Inequality Aversion, Health Inequalities, and Health Achievement

Adam Wagstaff

Development Research Group and Human Development Network, World Bank, Washington, D.C., USA and School of Social Sciences, University of Sussex, Brighton, UK

awagstaff@worldbank.org

January 2002

Without wishing to incriminate them in any way, I am grateful to Eddy van Doorslaer, and two anonymous referees for comments on an earlier version of this paper. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent. Working papers describe research in progress by the author and are published to elicit comments and to further debate.

Abstract

This paper addresses two issues. The first is how health inequalities can be measured in such a way as to take into account policymakers' attitudes toward inequality. The Gini coefficient and the related concentration index embody one particular set of value judgements. By generalizing these indices, alternative sets of value judgements can be reflected. The other issue addressed is how information on health inequality can be used together with information on the mean of the relevant distribution to obtain an overall measure of health "achievement."

Keywords: Health inequality, inequality aversion, equity-efficiency tradeoffs.

1. Introduction

The literature on health inequality measurement has benefited substantially from cross-fertilization, both within the discipline of economics (principally from the literature on income inequality measurement to the literature on health inequality measurement) and between the disciplines of economics, epidemiology, and public health (see e.g., Wagstaff, Paci, and van Doorslaer 1991; Mackenbach and Kunst 1997). This paper extends the literature on health inequality measurement in two directions, borrowing heavily on the income inequality literature.

The first is to allow for the fact that commonly used summary measures of health inequality have ethical judgments about inequality aversion built into them—albeit implicitly. This is true, for example, of the Gini coefficient, which has been used to measure pure health inequality (Le Grand 1987, 1989). But it is also true of the concentration index[1] (Wagstaff, Paci, and van Doorslaer 1991; Kakwani, Wagstaff, and Van Doorlsaer 1997), which has been used to measure *socioeconomic* inequalities in health—i.e., health inequalities by income or by some other measure of socioeconomic

[1] Similar remarks apply to the slope index of inequality used by epidemiologists (see e.g., Kunst, Geurts, and van den Berg 1995; Pamuk 1985, 1988; Schalick and others 2000). This is closely related to the concentration index (cf. e.g., Wagstaff, Paci, and van Doorslaer 1991; Kakwani, Wagstaff, and Van Doorlsaer 1997), and implicitly involves the same ethical judgements about inequality aversion.

status.[2] The implicit ethical judgements *have* been recognized in the measurement of pure health inequality, where Atkinson's (1970) index has been used to allow attitudes to inequality to be varied (cf. Le Grand 1987, 1989). But varying attitudes to inequality have *not* been allowed for up to now in the measurement of socioeconomic inequalities in health. To allow for varying attitudes to inequality aversion, this paper develops the concentration index analogue of the Yitzhaki's (1983) extended Gini coefficient. While the aim is primarily to extend the literature on the measurement of *socioeconomic* health inequalities, the paper also contributes to the literature on the measurement of *pure* inequality, since, from a formal point of view, the latter can be thought of a special case of the measurement of socioeconomic inequality in health, where what matters is the individual's rank in the health distribution rather than their rank in the income distribution. The approach suggested here, when used in the measurement of pure health inequality, is a natural alternative to Atkinson's index.

The second direction in which the paper extends the literature on the measurement of health inequality is to recognize that policymakers are unlikely to be concerned only about health inequalities, either of the pure variety or the socioeconomic. Rather they are likely to be willing to trade off increases in inequality against improvements in the mean of the distribution (cf. e.g., Wagstaff 1991). This paper shows how, as in the income inequality literature (see e.g., Lambert 1993), a single summary measure can be computed that reflects both average health and inequality in its distribution. This index is termed here an index of "achievement," but is in effect an abbreviated social welfare function—albeit in the health domain. Again, the exposition is for the case where the interest is in socioeconomic inequalities, but the application to the case of pure inequality is immediate.

The plan of the paper is as follows. The first part of section II generalizes the concentration index to allow the degree of inequality aversion to be specified. The second part of section II proposes the achievement index that combines information on inequality

[2] There has been a lively debate over which of these approaches makes more sense and squares better with policymakers' views. See, for example, Alleyne and others (2000), Braveman and others (2001),

with information on the average level of health. Section III presents some empirical illustrations of these two measurement tools using data for 44 developing countries on socioeconomic inequalities in and average levels of three health indicators: under-five mortality, child malnutrition, and fertility.

2. Measurement issues

The starting point is the measurement of health inequalities. To make the discussion more applicable to typical health indicators, it is assumed that the health variable measures *ill health*. It might be an index based on, say, a self-assessed health question (Wagstaff and Van Doorslaer 1994; Gerdtham and others 1999; Humphries and van Doorslaer 2000). Or it might be an anthropometric measure of malnutrition (Wagstaff and Watanabe 2000; Wagstaff, van Doorslaer, and Watanabe 2001). Or it might be a binary variable capturing death prior to a certain age (Wagstaff 2000). The approach is easily modified for health measures that are increasing in good health. This section summarizes the basics of the concentration curve and concentration index, and then shows how the concentration index has underlying it an implicit value judgement concerning the weights to be attached to people in different points in the income distribution. The section then shows how the index can be extended to make explicit differing attitudes to inequality. Finally, the section shows how information on the average and on the degree of inequality can be combined into a single summary measure of health achievement that is linked to extended concentration index.

2.1. The concentration curve and concentration index

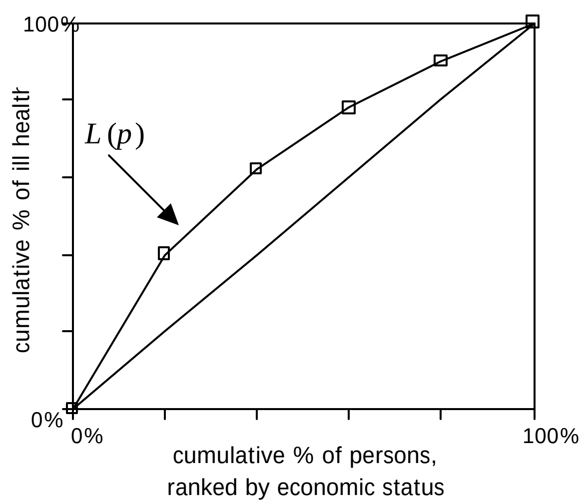
Suppose we want to measure inequalities in health by income, or some other measure of socioeconomic status (SES). (The case of pure inequality is easily handled, and is discussed briefly below.) We rank individuals by their household's income (or whatever measure of SES we are using), starting with the most disadvantaged. Let p be the cumulative proportion of people, so ranked. The curve labelled $L(p)$ in Figure 1 is an

---

Evans and others (2001), Gakidou and others (2000), Le Grand (1987), Wagstaff (2001) and Whitehead (1992).

ill-health concentration curve. It plots the cumulative proportion of ill health (on the *y*-axis) against the cumulative proportion of individuals (on the *x*-axis), ranked by living standards. If the curve $L(p)$ coincides with the diagonal, everyone, irrespective of their economic status, enjoys the same level of ill health. If, as is more likely, $L(p)$ lies above the diagonal, inequalities in ill health favor the better-off; we will call such inequalities *prorich*. If $L(p)$ lies *below* the diagonal, we have *propoor* inequalities in ill health (inequalities to the disadvantage of the better-off). The further $L(p)$ lies from the diagonal, the greater the degree of inequality in ill health between the poor and better-off. If $L(p)$ of country *X* is everywhere closer to the diagonal than that of country *Y*, then country *X*'s concentration curve is said to *dominate* that of country *Y*. It seems reasonable in such cases to conclude that there is unambiguously less inequality in ill health in country *X* than in country *Y*.

