ELSEVIER

Social Science & Medicine 66 (2008) 2308–2320

SOCIAL SCIENCE & MEDICINE

www.elsevier.com/locate/socscimed

Equity in health care financing in Palestine: The value-added of the disaggregate approach

Mohammad Abu-Zaineh [a,d,*], Awad Mataria [b], Stéphane Luchini [c], Jean-Paul Moatti [a,d]

[a] *Institute of Health and Medical Research (INSERM) and Southeastern Health Regional Observatory (ORS PACA), Research Unit 912, Marseille, France*

[b] *Institute of Community and Public Health and Department of Economics/Faculty of Commerce and Economics, Birzeit University, Ramallah, Palestine*

[c] *Research Group in Quantitative Economics of Aix-Marseille (GREQAM-CNRS), and Institute of Public Economics (IDEP), Marseille, France*

[d] *Faculty of Economics, University of Mediterranean, Marseille, France*

Available online 7 March 2008

Abstract

This paper analyzes the redistributive effect and progressivity associated with the current health care financing schemes in the Occupied Palestinian Territory, using data from the first Palestinian Household Health Expenditure Survey conducted in 2004. The paper goes beyond the commonly used "aggregate summary index approach" to apply a more detailed "disaggregate approach". Such an approach is borrowed from the general economic literature on taxation, and examines redistributive and vertical effects over specific parts of the income distribution, using the dominance criterion. In addition, the paper employs a bootstrap method to test for the statistical significance of the inequality measures. While both the aggregate and disaggregate approaches confirm the pro-rich and regressive character of out-of-pocket payments, the aggregate approach does not ascertain the potential progressive feature of any of the available insurance schemes. The disaggregate approach, however, significantly reveals a progressive aspect, for over half of the population, of the government health insurance scheme, and demonstrates that the regressivity of the out-of-pocket payments is most pronounced among the worst-off classes of the population. Recommendations are advanced to improve the performance of the government insurance schemes to enhance its capacity in limiting inequalities in health care financing in the Occupied Palestinian Territory.

Keywords: Health care financing; Equity; Redistributive effect; Progressivity; Bootstrap method; Developing countries; Occupied Palestinian Territory

Introduction

In most developing countries, private out-of-pocket funding accounts for a substantial share of overall health care expenditures (Gottret & Schieber, 2006), implying "generally" regressive health care financing arrangements, where the poor bear higher relative shares of the health care cost compared to the most wealthy. Reforms aiming at increasing efficiency in utilizing limited health care resources should therefore address the issues of equity as an integral part of any future policy (Gwatkin, 2001). Unfortunately, empirical evidence

* Corresponding author. INSERM & ORS PACA, 23, Rue Stanislas Torrents, 13006, Marseille, France. Tel.: +33 4 96 10 28 62; fax: +33 4 96 10 28 99.

E-mail address: abu-zaineh@marseille.inserm.fr (M. Abu-Zaineh).

0277-9536/$ - see front matter
doi:10.1016/j.socscimed.2008.01.028

about the actual degree of inequalities associated with the current health care financing mechanisms in developing countries remains sparse (Cissé, Luchini, & Moatti, 2007). In addition, standard measures of equity may not be fully appropriate to inform the complex debates involved in health reforms, mainly in the context of developing countries.

Equity implications of various forms of financing on prevalent income distribution are commonly summarized over the entire range of income distribution of population either through assessing aggregate deviations of a payment schedule away from proportionality – e.g., *Kakwani index of progressivity* (*KPI*) (Kakwani, 1977) – or through assessing aggregate deviations of a post-payment income distribution away from pre-payment income distribution – e.g., *Reynolds-Smolensky index of redistribution* (*RS*) (Reynolds & Smolensky, 1977). Such two indices are derived from transformations between the Lorenz and the associated concentration curves, and are generally referred to as *aggregate summary indices* (Lambert, 1993). They have been extensively deployed in the literature about inequality in health financing (Wagstaff & van Doorslaer, 2000). Applied to health care financing, the two *indices* (KPI and RS) are related to the normative notion of "*unequal treatment of unequals*", and serve to assess respectively how health care is financed according to *abilities-to-pay* (*ATP*) – a measure of *vertical* (*equity*) *effect* (*VE*) – and the extent to which such financing are associated with (*dis*)*equalizing effect* on prevalent income distribution overall – a measure of overall *redistributive effect* (*RE*). Features of these indices are that they provide a single-valued measure of inequality and that inequality is measured at a population level (Clarke, Gerdtham, & Connelly, 2003). A practical advantage of such *aggregate measures* is that they "*enable comparisons to be performed both across counties and across financing sources*" (Wagstaff & van Doorslaer, 1992).

Despite their convenient cardinal representation, an exclusive reliance on such *aggregate summary indices* may not reveal the actual burden of health care payments across different income groups. As stated by Klavus (2001): "*while the inequality assessment given by the summary measure…would not be incorrect…it would certainly yield an imperfect description of the nature of inequality prevailing in the distribution*". Such limitation may be particularly problematic in the context of developing countries. This is because discrepancies in living standards among different socioeconomic classes of the population represent the common trend, and where out-of-pocket health expenditures predominate. Using a single-value index cannot, therefore, tell us if for instance the observed week (or insignificant) *regressivity* identified at the aggregate level was due to low expenditures at low-income levels, or if the observed *progressivity* identified overall was due to high proportions of incomes spent on health care by the better-off than the poor (Wagstaff, 2002). Consequently, a more revealing analysis may require going beyond *aggregate summary indices* to assess prevailing inequalities at a disaggregate level. A *disaggregate approach*, which has been previously explored in the literature about inequality measurement in health care financing (e.g., Klavus, 2001) can lend itself better to such interpretation. While involving actual estimations of relative health burdens at various levels of aggregation, such approach allows identifying the magnitude and significance of distributional outcome at each of these levels, using the *dominance criterion* framework. The latter involves using "*appropriate*" statistical inference for testing dominance relationships – i.e. whether there is a significant difference – between two distributions (Bishop, Chow, & Formby, 1994).

Indeed, another limitation of previous studies on the impact of health care financing on income distribution, which may fuel unnecessary misinterpretations and controversies in the policy debates, is related to the fact that most of these studies have rarely assessed the statistical significance of inequality measures, using appropriate inferential techniques (Mills & Zandvakili, 1997). Constructing appropriate procedures to testing for inequality dominance represents, however, a major challenge (Davidson & Duclos, 2006). Specifically, one needs to address key issues related to the particular nature of statistical properties of inequality measures, their sampling distributions, the presence of correlation in dataset (e.g., dependent distributions coming from a single sample), the presence and impact of outliers (e.g., heavy-tailed distributions), as well as accounting for complex sampling designs from which the data are drawn. Two types of statistical inference have been developed in the literature, based on the asymptotic and bootstrap (BTS) methods (Davidson & Flachaire, 2007). The very few studies that incorporated such attempts in the specific area of health care financing (e.g., Cissé et al., 2007; Klavus, 2001) resorted to the asymptotic method. However, compared with asymptotic inference, statistical inference for inequality measures based on bootstrap methods can lead to more subtle results (Biewen, 2002; Davidson & Flachaire, 2007). Contrary to the asymptotic method, an advantage of bootstrap method is that it allows incorporating the correlation structures existing in the dataset, while no complex composition of covariance structure is required as is typically the case in the asymptotic method. Besides, allowing us to take into account complex multi-stage sampling designs, as well as sample weights, non-parametric testing based on the bootstrap method takes into account the specific bounds of the inequality measures. Bootstrap test for inequality measures may, therefore, provide improved reliability of statistical inference compared with the asymptotic tests so far used in the literature (Andres & Calonge, 2005).

