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A Distributional Analysis of out-of-pocket Healthcare Financing in Nigeria Using a New Decomposable Gini Index

***H. Eme Ichoku¹, William M. Fonta¹ and Abdelkrim Araar²**

This study applies a new method of decomposing total redistributive effect of taxation proposed by Duclos et al. (2003) to assess the redistributive effects of direct healthcare financing in Nigeria. This new framework makes it possible not only to introduce into the conventional Gini Index estimation framework a flexible ethical measure of aversion to inequality but also a novel concepts of horizontal inequity and re-ranking. The empirical results indicate that when the decision to utilize healthcare is always linked to the decision to pay for healthcare, as is the case in Nigeria, out-of-pocket payment, contrary to existing literature, may indeed be progressive with high levels of horizontal inequity and re-ranking effect. But the progressivity may underlie the lack of ability to pay by poorer households. All the components of the redistributive effect are also likely to vary with the level of the social aversion to inequity

Keywords: DJA decomposition, Gini index, horizontal inequity and re-ranking.

JEL Classification: B41, C52, C81, D63, I11.

1. Introduction

It is well established in the literature that social inequalities lead to unequal health outcomes. However, it is also possible that health institutions, and in particular; the method of financing health services, could feed inequality back into the social space and exacerbate the existing inequalities and impede the social capacity to care. Methods of financing health services could, for example; give rise to unequal claims and different experiences of using the health system³. Health system can feed into and reinforce existing social and health inequalities (Mackintosh, 2001 and 2006). In particular health care financing system has potential to deepen and widen the existing levels of social inequalities (McIntyre et al., 2006 and Sauerborn et al., 1996). There is therefore the need for rigorous analysis of inequalities embedded in healthcare financing system in order to make explicit their implied redistributive consequences, the extent health institutions aggravate social inequalities and whether or not such redistributive consequences are justifiable on the basis of equity (Acocela, 1998). While equity in health financing has been the subject of several studies, such analyses have usually applied descriptive analysis in the analysis of equity and therefore often fail to isolate the components of inequities where they exist.

This study has two objectives. Firstly, it is an empirical study aimed at estimating the total redistributive effect of the prevailing health financing mechanism in Nigeria, namely; out-of-pocket payment (oop), and the components of this redistributive effect⁴. Secondly, it aims to test the performance of a new decompositional framework developed by Duclos, Jalbert and Araar -DJA (Duclos et al., 2003) in contrast to the prevailing Aronson, Johnson, and Lambert - AJL (Aronson et al., 1994) decomposition framework which has largely dominated the literature.

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³ Tibandebage and Mackintosh (2001) described such an experience in Tanzania

⁴ Equity in health financing is only one aspect of overall equity goal that a health system may strive to achieve (See, for e.g., WHO 2000). Other forms of equity goal include equity in access and utilization, financial risk protection etc.

2. Redistribution as a Central Policy Issue in Nigeria

Unequal access to economic and social resources is central to understanding the political economy of Nigeria. This is not only because of the increasing scope and severity of poverty in the country estimated at about 54%, but also because it is central to political instability, claims of marginalization and resource control agitations amidst frequent conflicts in many parts of the country (Egwu, 1998). Similarly, there is also large disparity in income as recorded by the Gini coefficient estimates of about 50.6 (Adams 2004, Canagarajan et al. 1997 and Okojie et al. 2000). This has led to what is now termed politics of prebendalism⁵ and state capture by entrenched interests. This system of power relation determines access to social services including health services which are generally characterized by privilege and patronage (Alubo, 2001 and 1987).

Although health expenditure in Nigeria is made at the three tiers of governments (i.e., federal, state and local government levels), nevertheless, available statistics still show that households largely bear the responsibility of financing their health needs through direct payments (USAID-FMOH, 2009). Over 68% of total health expenditure comes from direct out-of-pocket payments (FMOH 2003 and WHO 2009,). This proportion is very high even in the context of other poorer African countries⁶. Despite increased funding to the health sector averaging over 6% of the total budget since 2003; health expenditure still lags behind the 15% of commitment to the Abuja Declaration 2000 and Gaborone Declaration 2005. In the absence of mechanisms for risk-sharing and pooling of resources for the majority of the population, households have to pay for nearly every healthcare cost directly on a 'cash and carry' basis. The dominance of the Nigerian health system by for-profit providers could interact with poor public financing and out-of-pocket to escalate the potential disequalizing and impoverishing effects of health care.

The key question being addressed is why should the post payment income distribution be of policy concern? The concern arises in the first place, from the fact that healthcare payments may eat so deep into the pocket of a household that it has little or nothing left to provide other basic life necessities such as food, shelter, and the education of the children (McIntyre et al. 2006, Wagstaff and van Doorslaer, 2001). Secondly, since the experience of ill-health is random among households, the cost implications of treatment would also differ in the absence of a mechanism for pooling of resources and risk-sharing. Such would be the case, for instance, where every household is expected to pay for its healthcare needs directly from out-of-pocket. In that case, the prepayment income distribution could differ significantly from the post-payment distribution. The concern here, therefore, is how far the healthcare financing mechanism worsens or improves the prepayment inequality in income distribution at the post-payment period.

3. Decomposition Method

3.1 The DJA Decomposition Framework

Achieving the objectives of this study requires the decomposition of the total redistributive effect of healthcare financing into its various components. Although decomposition methods have been developed in the context of analysis of equity effects of fiscal system, we apply the methods in the context of equity effects of healthcare financing. Following Arrow (1963) we reason that out-of-pocket healthcare payments, like the tax system, represent further deductions from household income, albeit, more idiosyncratically. Indeed, its effects on household are less systematic than the tax system since ill-health and the cost of treatment are stochastic distributions.