Fig 1: Ill health concentration curve



Where concentration curves cross, the literature to date has used the concentration index as a tiebreaker. This index, denoted below by *C*, is defined as twice the area between $L(p)$ and the diagonal, or equivalently one minus twice the area underneath the concentration curve:

(1) $$C = 1 - 2\int_0^1 L(p)\mathrm{d}p \,.$$

C takes a value of zero when $L(p)$ coincides with the diagonal and is negative (positive) when $L(p)$ lies above (below) the diagonal. For individual-level data, C is equal to (Kakwani, Wagstaff, and Van Doorslaer 1997)

(2) $$C = \frac{2}{n \cdot m}\sum_{i=1}^{n} y_i R_i - 1 \ ,$$

where n is the sample size, y_i is the ill-health indicator for person i, m is the mean level of ill health, and R_i is the fractional rank in the living-standards distribution of the ith person (i.e., the empirical analogue of p).

In the case where one wants to measure pure inequalities, the only change one has to make in the above is that one ranks by health (or ill health), beginning with the most healthy (or least healthy in the case where the health measure is a measure of ill health). The resultant index is, of course, the Gini coefficient.

2.2. Attitudes to inequality

Like the Gini coefficient, the concentration index implicitly embodies a particular view about where in the income distribution reductions in health inequality matter most. One way to see this clearly is to rewrite eqn (2) slightly differently:[3]

(3) $$C = 1 - \frac{2}{n \cdot m}\sum_{i=1}^{n} y_i \left(1 - R_i\right) \ .$$

The two expressions are equivalent. The quantity (y_i/nm) is the share of health (or ill health) enjoyed (or suffered by) person *i*. This is then weighted in the summation by twice the complement of the person's fractional rank. Thus the poorest person gets their health share weighted by a number close to two. The weights decline in a stepwise fashion, reaching a number close to zero for the richest person. The concentration index is simply one minus the sum of these weighted health shares.

[3] Replace -1 in eqn (2) by [1-2($S_i y_i/nm$)] and then rearrange terms.

In the income inequality literature, a variety of indices have been proposed that allow the analyst to specify explicitly the degree of aversion to inequality and then to experiment to see how sensitive the rankings of countries are to the value judgements. Of these indices, the most useful in the present context is Yitzhaki's (1983) extended Gini coefficient. Like the approach proposed by Atkinson (1970), this involves a parameter capturing the extent of aversion to inequality. The extended concentration index is equal to:

$$C(n) = 1 - n(n-1)\int_0^1 (1-p)^{n-2} L(p)\mathrm{d}p\,, \qquad n>1. \tag{4}$$

Setting n=2 gives the standard concentration index. One way of seeing clearly the ethical judgements underlying the extended concentration index[4] is to write it down along the lines of eqn (3), namely[5]

$$\begin{aligned} C(n) &= 1 - \frac{n}{n \cdot m}\sum_{i=1}^{n} y_i \left(1 - R_i\right)^{(n-1)} \\ &= 1 - \sum_{i=1}^{n} \left(y_i / n \cdot m\right) w_i \left(R_i, n\right), \end{aligned} \tag{5}$$

where $w_i(R_i,n)=n(1-R_i)^{(n-1)}$ is the weight attached to the ith person's health share, (y_i/nm). Whatever the value of n, the average value of w_i is one.[6] When n=1, w_i=1 and everyone's health is weighted equally. This is the case where the investigator is indifferent to inequality, and $C(1)=0$ however unequal the distribution of health is across the income distribution. As n is raised above 1 toward 4 (see Figure 2), the weight attached to the health of persons in the top four quintiles falls, while the weight attached to the health of persons in the bottom two deciles rises. For people in the middle four quintiles, the precise effect on w_i of raising n above 1 toward 4 depends on their location in the income distribution and on the values of n in question. The general conclusion, though, is clear: as n is raised above 1, the weight attached to the health of a very poor person rises, while the weight attached to the health of people who are above the 55th percentile decreases.

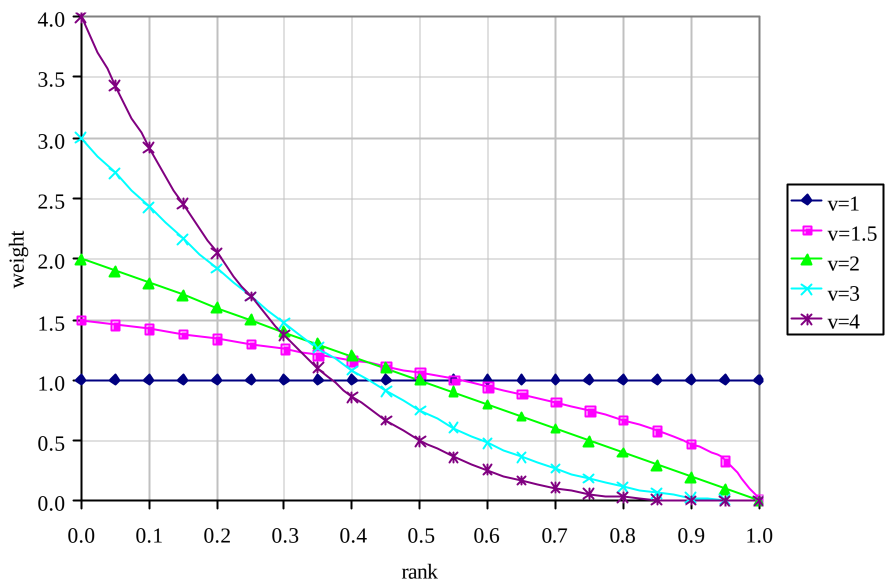
---

[4] There are other ways of showing the implied value judgements—see e.g., Yitzhaki (1994).

[5] See Appendix for derivation of eqn (5).

As can be seen, for n=6 the weight attached to the health of persons in the top two quintiles is virtually zero. When n is raised to 8, the weight attached to the health of those in the top *half* of the income distribution is virtually zero.

Fig 2: Weighting scheme for extended concentration index—eqn (5)



2.3. *Measuring achievement*

Overall "achievement" in health can be thought of as reflecting the average level of health and the inequality in health between the poor and better-off. In the context of the above index, the obvious way of thinking about achievement is as a weighted average of the health levels of the members of the community, where higher weights are attached to poorer people than to better-off people. Thus achievement might be measured by the index:

(6) $$I(n) = \frac{1}{n} \sum_{i=1}^{n} y_i n \left(1 - R_i\right)^{(n-1)},$$

[6] This is true when individual-level data are used. The situation where grouped data are used is a little more complex. See the appendix on this issue.

which is a weighted average of health levels, where the weights are as graphed in Fig 2 and average to one. It turns out[7] that this index is simply equal to:

$$I(n) = m\left(1 - C(n)\right). \qquad (7)$$

Consider the case where the health indicator is a measure of ill health (so high values of $I(n)$ are considered bad) and $C(n)<0$ (ill health is higher amongst the poor). Inequality serves to raise the value of $I(n)$ above the mean (making achievement seem worse than it seems when looking just at the mean). So, for example, two countries might have the same value of $I(n)$, but one might have a high mean but an equal distribution across income groups while the other might have a lower mean but an unequal distribution across income groups to the disadvantage of the poor. Or suppose that the mean stays unchanged over time but the distribution of health becomes more prorich. In this case, even though m has not changed, $I(n)$ rises, assuming that $n>1$. If ill-health declines monotonically with income, the greater the degree of inequality aversion, the greater the wedge between the mean and the value of the index $I(n)$.