This paper attempts to apply the above methodological advances to the specific domain of health care financing, and to elucidate the extent to which these methods can help clarifying the debates about health care policies in the context of developing countries – using the case of the Occupied Palestinian Territory. The financing structure of health care in the Occupied Palestinian Territory is expected to be associated with a major risk of exacerbation of inequalities due to the lack of a universal system of health care financing, and because a substantial share of health care expenditures is funded through households' out-of-pocket payments (PCBS, 2006a). In addition, the chronic political crisis in the region, which has brutally increased poverty, and the lack of adequate and effective tax polices, raise serious concerns about equity in health care. Despite this idiosyncrasy, the analysis presented in this paper develops methodological tools suitable for assessing inequalities in other countries. Using the bootstrap inference methods demonstrates how the approach being applied in the context of dependent distributions can provide a criterion for making rigours inequality comparisons. The remainder of the paper is organized as follows. The section The Palestinian health care system outlines the institutional details necessary to understand the specific health care system under consideration. Methodology presents the methodology used to measure the redistributive and vertical effects. This is followed by outlining the bootstrap method. The dataset and variable definitions are also presented in this section. Results are reported after this section. The last two sections contain some Discussion and Conclusions.

The Palestinian health care system

The evolution of the Palestinian health system has been largely shaped by the country's complex political history. The two regions of the Occupied Palestinian Territory: the West Bank (WB) and Gaza Strip (GS) have been continuously subject to different organizational structures imposed by their diverse geopolitical and historical contexts. This is in addition to their dissimilar demographic and socioeconomic characteristics. Since the establishment of the Palestinian Authority (PA) in 1994, attempts were made to unify the organizational structures of the two geographically isolated health systems. Today, these initiatives are unable to erase 27 years of separation during which the WB followed the Jordanian rules while GS was ruled by Egypt (Giacaman, Abdul-Rahim, & Wick, 2003). In general, health care delivery is structured into three-tiered pyramidal levels, with primary health care at the bottom, secondary and tertiary care at the middle and top levels, respectively. Health care services at almost all three tiers are provided by four actors: the Ministry of health (MoH), a group of Palestinian non-governmental organization (PNGOs), the United Nations Relief and Welfare Agency (UNRWA), and the Private sector. In terms of delivery of care, 46.1% of total health care visits take place at MoH institutions (of which 67% made by households belonging to the lower half of income deciles), 21.4% at the Private sector, while the remainder is shared between UNRWA and PNGOs in the ratio of 60:40, respectively. On average, out-of-pocket payments amounted to 5.4 USD at the MoH; 43.5 USD at the private sector; and 32.3 USD at PNGOs (PCBS, 2004). Annual total health care expenditure was estimated at about 266 million USD in 2004, indicating a per capita health expenditure of 73 USD (PCBS, 2006a).

The finance for health care usually comes from the government (about 35.2% supported by MoH), the private sector (40.5% through out-of-pocket payments), external assistance (9.8% through UNRWA) and PNGOs (14.5%). The governmental health insurance scheme (GHI) is the main insurance scheme. Prior to the establishment of the PA, enrolment was compulsory for public sector employees and their dependents. Following 1994, an incremental extension of coverage was achieved based on voluntary special contract for firms' employees and for the self-employed. Consequently, enrolment in the GHI grew from 20% of the total WB and GS population in 1993 to cover about 34% of the Palestinian population in 2000. The GHI coverage includes in-patient and out-patient services primarily provided at MoH institutions, with co-payments paid for medications and some specified services. While the GHI coverage entitles usually all enrolees' household members to public services, contribution rules are, generally, applied to households or families rather than individuals. Average monthly premiums is about 7.4 USD; for public sector employees, it is a fixed percentage of 5% of basic salary up to a ceiling of 17.3 USD; for firms' employees and self-employed it is a lump-sum payment of 11.5 USD and 17.3 USD, respectively. Finally, premiums of hardship cases are fully subsidized by the Ministry of Social Welfare (MoH-PHIC, 2006).

Following the renewal of the second Palestinian uprising (*Intifada*) in 2000, GHI has experienced a further extension when the MoH started to offer a very low-premium insurance – latterly known as "*Al-Aqsa Coverage*". Although the latter was largely fuelled by the overwhelming need to promote equity in the provision of health care through offering a low-priced coverage to the mostly affected classes of population (e.g., unemployed), the practice followed latterly has made such coverage obtainable for high proportions of households (30% of total population), regardless of any income-related criteria. This expanded coverage of GHI has not been associated with a parallel improvement in the capacity of health services, and consequently, led to a deterioration in services including a lack of essential drugs and supplies (Giacaman et al., 2003). Private health insurance market, on the other hand, has expanded rapidly in the past few years (Hamdan, Defever, & Abdeen, 2003). However, especially, due to the relatively high premiums (three times higher than GHI) private insurance caters so far for a tiny proportion of population, and represents less than 10% of the total health expenditure in 2005. Lastly, it is noteworthy that the geographical divisions aggravated by the political conditions of the past years producing two separate *de facto* health care systems in the WB and GS, motivates tackling equity features associated with each system separately.

Methodology

Inequality measures

Analogous to a tax structure, RS measures the overall RE of a payment schedule over the entire income range through comparing the Gini coefficients, G_X and G_N, for pre-payment and post-payment income distributions, whereas KPI measures the extent to which a payment schedule (T) departs from proportionality (Kakwani, 1977) – proportionality being measured against the distribution of pre-payment income (X) – and involves comparing the concentration index of payment, C_T, with G_X. Thus, for a given G_X, the two aggregate indices can then be assessed as:

$$\mathrm{RS} = G_X - G_N \tag{1}$$

$$\mathrm{KPI} = C_T - G_X \tag{2}$$

A positive (negative) value of the indices indicates a *pro-poor* and *progressive* (*pro-rich* and *regressive*) structure, while a zero value indicates proportionality. Accurate estimates of the indices are obtained using the convenient (*weighted*) covariance method (cf. Lerman & Yitzhaki, 1989). While the two indices are derived from the Lorenz curves and the associated concentration curves, one limitation of relying on their aggregate single values lies in the fact that progressivity (regressivity) prevailing in some parts of the distribution may not be *significantly* applicable to other parts (Klavus, 2001). Another difficulty may arise when the two underlying distributional curves cross, whereas the observed single-value result is *non-zero*. This occurs when inequalities favouring the poor (rich) in some part are not exactly offset by inequalities favouring the rich (poor) in the other part (Wagstaff & van Doorslaer, 1992). Consequently, inequality evidence based on the single-valued summery index can provide imperfect description of the nature of inequality prevailing in the distribution. For these reasons, it is often useful to conduct analysis at disaggregate level and perform statistical tests at certain ranges of the income distribution rather than in the overall distribution. Therefore, we deploy the *disaggregate approach* as used by Klavus (2001). Specifically, we estimate the underlying distributions of the above indices, L_X, L_N and L_T for a set of *p-ordinates* – where p is defined over the kth percentile point (e.g.; 10th percentile), as follows:

