (21.36)
RP	84.66 (30.85)	81.37(34.08)
BP	76.75 (24.24)	77.26 (24.45)
GH	75.26 (75.26)	72.26 (20.16)
EV	65.88 (22.11)	64.30 (19.50)
SF	87.56 (19.84)	85.46 (21.82)
RE	84.95 (30.42)	83.82 (31.64)
MH	79.08 (79.08)	75.81 (16.84)

Table 3: Relative concentration indexes by scale of the SF-36

	CI for Health(*h*) (S.E.) (Sf-36 scores)		**CI for Morbidity(*m*) (S.E)** (100-Sf-36 score)	
	Sweden	**Australia**	**Sweden**	**Australia**
PF	0.016 (0.005)	0.023 (0.005)	-0.176 (0.021)	-0.117 (0.031)
RP	0.026 (0.006)	0.033 (0.006)	-0.164 (0.013)	-0.132 (0.024)
BP	0.022 (0.005)	0.023 (0.007)	-0.091 (0.016)	-0.073 (0.022)
GH	0.025 (0.005)	0.026 (0.007)	-0.093 (0.009)	-0.065 (0.017)
EV	0.015 (0.006)	0.020 (0.004)	-0.045 (0.004)	-0.036 (0.008)
SF	0.010 (0.004)	0.020 (0.004)	-0.107 (0.016)	-0.116 (0.029)
RE	0.022 (0.007)	0.029 (0.004)	-0.152 (0.011)	-0.145 (0.022)
MH	0.017 (0.005)	0.016 (0.003)	-0.087 (0.008)	-0.051 (0.009)

Table 4 Generalized concentration indexes by scale of the SF-36

	Health (Sf-36 scores)	
	Sweden	**Australia**
PF	2.311	1.902
RP	3.407	2.650
BP	2.864	1.730
GH	3.072	1.842
EV	1.957	1.271
SF	2.446	1.713
RE	3.761	2.416
MH	2.744	1.236

Table 5 Decomposition of CI for each scale by item

Scale/ Item	Percentage contribution to the CI for each scale by country		Scale/Item	Percentage contribution to the CI for each scale by country	
PF	**Sweden**	**Australia**	GH	**Sweden**	**Australia**
3a	18	10	1	25	26
3b	11	12	11a	19	23
3c	13	12	11b	20	20
3d	13	13	11c	9	8
3e	6	10	11d	27	23
3f	9	12	EV		
3g	16	12	9a	41	28
3h	6	9	9e	39	33
3I	4	6	9g	11	19
3j	6	4	9I	8	20
RP			SF		
4a	23	19	6	40	48
4b	31	26	10	60	52
4c	23	27	RE		
4d	23	28	5a	35	37
BP			5b	34	37
7	47	53	5c	31	25
8	53	47	MH		
			9b	17	23
			9c	16	28
			9d	25	12
			9f	21	23
			9h	21	15

Figure 1: Relative health and morbidity concentration curves

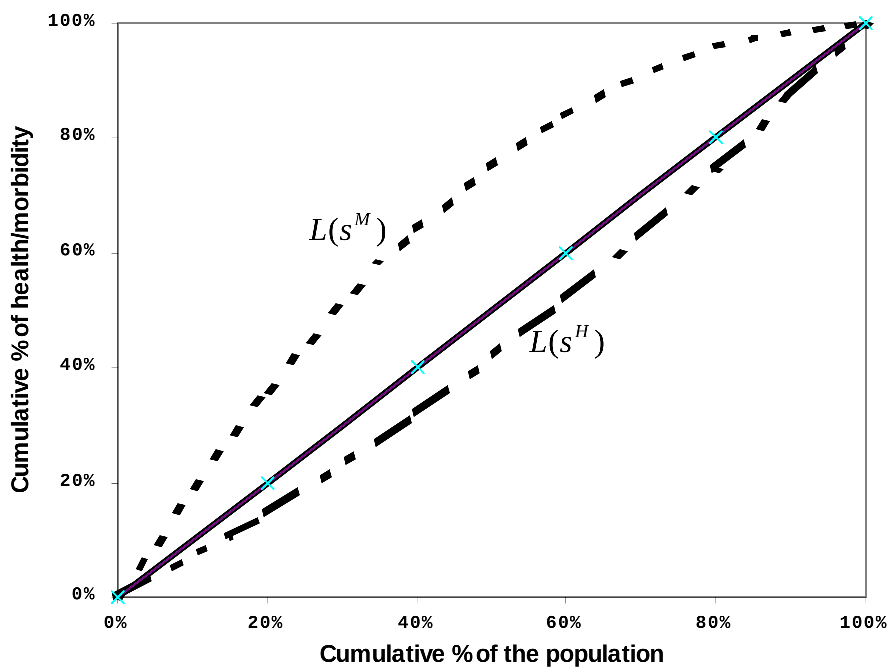

Figure 2a: Generalized health concentration curve

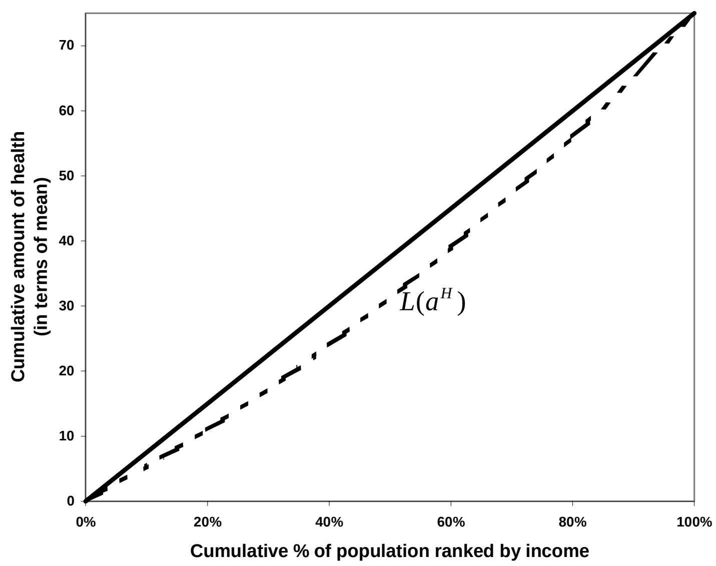

Figure 2b: Generalized morbidity concentration curve