3. Empirical illustrations

In this section, these methods are illustrated for three health indicators—under-five mortality, child malnutrition, and fertility. The computations are based on grouped data from 44 developing countries, taken from tabulations by Gawtkin and others (2000) on data from the Demographic and Health Survey (DHS). The tabulations show average values for each of five "wealth" quintiles.

3.1. Data and methods

Three indicators have been selected. The first is under-five mortality (U5MR), which is simply the proportion of children dying before they reach their fifth birthday. The second is child malnutrition, as measured by the proportion of under-five children who are classified as underweight, based on anthropometric measures (Alderman 2000).

[7] This is most simply seen by substituting eqn (5) into eqn (7) and rearranging to get eqn (6).

The third indicator is the adult total fertility rate (TFR), defined as the total number of children a woman would have by the end of her reproductive period if she experienced the currently prevailing age-specific fertility rates throughout her childbearing life. All three indicators feature in the international development targets (International Monetary Fund and others 2000), and there are specific targets for the first two.[8] There is, however, a concern (Gwatkin 2000) that progress toward population-based targets could mask uneven progress across socio-economic groups. Indeed, there is evidence that in some countries progress in reducing child mortality and malnutrition has been slower amongst the poor (Victora and others 2000; Stecklov, Bommier, and Boerma 1999; Vega and others 2001; Wagstaff, van Doorslaer, and Watanabe 2001).

Households were ranked in the production of the tables in Gwatkin and others (2000) using an index of wealth obtained from a principal components analysis (PCA) of questions on housing characteristics (e.g., the material from which the floor is made of) and ownership of household durables (e.g., bicycle, refrigerator, etc.) (Filmer and Pritchett 1999). These methods along with the factor score matrices are reported elsewhere (Gwatkin and others 2000). The data are in grouped form, based on quintiles of households. The denominators relevant for computation of the concentration indices are the sample at risk (e.g., children under the age of five in the case of child malnutrition) so that the groups are not necessarily quintiles of the sample at risk. In the case where grouped data are used to compute the extended concentration indices, certain modifications need to be made to the equations in the previous section. These and other computational issues are discussed in the Appendix.

3.2. Poor-nonpoor inequalities

Inequalities to the disadvantage of the poor are evident in all three health indicators (see Tables 1-3). They are especially pronounced for malnutrition, where the average value of $C(2)$ is equal to -0.1475. The extent of prorich inequalities varies across countries, the values of $C(2)$ ranging from –0.2590 (Brazil) to 0.0020 (Kazakhstan) in the

[8] The targets are to reduce the under-five mortality rate by two-thirds between 1990 and 2015, to halve the percentage of children suffering from malnutrition between 1995 and 2015, and to reduce child

case of the under-five mortality rate, from -0.4167 (Dominican Republic) to –0.0487 (Niger) in the case of malnutrition, and from -0.2530 (Peru) to –0.0048 (Central African Republic) in the case of the TFR.

The concern here is not so much with inequalities per se (important as these are) but rather with the extent to which measured inequality varies according to the weight attached to the poor in the computation of the inequality index. As expected, raising the value of n above 2 results in more prorich inequality. Thus, for example, for malnutrition the average value of $C(8)$ is -0.3375 while the average value of $C(2)$ is only -0.1475. Interestingly, the impact of raising n varies across countries. For example, raising the value of n from 2 to 8 causes the extended concentration index for TFR in Chad to fall from -0.0157 to -0.0777—a fourfold change. By contrast in Cameroon, the change is far smaller—from -0.0627 to -0.0843. This reflects the fact that in Chad, the TFR amongst the poorest group differs quite dramatically from the rest of the sample while in Cameroon the poorest group actually has a lower TFR than the second poorest group.

Another country whose extended concentration index is highly sensitive to the choice of n is Brazil. In the case of the TFR, for example, raising the value of n from 2 to 8 causes the extended concentration index to fall from -0.1197 to -0.6593. This is a smaller percentage change than the change in the case of Chad, but the absolute change is much larger. This reflects the fact that the TFR amongst the poorest quintile in Brazil is much higher than that amongst the other four quintiles. The heavy concentration of high fertility in the poorest group in Brazil is reflected in that county's dramatic change of rank in the TFR inequality "league table" as n is raised above 2. For n=2, Brazil is ranked 34 out of 43. When n reaches 8, Brazil is almost bottom (number 42). Namibia, by contrast, where the poorest group has a somewhat *lower* TFR than the second poorest group, sees its rank position improve from 25 to 17. While these are just examples, they serve to illustrate the point that both measured inequality and the rankings of countries by inequality can be quite sensitive to the decision of whether to depart from the implicit weighting scheme of the standard concentration index and of so by how much.

---

malnutrition to under 15 percent by 2015 (International Monetary Fund and others 2000).

3.3. Health achievement

The need to take into account inequality as well as the average level of health is also evident from Tables 1-3. Many countries that do well on one dimension (e.g., the average) do badly on the other (e.g., inequality). Brazil, for example, has low average levels of under-five mortality, child malnutrition and fertility, but the inequalities between the poor and the better off are very large. By contrast, Niger has fairly small gaps between the poor and the better off on all three indicators, but the average values of the indicator are extremely high. It is important is assessing achievement to think not just about the mean, nor just about inequality, but about both.

Moving from a focus on the mean to a focus on the achievement index produces some interesting results, especially for the TFR indicator. In the average TFR league table, for example, Mozambique comes 23rd out of 43. If achievement is measured using the index I and n is set at 2, Mozambique's position improves to 22 (the inequality in Mozambique is very low). If n is raised from 2 to 8, Mozambique moves up another eight places in the TFR achievement league table to number 14. A counterexample is Guatemala. In the average TFR league table, Guatemala is ranked 29 with a TFR of 5.08. By contrast, in the achievement league table with n set at 2, Guatemala is ranked 32. If n is raised from 2 to 8, its position slips to 41 with an achievement score of 7.54.

4. Summary and conclusions

To recap briefly, the concentration index has embedded in it a particular set of value judgements about the weights to be attached to the health of people at different points in the income distribution. The standard concentration index can be shown to be equal to the complement of a weighted sum of the health shares of the individuals in the sample. The weights decline in a stepwise fashion, starting with a weight close to two for the poorest person, declining by equal steps for each one-person move upward through the income distribution, and reaching a number close to zero at the top end of the distribution. The extended concentration index allows different weightings to be used and hence the value judgements built into the calculations to be made explicit. By setting the inequality aversion parameter n equal to 2, the extended concentration index reverts to the standard concentration index. By setting a value of n above 2, the analyst raises the weight attached to the poor (compared to the weight in the standard concentration index) and reduces the weight attached to the better off. Reducing the parameter n below 2 has the opposite effect.

The paper also showed how inequality, as measured by the extended concentration index, can be combined with information on the average to measure overall health achievement. It was shown that by measuring achievement as a weighted average of health levels, where the weights are the same as used in the extended concentration index, the resultant index is in fact simply equal to the product of the average and the complement of the extended concentration index. In the case where the measure of health is a measure of ill health, and ill health is higher amongst the poor and hence the concentration index is negative, pro-rich inequality raises the level of achievement (or "disachievement") above the mean, by a percentage that is equal to the value of the extended concentration index.