$$\mathrm{RE}(p) = L_X(p) - L_N(p) \tag{3}$$

$$\mathrm{VE}(p) = L_X(p) - L_T(p) \tag{4}$$

where $L_X(p)$ and $L_N(p)$ are the pre-payment and post-payment income distributions, respectively, and representing the fractions of income received by pth proportion of population before and after paying for health care. Similarly, $L_T(p)$ is the concentration curve for health care payments, and indicating the proportion paid for health care by the pth proportion of population. Each of which is being estimated for a set of p-ordinates. Therefore, in the case of *decile-ordinates*, p takes the values from 1 to 9. Such *disaggregate approach* shall enable us to properly identify the prevailing inequalities at various levels of the aggregation while testing for differences in the ordinates of $L_X(p)$ and $L_N(p)$ and $L_X(p)$ and $L_T(p)$. In the next section, we develop statistical inference using a *bootstrap-based* method for both cases: redistribution and progressivity indices – i.e., at the *aggregate level* – and for the differences in p-ordinates corresponding to income deciles – i.e., at the *disaggregate level*.

Statistical inference

Statistical significance of observed variations in the computed values of each of the above measures was tested using bootstrap (BTS) method. A standard BTS procedure is conventionally undertaken by drawing randomly with replacement R independent samples of a size equal to the original sample size (i.e., $m=n$). It assumes that the observed distribution is a "*purely*" random sample of the underlying population distribution and the observations are independent (Efron & Tibshirani, 1993). Given that inequality measures are non-linear functions of a random variable such as income, the heavy-tailed income distributions, and the fact that the sample may not be a "*purely*" random of the underlying population distribution, applying the standard BTS may fail to provide accurate inference for inequality measures – e.g., inconsistent standard error – and consequently, make conventional hypothesis testing inappropriate (Davidson & Flachaire, 2007). In order to improve the reliability of BTS inference we have opted to implement a *non-standard* BTS using: the "*m-out-of-n* bootstrap method" – a technique used to assess the reliability of standard errors when a small number of extreme values have an overwhelming influence on the behaviour of BTS distribution function, and involves evaluating the error in rejection probability (ERP) under different choices of m, where m is the sub-sample size and equals n in the standard BTS (Davidson & Flachaire, 2007). Details of technical derivations can be found in standard references such as Deaton (1997), Horowitz (2000), and Shao and Tu (1995), and recent applications are provided in Andres and Calonge (2005) and Davidson and Flachaire (2007). However, to illustrate the methods, we briefly point to the implemented procedures for both cases: the aggregate indices and p-ordinates.

Consider a statistic $\widehat{I}$ based on a sample of size n, hence, instead of assuming the shape of the distribution of $\widehat{I}$ statistic, the distribution of $\widehat{I}$ is approximated through investigating its variation over a large number of *pseudo-samples* obtained by randomly selecting, with replacement, a large number (R) of sub-samples of size m, out of the dataset – the BTS re-samples. In case where the dataset is sampled based on multi-stage designs, drawings can be made out of clusters. This step was not followed in our procedure since the necessary clusters sampling information was not available. We have, however, corrected for differences in sampling probability rather than the different types of the multi-stage sampling designs used in the survey. This was completed using *inflation technique* (e.g., van Doorslaer & Koolman, 2004). The latter involves inflating the sample size by multiplying the sampling weights by the inverse of the smallest weight and rounded to the nearest integer. This culminated in *an expanded sample* from which our random sub-samples have been drawn. The same statistic is then computed for each BTS re-sample, yielding $\widehat{I}^*$ – the *replication of the statistic* $\widehat{I}$. The sampling variation of $\widehat{I}^*$ can be estimated by applying the expression of standard errors to the *R-length* vector of bootstrap method replications. Regarding the estimation of probability confidence intervals, BTS provides us with different possible methods to construct tail probabilities for the statistic $\widehat{I}$, e.g., the *percentile method* (Mills & Zandvakili, 1997). The latter procedure involves an estimation of an empirical function of $\widehat{I}$ from the R re-samples, which culminates in the estimation of appropriate confidence intervals.

Since our distributions are obtained from the same sample, comparing the two Lorenz curves, L_X and L_N, or L_X with the concentration curve (L_T), involves different BTS testing procedure than comparing two independently distributed curves obtained from separate samples. Testing for the former relationship requires the joint composition of the two distributions; the observed data in such a case $\{(X_1, Y_1), \ldots, (X_n, Y_n)\}$ are drawn from the joint sampling distribution in which each observation consists of a vector of two components, e.g., pre-payment and post-payment incomes measured for the same household in a particular year; whereas in the latter case, the test can be completed based on the separate distributions ($X_1, \ldots, X_n$), ($Y_1, \ldots, Y_n$) of the independent samples. Thus, the following BTS testing procedures can be adapted for each case. Let V_1 and V_2 be two vectors representing the bootstrap method values of pre-payment and post-payment incomes, and let the hypothesis testing be H_0: $I_1 = I_2$ against H_0: $I_1 \neq I_2$, or equivalently, H_0: $D=0$ against H_A: $D \neq 0$ – where $D = V_2 - V_1$. In the case of independent samples the BTS testing procedures can be conducted by first obtaining the difference statistics $\widehat{D} = \widehat{I}_2 - \widehat{I}_1$, and then BTS re-sampling can be obtained separately from each sample. In the case of dependent distributions (our case) the joint distribution should be re-sampled as a whole. Thus, instead of separately bootstrapping V_1 and V_2, we have bootstrapped D, such that each pair of observations belonging to the same individual is treated as a *block*. The BTS probability intervals are then computed based on the empirical distribution of the statistic $\widehat{D}$, which is obtained by fixing R at 1000 simulated samples of size

m. The latter is selected through evaluating the sensitivity of ERP under different choices of m (Davidson & Flachaire, 2007). Lastly, it should be noted that testing for dominance relations at the *disaggregate level* requires different hypothesis procedure than testing for inequality at the *aggregate level*. This is because the latter involves testing for a vector of p-ordinates – i.e., a *multiple testing context* – while the former case involves testing for a single value. For testing hypothesis concerning the dominance relations as they correspond to a set of *p-ordinates* – where p is defined over the kth *percentile point*– the testing procedure requires, first, computing the estimated differences between the two curves, evaluated over the p-ordinates. Thus, $\widehat{D}(p_i), \quad i = 1,\ldots,k$ and the hypothesis to be tested in this case is defined as:

$$H_0 : \bigcup_{i=1}^{k}\{\widehat{D}(p_i) = 0\} \text{ against } H_A : \bigcap_{i=1}^{k}\{\widehat{D}(p_i) \neq 0\}$$

where $\widehat{D}(p_i)$ represent the differences between the two curves for each i; i taking the values from 1 to 9 in the case of deciles. If $\widehat{D}(p_i)$ are presented graphically on the y-axis, along with their corresponding bootstrap method confidence intervals, against the corresponding p-ordinates, the dominance test rejects the null hypothesis should the BTS confidence intervals, evaluated over p-ordinates, do not cross the abscissa-axis.

Data and variable definitions

Our analysis is based on data taken from the 2004 Household Health Expenditure Survey (HHES) undertaken by the Palestinian Central Bureau of Statistics (PCBS). A two-stage cluster random sample was used to select 4499 households of which 3826 households were interviewed: 2504 in the WB and 1322 in GS. The data were weighted as per the Population Census of 1997. The latter represents the first census of population in the Occupied Palestinian Territory, and on which a set of representative enumeration areas were identified – these were updated in 2003. The HHES-2004 contains information about household's socio-demographic characteristics, gross monthly income and expenditures. Concerning health care expenditures, information was gathered based on two approaches. A *utilization approach* in which data on only four types of expenditures were estimated based on individuals' utilization patterns. In addition to a *direct expenditure approach* in which data on household total health care expenditures were approximated on a reference period of one month, using a list of questions tracking all potential types of expenditures incurred by all households' members. These include doctors' consultation fees, hospitalization costs, laboratory tests, medications, and transportation costs, and so on up to 25 separate items.

Payments were computed for three modes of financing: out-of-pocket payments, GHI, and private health insurance; and using the second source of information. This was preferred on the grounds that although it is likely to suffer from eventual bias, it can still better reflect the actual burden of payments. This is because asking each household to fill up a list containing a wide range of items can help minimize the recall error. In addition, using the same reference period upon which these items were recorded can help avoid variations in payments due to the variable recall periods (Wagstaff et al., 1999). Therefore, total health expenditures born by the household (net of reimbursement if any) were converted to annual basis based on summing up *pro rata* expenditures in the various categories and scaling up to 12 months. Lastly, regarding GHI and private insurance premiums, they represent contributions born by households and were obtained directly from the survey.

On the other hand, since data on household expenditures are commonly advocated, relative to data on income, as a more accurate measure of households' living standards in the context of developing countries (Deaton & Grosh, 2000), pre-payment income variable is apprehended through household expenditures – gross of health care expenditures. Post-payment income is then estimated as pre-payment income net of health care expenditures. Household income and health care payments were *equivalised* to generate an *average income per equivalent-adult*, using WHO/FAO equivalence scale proposed for developing countries (e.g., Cissé et al., 2007; Deaton & Grosh, 2000).

Results

The aggregate summary index approach

Estimates of the aggregate inequality indices associated with each, and all, source(s) of health care financing are presented in Table 1 – along with the corresponding values of BTS standard errors and 95% BTS confidence intervals. It is of interest to note, first, that the estimated values of BTS standard errors are quite small compared to estimated coefficients, indicating a good precision in the results. As shown in Table 1, out-of-pocket payments tend to increase overall inequality in income distribution, with G_N equal 0.48

Table 1
Overall redistributive effect and progressivity indices of health care financing in the West Bank (WB) and Gaza Strip (GS)[a]

Region	Index	Pre-payment income	Out-of-pocket payments	Governmental health insurance	Private health insurance	Total payments
	Reynolds-Smolensky index of redistribution (RS)					
WB	G_X or G_N	0.4463 (0.0074)	0.4832 (0.0078)	0.4456 (0.0074)	0.4462 (0.0068)	0.4842 (0.0079)
		[0.4339, 0.4601]	[0.566, 0.690]	[0.4303, 0.4594]	[0.4321, 0.4606]	[0.4695, 0.5006]
	RS		−0.0370 (0.0026)	0.0007 (0.0004)	0.0001 (0.0001)	−0.0379 (0.0028)
			[−0.0417, −0.0313]	[−0.0001, 0.0016]	[−0.0014, 0.0004]	[−0.0430, −0.0327]
GS	G_X or G_N	0.4124 (0.0108)	0.4371 (0.0110)	0.4117 (0.0110)	0.4122 (0.0109)	0.4377 (0.0116)
		[0.3877, 0.4211]	[0.4248, 0.4597]	[0.3879, 0.4321]	[0.3887, 0.4326]	[0.4316, 0.4602]
	RS		−0.0247 (0.0038)	0.0007 (0.0004)	0.0001 (0.0001)	−0.0254 (0.0037)
			[−0.0321, −0.0178]	[−0.0001, 0.0016]	[−0.00004, 0.0003]	[−0.0323, −0.0182]
	Kakwani index of progressivity (KPI)					
WB	G_X or C_T	0.4463 (0.0074)	0.3633 (0.0160)	0.5076 (0.0207)	0.5558 (0.0784)	0.3786 (0.0138)
		[0.4339, 0.4601]	[0.3321, 0.3933]	[0.4330, 0.5452]	[0.3814, 0.6764]	[0.3542, 0.4066]
	KPI		−0.0830 (0.0149)	0.0603 (0.0193)	0.1095 (0.0779)	−0.0677 (0.0137)
			[−0.1133, −0.0554]	[−0.0190, 0.0976]	[−0.0609, 0.2304]	[−0.0906, −0.0425]
GS	G_X or C_T	0.4124 (0.0108)	0.3488 (0.0322)	0.4648 (0.0204)	0.5790 (0.0950)	0.3651 (0.0252)
		[0.3877, 0.4211]	[0.2863, 0.3643]	[0.4215, 0.4989]	[0.3793, 0.7339]	[0.3126, 0.4108]
	KPI		−0.0636 (0.0301)	0.0524 (0.0192)	0.1666 (0.0935)	−0.0473 (0.0228)
			[−0.1200, −0.0078]	[−0.0119, 0.0895]	[−0.0315, 0.3270]	[−0.0939, −0.0050]

[a] Bootstrap standard errors of the estimate are in parenthesis; the 95% bootstrap confidence intervals of the estimate are in the square brackets.

and 0.44 for the WB and GS, respectively – both statistically significantly different from G_X at a significance level of 0.05. This resulted in a significant negative value of RS, clearly indicating a "*pro-rich*" out-of-pocket financing arrangement. This was slightly more pronounced in the case of the WB (RS = −0.0370) compared to GS (RS = −0.0247). By contrast, GHI and private insurance schemes appear to be "*pro-poor*" in their RE, as represented by the positive values of RS for the WB and GS. Table 1 shows, however, that the positive RE associated with the two insurance schemes, in the WB and GS, are both marginal (RS = 0.0007 and 0.0001 for GHI and private insurance, respectively) and statistically insignificant (at $\alpha = 0.05$). Results such as these seem to reflect, in part, the relatively low shares of the public and private insurance schemes in the overall financing burden in the two Palestinian regions. Some, though, is undoubtedly due to the fact that converge is not universal, and hence, the RE associated with the insurance schemes are likely to be driven by variations in coverage across income groups as well as the diversity of institutional arrangements and the associated premiums – consequences of each of which will be further discussed in the next section. Suffice to note here that RS for the overall health care burden remains, consequently, significantly negative, indicating a detrimental RE against the poorest sections of the population – with relatively higher negative values (RS = −0.0379 and −0.0254 for WB and GS, respectively) compared with out-of-pocket payments when assessed separately. This indicates that health care financing burden, overall, induces further income-reranking in the post-payment income period relative to pre-payment income period.