The methods were illustrated using distributional data on under-five mortality, child malnutrition and adult fertility for 44 developing countries. The results illustrate two important points, each of which has an important implication. First, levels of inequality and the rankings of countries can both be sensitive to how far one deviates from the implicit value judgements underlying the concentration index. In countries where the health of the poor is very much worse than that of the rest of the population, the increase in measured inequality when one weights more highly the health of the poor can be quite marked. This suggests that in future empirical work on health inequalities, especially in contexts where there is a specific concern with the health of the poor, more attention should be paid to the sensitivity of results—including country rankings—to the weighting scheme used in the health inequality measure. The second important point to emerge is that noteworthy changes—including major rank changes—result when one moves from an assessment of achievement based solely on the average to an index of achievement that captures both the average and the extent of inequality between the poor and better-off. These changes are especially pronounced when the weight attached to the poor is increased substantially above the weight implied by the standard concentration index, and when ill health is highly concentrated amongst the poor. This suggests that if it is indeed a concern of the international development community to ensure that improvements in health are disproportionately concentrated amongst the world's poor, it would make sense to move away from the use of population averages toward the use of an index of achievement such as that proposed here that captures both average health levels and the often large inequalities in health between the poor and better off.

Appendix

Derivation of eqn (5)

Lerman and Yitzhaki (1984) show that the extended Gini coefficient (the same logic applies to an extended concentration index) can be written as:

(A1) $$C = -\frac{n}{m}\mathrm{cov}\left(y_i, (1-R_i)^{n-1}\right) .$$

Like the standard concentration index, this can be written as a convenient regression (Jenkins 1988; Kakwani, Wagstaff, and Van Doorlsaer 1997). In this case the regression is:

(A2) $$-n\ \mathrm{var}\left[(1-R_i)^{n-1}\right]\cdot\left[y_i / m\right] = a_1 + b_1 \cdot (1-R_i)^{n-1} + u_i ,$$

where b_1 is the extended concentration index. Denoting the LHS variable by Y_i and the RHS variable by X_i, the OLS estimate of b_1 is equal to

(A3) $$\hat{b}_1 = \frac{\sum_i X_i Y_i - n\overline{Y}\overline{X}}{n s_X^2} = \frac{\sum_i X_i Y_i}{n s_X^2} - \frac{\overline{Y}\overline{X}}{s_X^2}.$$

From the definition of Y_i, we have

(A4) $$\overline{Y} = \frac{1}{n}\sum_i -n s_X^2 \frac{y_i}{m} = -n s_X^2 .$$

Substituting this and the definition of Y_i into (A3), and using the definition of X_i, yields:

$$
\begin{aligned}
\hat{b}_1 &= -\frac{\sum_i X_i n s_X^2 (y_i / m)}{n s_X^2} + \frac{n s_X^2 \overline{X}}{s_X^2} \\
&= -\frac{n}{mn} \sum_i X_i y_i + n\overline{X} \\
&= -\frac{n}{mn} \sum_i y_i (1 - R_i)^{n-1} + \frac{n}{n} \sum_i (1 - R_i)^{n-1} \\
&= 1 - \frac{n}{mn} \sum_i y_i (1 - R_i)^{n-1}
\end{aligned} \tag{A5}
$$

for large *n*.

Computation of C(v) on grouped data

From eqn (A5), it is clear that the analog of eqn (5) is equal to:

$$
C(n) = n \sum_{t=1}^{T} f_t y_t (1 - R_t)^{(n-1)} - \frac{n}{m} \sum_{t=1}^{T} f_t y_t (1 - R_t)^{(n-1)}, \tag{A6}
$$

where f_t is the sample proportion in the *t*th group, y_t is the average level of ill health of the *t*th group, and R_t is its fractional rank, defined as

$$
R_t = \sum_{g=1}^{t-1} f_g + \tfrac{1}{2} f_t, \tag{A7}
$$

and indicating the cumulative proportion of the population up to the midpoint of each group interval. Typically, the first term will not equal one on grouped data.

Table 1: Under-five mortality levels and inequalities

	v=1.0		v=1.5				v=2.0				v=4.0				v=6.0				v=8.0			
	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank
Bangladesh	127.86	24	-0.0553	13	134.93	24	-0.0841	14	138.61	23	-0.1085	11	141.74	23	-0.1043	9	141.20	23	-0.0966	9	140.22	23
Benin	184.38	36	-0.0534	12	194.22	37	-0.0814	13	199.39	36	-0.1113	12	204.90	38	-0.1143	10	205.44	38	-0.1106	12	204.78	38
Bolivia	99.40	19	-0.1351	41	112.83	19	-0.2218	41	121.44	19	-0.3593	39	135.12	21	-0.3895	39	138.11	20	-0.3825	38	137.42	20
Brazil	56.89	8	-0.1441	44	65.10	8	-0.2590	44	71.63	8	-0.5056	44	85.66	10	-0.5786	44	89.81	10	-0.5733	44	89.51	11
Burkina Faso	204.74	40	-0.0624	18	148.26	27	-0.0398	3	212.89	39	-0.1243	14	156.90	26	-0.1173	11	155.92	26	-0.1062	10	154.38	26
Cameroun	143.38	29	-0.0938	32	156.83	32	-0.1594	33	166.24	31	-0.2783	35	183.29	34	-0.3180	35	188.98	36	-0.3296	36	190.64	37
CAR	158.44	34	-0.0676	20	169.15	35	-0.1103	21	175.92	34	-0.1742	22	186.04	35	-0.1876	22	188.17	35	-0.1850	23	187.76	35
Chad	201.01	39	-0.0095	2	202.92	39	-0.0068	2	202.38	37	0.0383	2	193.31	37	0.0763	2	185.68	34	0.0980	1	181.30	32
Colombia	37.36	1	-0.0752	25	40.17	1	-0.1306	28	42.24	1	-0.2547	31	46.88	2	-0.3016	33	48.63	2	-0.3086	34	48.89	2
Comoros	112.48	21	-0.0577	17	118.97	21	-0.0955	18	123.22	21	-0.1438	19	128.66	18	-0.1416	18	128.41	18	-0.1305	14	127.16	18
Cote d'Ivoire	149.99	32	-0.0689	22	160.33	33	-0.1145	22	167.17	32	-0.1930	25	178.93	33	-0.2153	26	182.29	33	-0.2173	29	182.58	33
Dom Rep	61.04	9	-0.1237	38	68.59	9	-0.2079	38	73.73	9	-0.3524	38	82.56	8	-0.3890	38	84.79	9	-0.3875	39	84.70	9
Egypt	95.78	18	-0.1357	42	108.79	18	-0.2311	42	117.92	18	-0.4006	42	134.16	20	-0.4435	42	138.27	21	-0.4402	42	137.95	21
Ghana	132.86	25	-0.0834	29	143.93	25	-0.1346	30	150.74	26	-0.1945	27	158.70	29	-0.1913	24	158.27	28	-0.1780	22	156.50	28
Guatamala	79.42	14	-0.0778	28	85.60	14	-0.1188	25	88.85	14	-0.1484	20	91.21	12	-0.1326	15	89.95	11	-0.1147	13	88.52	10
Haiti	140.63	28	-0.0432	9	146.72	26	-0.0709	10	150.61	25	-0.1180	13	157.23	28	-0.1314	14	159.12	29	-0.1323	15	159.25	29
India	118.91	22	-0.1038	36	131.25	23	-0.1694	36	139.05	24	-0.2619	33	150.04	24	-0.2726	32	151.33	25	-0.2627	31	150.15	25
Indonesia	70.51	11	-0.1240	39	79.25	12	-0.2102	39	85.33	13	-0.3731	41	96.81	13	-0.4274	41	100.64	13	-0.4356	41	101.22	14
Kazakhstan	48.22	4	-0.0079	1	48.60	2	0.0020	1	48.12	2	0.0555	1	45.54	1	0.0782	1	44.45	1	0.0840	2	44.17	1
Kenya	105.14	20	-0.0885	31	114.44	20	-0.1568	32	121.63	20	-0.2900	36	135.63	22	-0.3205	36	138.83	22	-0.3124	35	137.98	22
Kyrgz Rep	75.93	12	-0.0692	23	81.19	13	-0.1151	23	84.67	11	-0.1942	26	90.67	11	-0.2159	27	92.32	12	-0.2147	27	92.24	12
Madagascar	164.24	35	-0.0683	21	175.47	36	-0.1094	20	182.21	35	-0.1611	21	190.70	36	-0.1634	20	191.08	37	-0.1531	19	189.39	36
Malawi	239.80	42	-0.0319	5	247.44	42	-0.0459	4	250.81	42	-0.0515	5	252.14	41	-0.0497	5	251.72	41	-0.0481	5	251.34	41
Mali	252.13	43	-0.0556	14	266.16	43	-0.0901	17	274.85	43	-0.1422	18	287.99	43	-0.1550	19	291.20	43	-0.1551	20	291.24	43
Morocco	84.06	16	-0.0940	33	91.96	16	-0.1537	31	96.98	16	-0.2500	30	105.08	16	-0.2726	31	106.98	16	-0.2690	32	106.67	16
Mozambique	218.14	41	-0.0703	24	233.47	41	-0.1184	24	243.97	41	-0.2015	28	262.09	42	-0.2168	28	265.42	42	-0.2047	26	262.78	42
Namibia	91.86	17	-0.0311	4	94.72	17	-0.0532	7	96.75	15	-0.1067	10	101.66	15	-0.1373	16	104.47	15	-0.1515	18	105.78	15
Nepal	139.55	26	-0.0624	18	148.26	27	-0.0960	19	152.95	28	-0.1243	14	156.90	26	-0.1173	11	155.92	26	-0.1062	10	154.38	26
Nicaragua	56.25	7	-0.0773	27	60.59	6	-0.1241	26	63.23	6	-0.1897	24	66.91	6	-0.1964	25	67.29	6	-0.1861	25	66.71	6
Niger	302.95	44	-0.0406	8	315.26	44	-0.0537	8	319.21	44	-0.0252	3	310.59	44	0.0088	3	300.29	44	0.0301	3	293.84	44
Nigeria	191.56	37	-0.0767	26	206.26	40	-0.1275	27	215.99	40	-0.2061	29	231.04	40	-0.2201	29	233.72	40	-0.2157	28	232.88	40
Pakistan	119.74	23	-0.0569	16	126.56	22	-0.0862	15	130.07	22	-0.0981	7	131.49	19	-0.0795	6	129.26	19	-0.0626	6	127.24	19
Paraguay	46.59	3	-0.0859	30	50.59	4	-0.1334	29	52.80	3	-0.1852	23	55.21	3	-0.1910	23	55.48	3	-0.1853	24	55.22	3
Peru	68.70	10	-0.1384	43	78.21	10	-0.2357	43	84.89	12	-0.4247	43	97.87	14	-0.4759	43	101.39	14	-0.4674	43	100.80	13
Senegal	140.05	27	-0.0997	35	154.01	31	-0.1636	35	162.97	30	-0.2550	32	175.76	31	-0.2666	30	177.39	31	-0.2584	30	176.24	31
Tanzania	144.69	31	-0.0367	6	150.01	29	-0.0513	6	152.11	27	-0.0398	4	150.45	25	-0.0160	4	147.00	24	0.0010	4	144.54	24
The Philippines	55.07	5	-0.1122	37	61.24	7	-0.1908	37	65.57	7	-0.3320	37	73.35	7	-0.3645	37	75.14	7	-0.3556	37	74.64	7
Togo	144.37	30	-0.0557	15	152.41	30	-0.0887	16	157.17	29	-0.1317	16	163.39	30	-0.1383	17	164.33	30	-0.1349	16	163.84	30
Turkey	80.66	15	-0.1261	40	90.83	15	-0.2104	40	97.63	17	-0.3664	40	110.21	17	-0.4216	40	114.66	17	-0.4322	40	115.52	17
Uganda	156.28	33	-0.0476	11	163.71	34	-0.0786	12	168.55	33	-0.1373	17	177.73	32	-0.1646	21	182.01	32	-0.1756	21	183.72	34
Uzbekistan	55.26	6	-0.0259	3	56.69	5	-0.0466	5	57.83	5	-0.0994	8	60.76	5	-0.1281	13	62.34	5	-0.1388	17	62.93	5
Vietnam	46.03	2	-0.0956	34	50.43	3	-0.1595	34	53.37	4	-0.2730	34	58.59	4	-0.3046	34	60.05	4	-0.3042	33	60.03	4
Zambia	192.31	38	-0.0465	10	201.25	38	-0.0733	11	206.40	38	-0.1026	9	212.04	39	-0.1008	8	211.71	39	-0.0923	7	210.07	39
Zimbabwe	76.01	13	-0.0401	7	79.05	11	-0.0537	9	80.09	10	-0.0872	6	82.63	9	-0.0971	7	83.39	8	-0.0954	8	83.26	8
Average	124.33		-0.0740		131.06		-0.1195		137.46		-0.1928		143.15		-0.2070		144.16		-0.2022		143.42	