Results on VE of the three financing sources – as captured by KPI, offer some insights about the aggregate deviation from proportionality in the payments structure of each of which with respect to G_X. In the case of out-of-pocket source of financing, the value of concentration index of payment for health care (C_T) appears to be far inferior and significantly different from G_X in the two regions. This resulted in a significant negative value of KPI at a significance level of 0.05, clearly indicating a regressive out-of-pocket financing arrangement. The extent of regressivity in households' out-of-pocket payments in the WB emerges to be more pronounced (KPI = −0.0830) than in GS (KPI = −0.0636). By contrast, the values of C_T for both the GHI and private insurance schemes, although appear to be far superior to G_X, differences between the two indices (C_T and G_X) are found to be statistically insignificant (at $\alpha = 0.05$), and resulted in non-significant positive values of KPI. Total health care payments, borne by the Palestinian households, overall, remain, as a result, regressive with a KPI of −0.0677 in the WB and −0.0473 in GS – both statistically significant (at $\alpha = 0.05$). It must, however, be noted that there is some variation in the extent of overall regressivity for the total payments compared to regressivity of out-of-pocket payments *per se*. Considered jointly, the overall regressivity indices in the two regions turned out to be somewhat less exacerbated in magnitude. This may indicate that some progressivity in insurance contributions has partially compensated for regressivity found in out-of-pocket payments. However, given the dominante role of the latter in the overall financing-mix and the insignificant progressivity we found in insurance schemes, the overall regressivity observed did not change to any great extent.

The disaggregate approach

In this section, the Lorenz and concentration curves are evaluated throughout income p-ordinates, using the dominance criterion. The analysis yields RE(p) and VE(p), which represent the differences in cumulative shares of: pre-payment income and, respectively, post-payment income and health care payments as per each decile. Results are presented in Figs. 1 and 2 where RE(p) and VE(p) are plotted against the decile-ordinates. The corresponding BTS confidence intervals at a significance level of 95% are presented as intersecting lines at the ordinates of each decile.

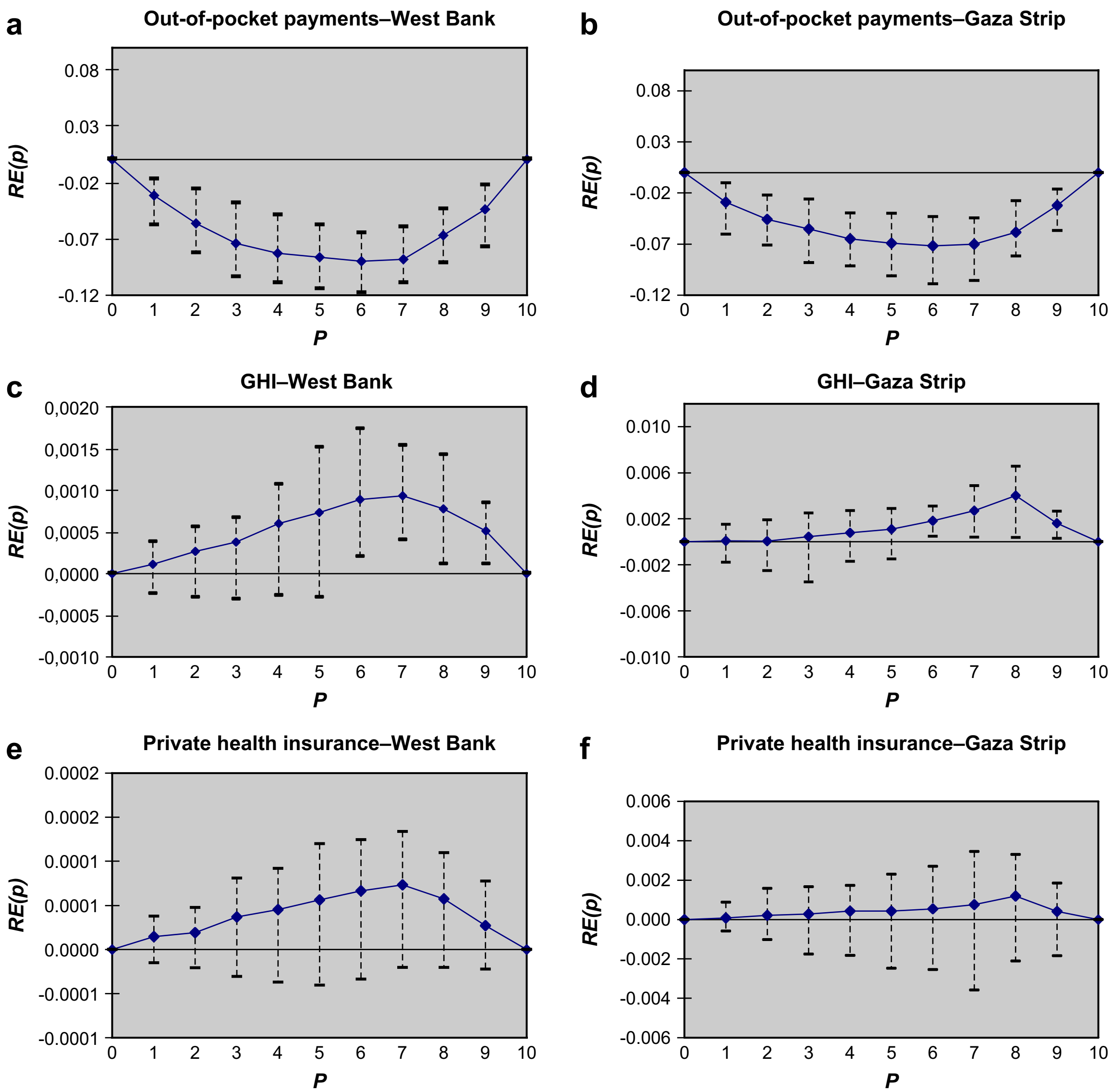

Fig. 1. Redistributive effect of health care financing (with 95% upper/lower BTS confidence intervals).