Table 2: Child malnutrition levels and inequalities

	v=1.0		v=1.5				v=2.0				v=4.0				v=6.0				v=8.0			
	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank
Bangladesh	47.66	38	-0.0741	14	51.19	39	-0.1213	14	53.44	39	-0.1961	13	57.01	39	-0.2168	14	57.99	39	-0.2196	14	58.13	39
Benin	29.26	29	-0.0778	17	31.54	29	-0.1312	17	33.10	29	-0.2228	18	35.78	29	-0.2427	17	36.36	28	-0.2397	16	36.27	28
Bolivia	8.99	7	-0.1781	35	10.59	7	-0.3125	35	11.80	7	-0.5964	36	14.36	8	-0.6890	36	15.19	8	-0.6957	36	15.25	8
Brazil	5.73	2	-0.1868	36	6.80	2	-0.3398	37	7.67	2	-0.6812	37	9.63	2	-0.7843	37	10.22	2	-0.7761	37	10.17	2
Burkina Faso	46.88	36	-0.0561	6	49.51	36	-0.0867	4	50.95	36	-0.1206	4	52.54	37	-0.1222	4	52.61	37	-0.1162	4	52.33	37
Cameroun	15.11	13	-0.1257	31	17.01	14	-0.2127	31	18.33	14	-0.3645	31	20.62	14	-0.4285	32	21.59	14	-0.4677	32	22.18	14
CAR	27.08	25	-0.0632	9	28.79	22	-0.1091	9	30.03	22	-0.2033	15	32.59	22	-0.2462	19	33.75	23	-0.2658	19	34.28	25
Chad	38.76	32	-0.0543	5	40.86	32	-0.0924	8	42.34	33	-0.1687	9	45.30	33	-0.2018	13	46.58	34	-0.2151	13	47.09	34
Colombia	8.36	6	-0.1695	34	9.78	6	-0.2931	34	10.81	6	-0.5345	34	12.83	6	-0.6040	34	13.41	6	-0.6024	34	13.40	6
Comoros	25.84	21	-0.0890	22	28.14	21	-0.1572	23	29.90	21	-0.2935	27	33.43	25	-0.3299	28	34.37	26	-0.3298	27	34.37	26
Cote d'Ivoire	23.84	18	-0.0862	21	25.89	18	-0.1410	19	27.20	17	-0.2242	19	29.18	16	-0.2435	18	29.64	16	-0.2436	17	29.64	16
Dom Rep	6.03	3	-0.2362	40	7.45	3	-0.4167	40	8.54	3	-0.7916	40	10.80	3	-0.9019	40	11.46	4	-0.8949	40	11.42	4
Egypt	12.48	12	-0.0831	18	13.51	11	-0.1454	22	14.29	11	-0.2727	24	15.88	10	-0.3149	25	16.41	10	-0.3211	26	16.48	10
Ghana	27.17	26	-0.0899	23	29.61	25	-0.1420	20	31.02	26	-0.1983	14	32.55	21	-0.2018	12	32.65	21	-0.1979	11	32.54	21
Guatamala	26.66	24	-0.1174	29	29.79	27	-0.1857	28	31.61	27	-0.2725	23	33.93	26	-0.2793	22	34.11	25	-0.2662	20	33.76	23
Haiti	27.47	27	-0.1035	27	30.31	28	-0.1693	26	32.12	28	-0.2873	26	35.36	28	-0.3270	27	36.45	29	-0.3336	28	36.63	29
India	51.91	40	-0.0575	8	54.90	40	-0.0920	7	56.68	40	-0.1351	6	58.92	40	-0.1392	6	59.13	40	-0.1345	6	58.89	40
Kazakhstan	8.32	5	-0.1205	30	9.32	4	-0.1973	30	9.96	4	-0.3093	29	10.89	4	-0.3234	26	11.01	3	-0.3124	25	10.92	3
Kenya	22.08	16	-0.1109	28	24.53	16	-0.1865	29	26.20	16	-0.3232	30	29.22	17	-0.3609	30	30.05	17	-0.3573	30	29.97	17
Kyrgz Rep	11.03	10	-0.0688	10	11.79	9	-0.1120	10	12.27	8	-0.1585	8	12.78	5	-0.1543	8	12.73	5	-0.1435	7	12.61	5
Madagascar	40.10	34	-0.0311	1	41.34	33	-0.0508	2	42.14	32	-0.0880	2	43.63	32	-0.0997	2	44.10	32	-0.0991	2	44.07	32
Malawi	27.75	28	-0.0701	11	29.70	26	-0.1151	11	30.94	25	-0.1835	11	32.84	23	-0.1987	11	33.26	22	-0.1983	12	33.25	22
Mali	40.08	33	-0.0531	3	42.20	34	-0.0871	6	43.56	34	-0.1406	7	45.71	34	-0.1539	7	46.25	33	-0.1544	8	46.26	33
Morocco	9.49	8	-0.1925	37	11.32	8	-0.3308	36	12.63	9	-0.5901	35	15.10	9	-0.6632	35	15.79	9	-0.6640	35	15.80	9
Mozambique	26.12	22	-0.1026	26	28.80	24	-0.1759	27	30.72	24	-0.3086	28	34.19	27	-0.3475	29	35.20	27	-0.3515	29	35.31	27
Namibia	26.21	23	-0.0988	25	28.80	23	-0.1626	24	30.47	23	-0.2612	22	33.06	24	-0.2897	23	33.80	24	-0.2967	24	33.98	24
Nepal	46.88	36	-0.0561	6	49.51	36	-0.0867	4	50.95	36	-0.1206	4	52.54	37	-0.1222	4	52.61	37	-0.1162	4	52.33	37
Nicaragua	12.16	11	-0.1404	32	13.87	12	-0.2336	32	15.01	12	-0.3893	32	16.90	11	-0.4220	31	17.30	11	-0.4104	31	17.16	11
Niger	49.48	39	-0.0327	2	51.10	38	-0.0487	1	51.89	38	-0.0584	1	52.37	36	-0.0552	1	52.21	36	-0.0515	1	52.03	36
Nigeria	35.64	31	-0.0534	4	37.55	31	-0.0822	3	38.57	31	-0.1112	3	39.61	31	-0.1134	3	39.69	31	-0.1101	3	39.57	31
Pakistan	40.21	35	-0.0768	15	43.30	35	-0.1306	16	45.46	35	-0.2273	20	49.35	35	-0.2622	20	50.76	35	-0.2758	22	51.30	35
Paraguay	3.66	1	-0.1669	33	4.28	1	-0.2790	33	4.69	1	-0.4631	33	5.36	1	-0.5011	33	5.50	1	-0.4876	33	5.45	1
Peru	7.75	4	-0.2238	39	9.48	5	-0.3934	39	10.80	5	-0.7552	39	13.60	7	-0.8709	39	14.50	7	-0.8730	38	14.52	7
Tanzania	30.67	30	-0.0771	16	33.03	30	-0.1279	15	34.59	30	-0.2147	16	37.25	30	-0.2413	16	38.07	30	-0.2445	18	38.16	30
Togo	25.10	19	-0.0857	20	27.25	19	-0.1387	18	28.58	20	-0.2197	17	30.61	20	-0.2359	15	31.02	20	-0.2305	15	30.88	20
Turkey	10.40	9	-0.1972	38	12.45	10	-0.3505	38	14.04	10	-0.6981	38	17.66	12	-0.8408	38	19.14	13	-0.8826	39	19.57	13
Uganda	25.53	20	-0.0708	12	27.34	20	-0.1154	12	28.48	19	-0.1797	10	30.12	19	-0.1910	10	30.41	19	-0.1870	10	30.31	19
Uzbekistan	18.78	15	-0.0832	19	20.35	15	-0.1426	21	21.46	15	-0.2539	21	23.55	15	-0.2784	21	24.01	15	-0.2711	21	23.88	15
Zambia	23.44	17	-0.0982	24	25.74	17	-0.1654	25	27.32	18	-0.2755	25	29.90	18	-0.2959	24	30.37	18	-0.2861	23	30.14	18
Zimbabwe	15.52	14	-0.0739	13	16.67	13	-0.1205	13	17.39	13	-0.1854	12	18.40	13	-0.1901	9	18.48	12	-0.1785	9	18.30	12
Average	24.64		-0.1033		26.64		-0.1745		27.95		-0.3020		30.13		-0.3371		30.70		-0.3375		30.72	

Table 3: Levels of and inequalities in total fertility rates

	v=1.0		v=1.5				v=2.0				v=4.0				v=6.0				v=8.0			
	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank	CI(v)	Rank	I(v)	Rank
Bangladesh	3.28	9	-0.0590	13	3.48	9	-0.0952	12	3.60	8	-0.1404	11	3.75	6	-0.1452	11	3.76	5	-0.1414	11	3.75	5
Benin	5.96	35	-0.0718	16	6.39	36	-0.1185	15	6.67	38	-0.1838	15	7.06	36	-0.1957	15	7.13	37	-0.1950	15	7.12	34
Bolivia	4.20	16	-0.1375	42	4.78	17	-0.2452	42	5.23	19	-0.4748	41	6.20	25	-0.5704	40	6.60	29	-0.6124	40	6.78	29
Brazil	2.51	4	-0.1074	34	2.78	4	-0.1997	34	3.01	5	-0.4455	40	3.63	5	-0.5829	41	3.98	7	-0.6593	42	4.17	7
Burkina Faso	4.67	19	-0.0733	19	5.02	20	-0.1228	18	5.25	20	-0.2144	19	5.67	19	-0.2498	19	5.84	19	-0.2610	18	5.89	17
Cameroun	5.78	34	-0.0376	10	6.00	32	-0.0627	10	6.15	30	-0.0946	10	6.33	27	-0.0925	9	6.32	25	-0.0843	8	6.27	25
CAR	5.06	25	-0.0031	1	5.08	22	-0.0048	1	5.09	18	-0.0079	2	5.10	13	-0.0088	2	5.11	13	-0.0083	2	5.10	13
Chad	6.36	39	-0.0080	2	6.41	37	-0.0157	3	6.46	35	-0.0435	3	6.64	30	-0.0645	6	6.77	30	-0.0777	6	6.86	31
Colombia	2.93	6	-0.1173	35	3.27	6	-0.2112	37	3.55	7	-0.4279	38	4.18	10	-0.5336	38	4.49	11	-0.5889	39	4.65	11
Comoros	4.60	18	-0.0825	26	4.98	19	-0.1432	27	5.26	23	-0.2617	28	5.81	22	-0.3060	28	6.01	21	-0.3212	29	6.08	21
Cote d'Ivoire	5.29	30	-0.0614	14	5.62	28	-0.1024	14	5.83	28	-0.1649	13	6.17	24	-0.1798	12	6.24	24	-0.1815	12	6.25	23
Dom Rep	3.17	8	-0.0944	30	3.47	8	-0.1694	31	3.70	9	-0.3378	33	4.24	11	-0.4179	34	4.49	10	-0.4597	34	4.62	10
Ghana	5.14	27	-0.0736	21	5.52	27	-0.1249	21	5.78	27	-0.2121	17	6.23	26	-0.2405	16	6.38	26	-0.2511	16	6.43	26
Guatamala	5.08	26	-0.1299	40	5.74	30	-0.2259	40	6.23	32	-0.4052	35	7.14	40	-0.4650	35	7.45	41	-0.4840	35	7.54	41
Haiti	4.73	23	-0.1181	37	5.28	26	-0.2025	35	5.68	25	-0.3481	34	6.37	28	-0.3925	33	6.58	28	-0.4069	32	6.65	28
India	3.09	7	-0.0727	17	3.32	7	-0.1249	20	3.48	6	-0.2213	21	3.77	7	-0.2560	22	3.88	6	-0.2686	23	3.92	6
Indonesia	2.66	5	-0.0525	11	2.80	5	-0.0893	11	2.90	4	-0.1597	12	3.09	2	-0.1859	14	3.16	3	-0.1941	14	3.18	3
Kazakhstan	2.46	3	-0.0982	32	2.70	3	-0.1646	30	2.86	3	-0.2599	27	3.10	3	-0.2775	25	3.14	2	-0.2772	24	3.14	2
Kenya	4.70	21	-0.0890	29	5.12	23	-0.1551	29	5.43	24	-0.2800	30	6.02	23	-0.3223	29	6.21	23	-0.3341	30	6.27	24
Kyrgz Rep	3.33	11	-0.0821	25	3.61	11	-0.1388	24	3.79	11	-0.2394	25	4.13	9	-0.2800	26	4.27	9	-0.2984	27	4.33	9
Madagascar	5.97	36	-0.0856	28	6.48	39	-0.1430	26	6.82	39	-0.2384	24	7.39	42	-0.2722	24	7.59	42	-0.2840	25	7.66	42
Malawi	6.72	41	-0.0197	4	6.85	40	-0.0329	4	6.94	40	-0.0543	5	7.08	39	-0.0599	5	7.12	36	-0.0609	5	7.13	35
Mali	6.71	40	-0.0334	6	6.93	41	-0.0498	6	7.04	41	-0.0526	4	7.06	37	-0.0428	3	7.00	33	-0.0354	3	6.95	32
Morocco	4.05	15	-0.1213	38	4.54	15	-0.2162	38	4.92	16	-0.4155	36	5.73	21	-0.4948	36	6.05	22	-0.5270	36	6.18	22
Mozambique	5.18	29	-0.0115	3	5.24	24	-0.0137	2	5.25	22	-0.0047	1	5.20	14	-0.0018	1	5.19	14	-0.0017	1	5.19	14
Namibia	5.43	31	-0.0808	24	5.87	31	-0.1393	25	6.19	31	-0.2363	23	6.72	32	-0.2570	23	6.83	31	-0.2563	17	6.83	30
Nepal	4.67	19	-0.0733	19	5.02	20	-0.1228	18	5.25	20	-0.2144	19	5.67	19	-0.2498	19	5.84	19	-0.2610	18	5.89	17
Nicaragua	3.61	13	-0.1328	41	4.09	13	-0.2388	41	4.48	13	-0.4782	42	5.34	17	-0.5889	42	5.74	18	-0.6419	41	5.93	20
Niger	7.21	43	-0.0357	9	7.47	43	-0.0579	9	7.63	43	-0.0934	9	7.89	43	-0.1103	10	8.01	43	-0.1209	10	8.09	43
Nigeria	6.00	37	-0.0345	7	6.21	35	-0.0550	7	6.33	33	-0.0816	8	6.49	29	-0.0873	8	6.53	27	-0.0867	9	6.52	27
Pakistan	4.80	24	-0.0255	5	4.92	18	-0.0399	5	4.99	17	-0.0560	6	5.07	12	-0.0578	4	5.08	12	-0.0566	4	5.07	12
Paraguay	4.72	22	-0.1174	36	5.27	25	-0.2108	36	5.71	26	-0.4173	37	6.68	31	-0.5075	37	7.11	35	-0.5458	37	7.29	38
Peru	3.52	12	-0.1414	43	4.02	12	-0.2530	43	4.41	12	-0.5030	43	5.30	15	-0.6191	43	5.70	17	-0.6761	43	5.91	19
Senegal	5.66	32	-0.0798	23	6.11	33	-0.1357	22	6.42	34	-0.2284	22	6.95	34	-0.2554	21	7.10	34	-0.2629	21	7.14	36
Tanzania	5.78	33	-0.0698	15	6.18	34	-0.1188	16	6.46	36	-0.2096	16	6.99	35	-0.2485	17	7.21	39	-0.2679	22	7.32	39
The Philippines	3.71	14	-0.1215	39	4.16	14	-0.2187	39	4.52	14	-0.4370	39	5.32	16	-0.5375	39	5.70	16	-0.5863	38	5.88	16
Togo	5.15	28	-0.1058	33	5.70	29	-0.1826	33	6.09	29	-0.3146	31	6.77	33	-0.3506	31	6.96	32	-0.3582	31	7.00	33
Turkey	2.42	2	-0.0965	31	2.66	2	-0.1696	32	2.84	2	-0.3209	32	3.20	4	-0.3851	32	3.36	4	-0.4146	33	3.43	4
Uganda	6.83	42	-0.0347	8	7.07	42	-0.0551	8	7.21	42	-0.0788	7	7.37	41	-0.0829	7	7.40	40	-0.0827	7	7.40	40
Uzbekistan	3.32	10	-0.0728	18	3.56	10	-0.1226	17	3.73	10	-0.2131	18	4.03	8	-0.2487	18	4.15	8	-0.2622	20	4.19	8
Vietnam	2.25	1	-0.0781	22	2.43	1	-0.1374	23	2.56	1	-0.2561	26	2.83	1	-0.2978	27	2.93	1	-0.3105	28	2.95	1
Zambia	6.06	38	-0.0584	12	6.41	38	-0.0987	13	6.66	37	-0.1654	14	7.06	38	-0.1830	13	7.17	38	-0.1838	13	7.17	37
Zimbabwe	4.26	17	-0.0841	27	4.61	16	-0.1479	28	4.89	15	-0.2798	29	5.45	18	-0.3364	30	5.69	15	-0.2890	26	5.49	15
Average	4.63		-0.0764		4.96		-0.1320		5.19		-0.2389		5.63		-0.2800		5.80		-0.2948		5.85	

References

Alderman, H. 2000. "Anthropometry." In M. Grosh and P. Glewwe, eds., *Designing Household Survey Questionnaires for Developing Countries.* Washington DC: The World Bank.