Fig. 1 indicates that RE(p) associated with out-of-pocket payments are significantly negative (at $\alpha = 0.05$) in the WB and GS, at all income deciles, indicating that out-of-pocket payments are "*pro-rich*" regardless of income decile. As for GHI, the results indicate that $L_N(p)$ dominates $L_X(p)$ at all income deciles indicating a "*pro-poor*" trend; however, the differences between $L_X(p)$ and $L_N(p)$ are only statistically significant (at $\alpha = 0.05$) at the sixth and higher deciles. Turning to private insurance, none of the differences between the Lorenz curves were significant (at $\alpha = 0.05$) at any of the decile-ordinates. Similar results are obtained for the case of the WB and GS.

Results concerning VE, as presented in Fig. 2, show the differences between $L_X(p)$ and $L_T(p)$ for the three health care financing sources. Fig. 2a, b suggests that out-of-pocket payments are regressive (at $\alpha = 0.05$), at all income deciles in the WB and GS. On the other hand, GHI and private insurance premiums seemed to be progressive for all income deciles in the WB and GS (Fig. 2c–f). However, such result was only significant for the four highest income deciles in the case of GHI. In the case of private insurance, although all VE(p) are found to be positive, none of the differences are significant at $\alpha = 0.05$ in the WB and GS.

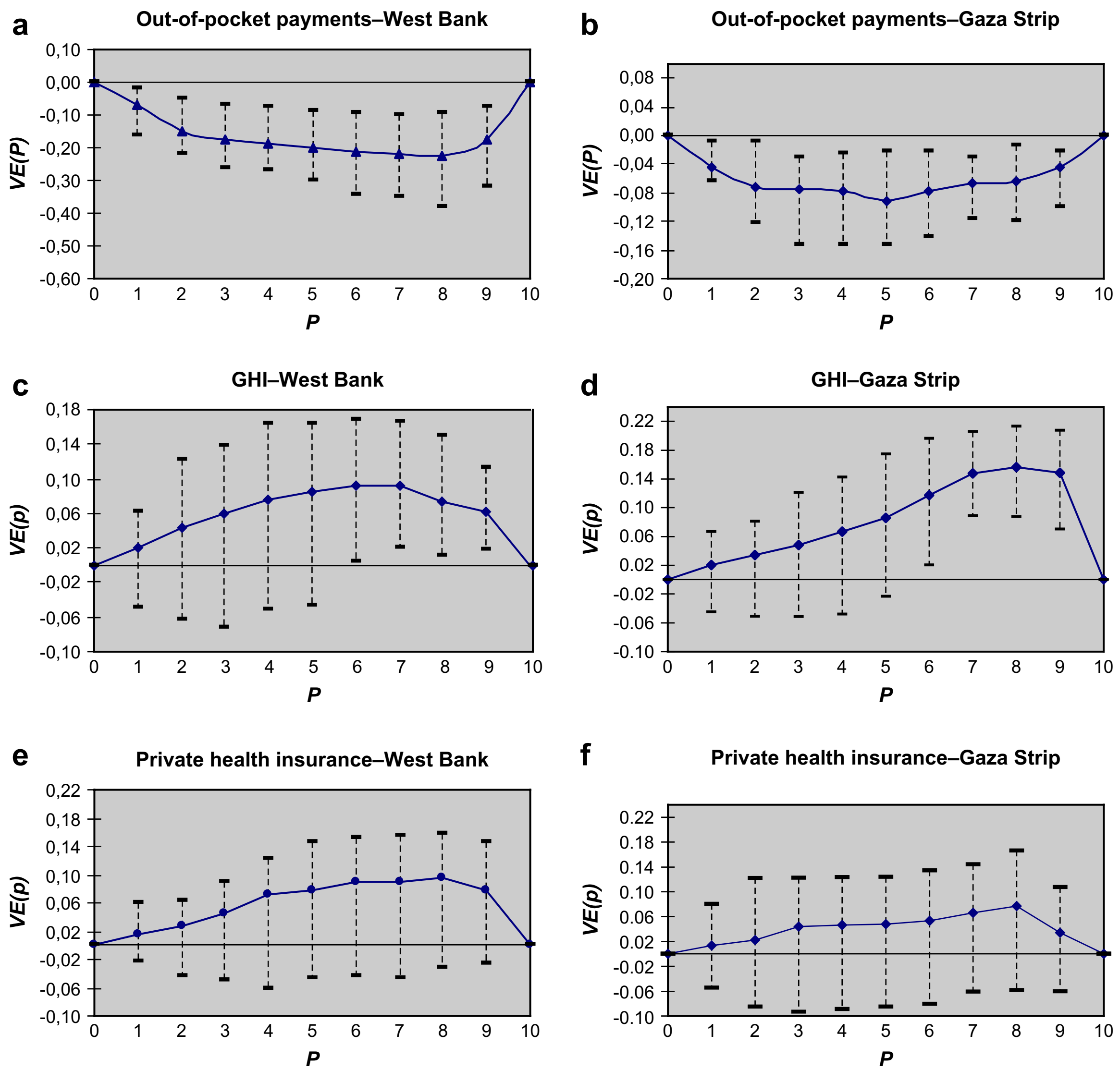

Fig. 2. Progressivity of health care financing (with 95% upper/lower BTS confidence intervals).

Discussion

This paper seeks to extend the distributional analysis of health care financing beyond the commonly used aggregate approach, to implement a disaggregate method that splits up summary measures over specific income groups. Therefore, instead of merely relying on summary indices, the analysis considered RE and VE distributions over constituent parts of income distribution, using the dominance criterion. In addition, statistical inference was apprehended using the bootstrap method. The analysis was conducted for alternative health care financing schemes proper to the Palestinian context. Results clearly suggest that although both the aggregate and disaggregate approaches identify similar trends, the latter offers more subtle diagnoses necessary to inform relevant and more "equitable" public policies.

Both the aggregate and disaggregate approaches for measurement of inequalities conclude that out-of-pocket payments – which constitute a major source of health care financing in the Occupied Palestinian Territory (≈40% of total health expenditures) – play in favour of the rich, and increase pre-existing income inequalities. The disaggregate analysis however stresses the high burden of health care expenditures among the most economically worse-off classes of the population, calling for a critical need to reconsider the prevailing financing-mix. Indeed, the current structure of out-of-pocket payments in the Occupied Palestinian Territory is a rigid one, with generally no mentioned price discrimination to account for individuals' contributive capacities. This is particularly pronounced in the case of the private sector, which plays a non-negligible role in health care provision (around 21.4% of health care visits take place at health institutions belonging to the private sector). Recently a user-fees exemption policy was advocated in the Occupied Palestinian Territory – following recommendations from elsewhere; e.g., see (Wagstaff, 2002) – to alleviate the burden on families in hardship situation. Indeed, it is well-established that introducing exemptions can enhance progressivity, should those being exempted be concentrated in lower income deciles. The system was however not strictly well-administered, nor properly followed up, in a way that it paradoxically culminated into deteriorating the quality of provided care (due to inflation in the number of insured individuals), and compromised the financial self-sufficiency in the system, without significantly limiting persisting inequalities.