Alleyne, G.A.O., J. A. Casas, and C. Castillo-Salgado. 2000. "Equality, equity: why bother?" *Bulletin of the World Health Organization* 78 (1): 76-77.

Atkinson, A. B. 1970. "On the measurement of inequality." *Journal of Economic Theory* 2:244-63.

Braveman, P., B. Starfield, and H. J. Geiger. 2001. "World Health Report 2000: how it removes equity from the agenda for public health monitoring and policy." *British Medical Journal* 323: 678-80.

Evans, T., M. Whitehead, F. Diderichsen, A. Bhuiya, and M. Wirth. 2001. "Introduction." In T. Evans, M. Whitehead, F. Diderichsen, A. Bhuiya and M. Wirth, eds., *Challenging Inequities in Health: From Ethics to Action*. Oxford: Oxford University Press.

Filmer, D., and L. Pritchett. 1999. "The effect of household wealth on educational attainment: evidence from 35 countries." *Population and Development Review* 25 (1): 85-120.

Gakidou, E. E., C. J. L. Murray, and J. Frenk. 2000. "Defining and measuring health inequality." *Bulletin of the World Health Organization* 78 (1): 42-54.

Gerdtham, U. -G., M. Johannesson, L. Lundberg, and D. Isacson. 1999. "A note on validating Wagstaff and van Doorslaer's health measure in the analysis of inequalities in health." *Journal of Health Economics* 18 (1): 117-24.

Gwatkin, D. 2000. "Health inequalities and the health of the poor: What do we know? What can we do?" *Bulletin of the World Health Organization* 78 (1): 3-17.

Gwatkin, D. R., S. Rutstein, K. Johnson, R. Pande, and A. Wagstaff. 2000. "Socioeconomic Differences in Health, Nutrition and Population." Health Nutrition & Population Discussion Paper. World Bank, Washington, D.C.

Humphries, K.H., and E. van Doorslaer. 2000. "Income-related health inequality in Canada." *Social Science and Medicine* 50: 663-71.

International Monetary Fund, OECD, United Nations, and World Bank. 2000. *2000 A better world for all: Progress toward the international development goals*. Washington, D.C.: International Monetary Fund, OECD, United Nations and the World Bank.

Jenkins, S. 1988. "Calculating income distribution indices from micro data." *National Tax Journal* 61: 139-42.

Kakwani, N., A. Wagstaff, and E. Van Doorlsaer. 1997. "Socioeconomic inequalities in health: Measurement, computation and statistical inference." *Journal of Econometrics* 77 (1): 87-104.

Kunst, A. E., J. J. Geurts, and J. van den Berg. 1995. "International variation in socioeconomic inequalities in self reported health." *J. Epidemiol. Community Health* 49 (2): 117-23.

Lambert, P. 1993. *The distribution and redistribution of income: A mathematical analysis*. 2nd ed. Manchester: Manchester University Press.

Le Grand, J. 1987. "Inequalities in health: some international comparisons." *European Economic Review* 31: 182-91.

———. 1989. An international comparison of distributions of ages-at-death. In J. Fox, ed., *Health inequality in European countries*. Aldershot: Gower.

Lerman, R. I. , and S. Yitzhaki. 1984. "A note on the calculation and interpretation of the Gini index." *Economics Letters* 15: 363-68.

Mackenbach, J. P., and A. E. Kunst. 1997. "Measuring the magnitude of socio-economic inequalities in health: An overview of available measures illustrated with two examples from Europe." *Social Science and Medicine* 44 (6): 757-71.

Pamuk, E. 1985. "Social class inequality in mortality from 1921-1972 in England and Wales." *Population Studies* 39: 17-31.

———. 1988. "Social class inequality in infant mortality in England and Wales from 1921 to 1980." *European Journal of Population* 4: 1-21.

Schalick, L. M., W. C. Hadden, E. Pamuk, V. Navarro, and G. Pappas. 2000. "The widening gap in death rates among income groups in the United States from 1967 to 1986." *International Journal of Health Services* 30 (1): 13-26.

Stecklov, G., A. Bommier, and T. Boerma. 1999. *Trends in equity in child survival in developing countries: An illustrative analysis using Ugandan data.* Carolina Population Center,

Vega, J., R. D. Hollstein, I. Delgado, K. C. Perez, S. Carrasco, G. Marshall, and D. Yach. 2001. "Chile: Socioeconomic differentials and mortality in middle-income nation." In T. Evans, M. Whitehead, F. Diderichsen, A. Bhuiya and M. Wirth, eds., *Challenging Inequalities in Health: From Ethics to Action.* Oxford: OUP.

Victora, C., F. C. Barros, J. P. Vaughan, A. C. Silva, and E. Tomasi. 2000. "Explaining trends in inequities: evidence from Brazilian child health studies." *Lancet* 356 (9235): 1093-98.

Wagstaff, A. 1991. "QALYs and the equity-efficiency trade-off." *Journal of Health Economics* 10 (1): 21-41.

———. 2000. "Socioeconomic inequalities in child mortality: comparisons across nine developing countries." *Bulletin of the World Health Organization* 78 (1): 19-29.

———. 2001. "Economics, health and development: some ethical dilemmas facing the World Bank and the international community." *Journal of Medical Ethics* 27 (4): 262-67.

Wagstaff, A., P. Paci, and E. van Doorslaer. 1991. "On the measurement of inequalities in health." *Social Science and Medicine* 33: 545-57.

Wagstaff, A., and E. Van Doorslaer. 1994. "Measuring inequalities in health in the presence of multiple-category morbidity indicators." *Health Economics* 3: 281-91.

Wagstaff, A., E. van Doorslaer, and N. Watanabe. 2001. "On decomposing the causes of health sector inequalities, with an application to malnutrition inequalities in Vietnam." Policy Research Working Paper 2714. Development Research Group, World Bank, Washington, D.C.

Wagstaff, A., and N. Watanabe. 2000. *Socioeconomic inequalities in child malnutrition in the developing world*. Policy Research Working Paper 2434. Development Research Group, World Bank, Washington, D.C.

Whitehead, M. 1992. "The concepts and principles of equity and health." *International Journal of Health Services* 22 (3): 429-45.

Yitzhaki, Shlomo. 1983. "On an extension of the Gini index." *International Economic Review* 24 (3): 617-28.

______. 1994. "On the progressivity of commodity taxation." In W. Eichhorn., ed., *Models and measurement of welfare and inequality*. Berlin and New York: Springer-Verlag.