It is increasingly argued that in the context of developing countries, more equitable financing could be acquired by a shift toward pre-payment schemes. A growing body of literature has brought evidence in favour of *ex-ante* modes of financing on the grounds that, beside its intrinsic risk-pooling characteristic, pre-payment schemes can be more easily designed to take into account individuals' ATP (Asfaw & Braun, 2004). Health insurance schemes in the Occupied Palestinian Territory – both public and private – though appear to have potential *equalizing effects* over the entire income distribution, their progressive feature was not found to be statistically significant at the aggregate level. Interestingly, when the analysis was conducted at the decile-level, results indicated a significant pro-poor characteristic of GHI over half of the deciles (the upper half). Such findings shall help inform appropriate health policies with regard to the payment structure to adopt, and the category of population to cover. More specific results with this regard could be obtained following a simulation exercise that assesses the impact of structural and organizational factors on the performance of the system – this is being attempted elsewhere (Abu-Zaineh, Mataria, Luchini, & Moatti, submitted for publication). The insignificant results at low-income levels might be due to the disconnection between insurance premiums and individuals' ATP, with the use of a ceiling for obligatory affiliations (17.3 USD per household per month) and a fixed *lump-sum* for voluntary affiliation – both measures constituting regressive elements that limit the positive equalizing effects of insurance schemes (Wagstaff & van Doorslaer, 1997). Moreover, exemptions through the so-called *Al-Aqsa Coverage* are practically not necessarily income-based.

An alternative financing mechanism to the *ex-ante* insurance schemes consists of payments at the point of consumption through user fees. However, given that *ex-post* payments are subject to the unpredictability of illness, and are generally unconnected to individuals' ATP, user-fees are seen regressive by definition, should they be the same for all users. It has been suggested that implementing a policy of price discrimination could culminate into a more equitable user-fees structure (Moony, 2000). Techniques for differentiating contributions to account for users' respective preferences and ATP have been extensively discussed in the economic literature and recently applied to the specific case of health (e.g., Mataria, Donaldson, Luchini, & Moatti, 2004). Accordingly, a pricing structure should depend not only on individuals' ATP but also on their preferences vis-à-vis the provided care, which could be informed by an elicitation of individuals' willingness to pay values.

On the other hand, government policies of controlling prices – especially those practiced in the private sector – and directing foreign assistance toward services that are mostly needed by the poor, could also be of help in alleviating prevalent regressivity. For instance, the cost of medications and doctors' tariffs are found to absorb the biggest shares of health care expenditures, and might be key factors behind the regressivity. Subsidizing the former and regulating the latter, as long as the poor are concerned, should be helpful.

The disaggregate approach was able to illuminate potential differences among different subgroups of the population. In effect, while the analysis at the aggregate level revealed insignificant GHI redistributive and vertical effects, the disaggregate approach demonstrated significant positive effects for the five highest income deciles of the population. This suggests that, in spite of the above mentioned limitations – e.g., ceiling and lump-sum payments – financial premiums paid by GHI affiliates belonging to middle and upper income deciles tend to be significantly positively related to their ATP. This indicates that specific subgroups, e.g. income deciles, might demonstrate features that would in effect be concealed by overall aggregate estimates. The insignificant positive effects observed at low-income deciles may be due, in part, to the poor design of insurance scheme where premiums are not properly linked to individuals' ATP at these levels. In addition, this may be also due to the extensive exemptions, and the low-cost insurance, provided through "*Al-Aqsa Coverage*", where high percentages of households end up with a *quasi free* coverage. Such observations indicate the feeble role of the available exemption and pricing policies in promoting progressivity, and hence, signal the utmost need to reconsider the current structure of GHI scheme in order to strengthen its progressive intrinsic capacities as an equitable health care financing scheme.

Although the analysis undertaken in this study attempted to use recent methodological developments in the field of inequality measurement, some practical limitations that might have influenced the study results are worth mentioning. Firstly, the absence of reliable data on taxes has made impossible to estimate the amount that would have been paid through taxation for health care in the Occupied Palestinian Territory. Including such data offers the opportunity to assess equity implications of overall health care financing. However, it must be noted that the particular context of the Occupied Palestinian Territory lacks a proper system of tax-transfer. In addition, given the chronic political crises in the region, that has considerably increased the proportion of the population living under the poverty (PCBS, 2006b), and compromised the performance of the local economy, the level of general taxation remains low. Therefore, even if the higher income groups have additionally contributed to health care through the share of their taxes that the government allocates to the public health sector, it remains however unlikely that this contribution reverses our diagnosis of regressivity.

Secondly, as in similar studies on inequality measurement in health care, our estimates concerning the direct out-of-pocket payments were based on survey data, and therefore, they may be subject to potential biases related to the particular nature of such source of financing. As indicated above, our analysis has made use of data derived based on the same reference period for all expenditure categories. Although, the latter – compared to a scenario where different recall periods are used – help minimize *recall bias*, data collected over a short period may be subject to "*eventual bias*" due to the stochastic and seasonal nature of illnesses and the infrequency with which some health care payments are made (Wagstaff, O'Donnell, & van Doorslaer, 2007). Annualising out-of-pocket payments in the presence of seasonality, by multiplying with some scaling factor might be associated with over-estimations or under-estimations of total health expenditures. This may be avoided in future studies, should health expenditure information be collected over a longer period of time, and using a diary approach. Lastly, it is worth noting that such direct measure of health care expenditures ignores some indirect costs, e.g., opportunity cost of time and the loss of income related to the time households' members spend to seek care – which are shown to be higher at higher income levels (Cissé et al., 2007). Considering such indirect costs – e.g., differences in waiting time at private-for-profit versus private-not-for-profit – allows assessing the extent to which *price-quality differentials* affect the magnitude of regressivity. Unfortunately, our survey did not offer data on waiting time, and in its absence it was impossible to incorporate such costs into our measure of total heath care expenditures.

Conclusions

Several dimensions have to be taken into account with regard to the feasibility and impact of any changes in the current financing-mix for health care in Palestine. The special context of the Occupied Palestinian Territory is characterized by an underdeveloped fiscal and managerial systems, extreme reliance on international aids in planning and financing, and protracted history of occupation. All these factors have created conditions for an absence of coherent policy, and an accumulation of *ad hoc* operational plans driven by historical inertia with concentration on emergency agenda – something that might attest being irrational at many instances (Giacaman et al., 2003). This should indicate the difficulties to be encountered if a change in the prevailing financing-mix – even a positive one – is attempted.

In spite of their limitations, the results presented in this paper should however help shape the policy toward building an equitable health care financing system for the Occupied Palestinian Territory. Given the high share of households income absorbed by out-of-pocket payments, and hence, the pronounced adverse effect of such financing modality on the already unbalanced income distribution, a need is there to identify innovative financing mechanisms capable to reduce the financial burden of health care and to limit existing regressivity. Although proven to be promising, the current structure of the Governmental Health Insurance scheme needs to be reconsidered to further enhance its positive intrinsic capacities. Given that the governmental insurance scheme appears to be significantly progressive for only the highest income deciles, a reconsideration of the unplanned extension of governmental insurance coverage through the so-called *Al-Aqsa Coverage* is needed. In addition, although private health insurance schemes are still limited, it was found that such financing modality may play some positive role in the reduction of the regressivity associated with ex-post payments, should enrolment's premiums be suitably linked to households' abilities-to-pay.

Acknowledgement

The authors would like to thank the Palestinian Central Bureau of Statistics (PCBS) for making available the data from the Palestinian Household Health Expenditure Survey (HHES-2004). The authors are grateful to Prof. Rita Giacaman for her generous help in reading and commenting on earlier draft of the paper. We are also grateful to three anonymous referees for helpful comments. The views presented in the paper are those of the authors and do not necessarily reflect those of PCBS. The authors alone are responsible for any errors or omissions.

References

Abu-Zaineh, M., Mataria, A., Luchini, S. & Moatti, J.P. Decomposing Inequality in health care utilisation: A micro-simulation approach with evidence from Palestine. *Health Economics*, submitted for publication.

Andres, R., & Calonge, S. (2005). *Inference on income inequality and tax progressivity indices: U-statistics and bootstrap methods, ECINEQ WP 2005-09*. Barcelona: Society for the Study of Economic Inequality.

Asfaw, A., & Braun, J. V. (2004). Can community health insurance schemes shield the poor against the downside effects of economic reforms? The case of rural Ethiopia. *Health Policy and Planning, 70*, 97–108.

Biewen, M. (2002). Bootstrap inference for inequality, mobility and poverty measurement. *Journal of Econometrics, 108*(2), 317–342.

Bishop, A. J., Chow, K. V., & Formby, J. P. (1994). Testing for marginal changes in income distributions with Lorenz and concentration curves. *International Economic Review, 35*, 479–488.

Cissé, B., Luchini, S., & Moatti, J. P. (2007). Progressivity and horizontal equity in health care finance and delivery: what about Africa? *Health Policy, 80*, 51–68.

Clarke, P. M., Gerdtham, U.-G., & Connelly, L. B. (2003). A note on the decomposition of the health concentration index. *Health Economics, 12*(6), 511–516.

Davidson, R., & Duclos, J. Y. (2006). Testing for restricted stochastic dominance, *ECINEQ WP 2006-36*: Society for the study of Economic Inequality.

Davidson, R., & Flachaire, E. (2007). Asymptotic and bootstrap inference for inequality and poverty measures. *Journal of Econometrics*. doi:10.1016/j.jeconom.2007.1001.1009.

Deaton, A. (1997). *The analysis of household surveys: A microeconometric approach to development policy*. Baltimore: Johns Hopkins University Press.

Deaton, A., & Grosh, M. (2000). Consumption. In M. Grosh, & P. Glewwe (Eds.), *Designing Household Survey Questionnaires for developing countries: Lessons from 15 years of living standards measurement study*. Washington, DC: The World Bank.

van Doorslaer, E., & Koolman, X. (2004). Explaining the differences in income-related health inequalities across European countries. *Health Economics, 13*(7), 605–608.

Efron, B., & Tibshirani, R. J. (1993). *An introduction to Bootstrap*. New York: Chapman and Hall.

Giacaman, R., Abdul-Rahim, H. F., & Wick, L. (2003). Health sector reform in the Occupied Palestinian Territories (Occupied Palestinian Territory): targeting the forest or the trees? *Health Policy and Planning, 18*(1), 59–67.

Gottret, P., & Schieber, G. (2006). *A practitioner's guide: Health financing revisited*. Washington, DC: The World Bank.

Gwatkin, R. D. (2001). The need for equity-oriented health sector reforms. *International Journal of Epidemiology, 30*(4), 720–723.

Hamdan, M., Defever, M., & Abdeen, Z. (2003). Organizing health care within political turmoil. *International Journal of Health Planning and Management, 18*(1), 63–87.

Horowitz, J. L. (2000). The bootstrap. In J. J. Heckman, & E. E. Leamer (Eds.), *Handbook of econometrics*. Elsevier Science.

Kakwani, N. (1977). Measurement of tax progressivity: an international comparison. *Economic Journal, 87*(345), 71–80.

Klavus, J. (2001). Statistical inference of progressivity dominance: an application to health care financing distribution. *Journal of Health Economics, 20*, 363–377.

Lambert, J. P. (1993). *The distribution and redistribution of income: A mathematical analysis*. Manchester: Manchester University Press.

Lerman, R., & Yitzhaki, S. (1989). Improving the accuracy of estimates of Gini coefficients. *Journal of Econometrics, 42*(1), 43–47.

Mataria, A., Donaldson, C., Luchini, S., & Moatti, J. P. (2004). A stated preference approach to assessing health care-quality improvements in Palestine: from theoretical validity to policy implications. *Journal of Health Economics, 23*, 1285–1311.

Mills, J. A., & Zandvakili, S. (1997). Statistical inference via bootstrapping for measures of inequality. *Journal of Applied Econometrics, 12*(2), 133–150.

MoH-PHIC. (2006). *Governmental health insurance in Palestine 2005*. Ramallah (Occupied Palestinian Territory): Ministry of Health.

Moony, G. (2000). Vertical equity in health care resource allocation. *Health Care Analysis, 8*(3), 203–215.

PCBS. (2004). *Households health expenditure survey 2004*. Ramallah (Occupied Palestinian Territory): Palestinian Central Bureau of Statistics.

PCBS. (2006a). *Health care providers and beneficiaries survey 2005*. Ramallah (Occupied Palestinian Territory): Palestinian Central Bureau of Statistics.

PCBS. (2006b). *Poverty in Palestinian territory 2005*. Ramallah (Occupied Palestinian Territory): Palestinian Central Bureau of Statistics.

Reynolds, M., & Smolensky, E. (1977). *Public expenditures, taxes, and the distribution of income: The United States, 1950, 1961, 1970*. New York: Academic Press.

Shao, J., & Tu, D. (1995). *The jackknife and bootstrap*. New York: Springer-Verlag.

Wagstaff, A. (2002). Reflections on and alternatives to WHO's fairness of financial contribution index. *Health Economics, 11*(2), 103–115.

Wagstaff, A., O'Donnell, O., & van Doorslaer, E. (2007). *Quantitative techniques for health equity analysis*. Washington, DC: World Bank publications.

Wagstaff, A., & van Doorslaer, E. (1992). Equity in the finance of health care: some international comparisons. *Journal of Health Economics, 11*(4), 361–387.

Wagstaff, A., & van Doorslaer, E. (1997). Progressivity, horizontal equity and reranking in health care finance: a decomposition analysis for The Netherlands. *Journal of Health Economics, 16*(5), 499–516.

Wagstaff, A., & van Doorslaer, E. (2000). Equity in health care finance and delivery. In A. J. Culyer, & J. P. Newhouse (Eds.), *Handbook of health economics* (pp. 1803–1862). North Holland: Elsevier.

Wagstaff, A., van Doorslaer, E., van der Burg, H., Calonge, S., Christiansen, T., & Citoni, G., et al. (1999). Equity in the finance of health care: some further international comparison. *Journal of Health Economics, 18*, 263–290.