⁵ Politics of prebendalism is defined as the intense struggle by interest groups to capture state resources for group welfare only (Ayogu, 1999). The term 'Prebendalism' was originally coined by Joseph (1987), with particular reference to the Nigerian political economy (see <http://en.wikipedia.org/wiki/Prebendalism>)

⁶ In most OECD countries, the fraction of direct healthcare payment to total payment is generally below 25%. US and Ireland with 22% and 23% respectively, have some of the highest proportions, while Germany has 9.3%, UK has 17% and Denmark has 14%.

The AJL approach to decomposition of total redistributive effects of taxation and transfer programs into vertical, horizontal and re-ranking effects has dominated the literature since it was first developed. However, the AJL approach has certain weaknesses that make the consideration of alternative decomposition frameworks necessary. Foremost among the weaknesses is the implicit assumption of a rigid ethical social welfare function that is insensitive to the policy-maker's concern or level of social aversion to inequality⁷.

To overcome the problem of ethical rigidity associated with the AJL approach as well as other shortcomings, DJA propose the use of an inequality index with two flexible ethical parameters of aversion to inequality (Duclos and Araar, 2006). One can recall here that the flexible forms of the generalised Gini index was already discussed by Yitzhaki (1983). The DJA single parameter, ethically sensitive weighting scheme uses differences in income rank of individuals. A brief summary of the framework is presented here in order to highlight the conceptual assumptions behind the estimated parameters in the empirical model.

For $p \in (0,1)$ denoting the percentile or fractional rank of an individual in the income distribution, a non-negative weight v may be defined such that:

$$w(p, v) = v(1 - p)^{(v-1)}, \quad v \geq 1 \quad (1)$$

Where v is a parameter reflecting social preferences about aversion to inequality using differences in the ranks of individuals in the income parade. Equation (1) has the following restrictions:

$$(i) \quad \int_0^1 w(p) dp = 1 \quad (2)$$

That is, the weights are normalized to 1. Furthermore,

$$(ii) \quad w(p_i) \leq w(p_j) \quad \text{for } p_i \geq p_j \quad (3)$$

In other words, the weights are sensitive to the individuals' ranks in the income distribution such that if a small transfer is made from a richer to a poorer person, inequality is perceived to be reduced (the Pigou-Dalton transfer principle). For $v = 2$, equation (1) reduces to the ethical weights of the standard Gini index which measures income disparity within a region or group of people. For values of v less than 2, the policy maker is assumed to prefer inequality favouring the rich while for values of v greater than 2, the policy maker is averse to inequality that disadvantages the poor.

DJA model specifies a social welfare function that is concave, additive, and linear in levels of income and that can generate relative inequality indices as:

$$W_X(\mathcal{E}, v) = \int_0^1 U_{\mathcal{E}}(X(p)) w(p, v) dp \quad (4)$$

Equation (4) is the Social Welfare Function (SWF) of the gross income (X) where $U_{\mathcal{E}}$ is the Atkinson (1970) concave utility function. The parameter \mathcal{E} is an index of aversion to uncertainty in post-payment income of those within any given income level y . In other words, \mathcal{E} may be interpreted as a measure of aversion to horizontal inequity. One can recall here that, with the fiscal system framework, the concept of horizontal inequity refers to the unequal treatment of equals. DJA uses the concept of Equally Distributed Equivalent Income (EDE) as in Atkinson (1970) in order to analyze the cost of inequality to the society.

⁷ See for example, Wagstaff (2005), Gerdtham and Sundberg (1996), Wagstaff et al. (1999), van Doorslaer et al. (1999), Wagstaff and van Doorslaer (2001), Wagstaff (2001), for the applications of this framework and Lambert and Ramos (1997a; 1997b) for a modified version.

Since EDE is determined by the level of ε , the inequality index can be expressed in the form (Atkinson 1970, Blakorby and Donalson, 1978):

$$I_x = 1 - \frac{\xi_x}{\mu_x} \quad (5)$$

Equation (5) expresses the cost of inequality in terms of proportion of total income. It is the fraction of total income that could be used to restore equality or remove existing inequality without loss in social welfare. By implication, if risk or uncertainty in the postpayment income increases (reduces), the ratio $\frac{\xi_x}{\mu_x}$ falls (rises) and thus

I_x (inequality) rises (falls) requiring more (less) level of equally distributed income (relative to the mean of the actual distribution) to achieve the same level of social welfare as before. This concept of EDE is central to the DJA model estimation of horizontal inequity and is sensitive to the parameter ε .

Inequality can similarly be defined for post-payment income to obtain (I_N), for expected post-payment income (I_N^E), and for expected net income utility (I_N^P). These relationships provide the key to understanding the DJA decomposition framework:

$$\Delta I = \underbrace{I_x - I_N}_{RE} = \underbrace{I_x - I_N^E}_V - \underbrace{(I_N^P - I_N^E)}_{H \geq 0} - \underbrace{(I_N - I_N^P)}_{R \geq 0} \quad (6)$$

Like in the case of the AJL framework, the total redistributive effect ΔI is composed of three main parts: the vertical equity (V), horizontal equity (H) and reranking effect (R). V is the conventional index of progressivity of payments. The index of horizontal inequity (H) aggregates the over all increase in inequality that arises due to unequal payment by those at the same level of prepayment income. It is assumed that at any fixed point in the distribution of prepayment income, say point x , there is a group of individuals having exactly income x at prepayment distribution who can be denoted as W_x . This is the group of prepayment equals at point x . This is different from what is done in the AJL framework where ‘income equals’ could more appropriately be regarded as ‘near equals’. Horizontal inequity at point x is the measured level of inequality induced among the group W_x located at point x by the payment system. An individual who belonged to this class of prepayment income may now find her income at point x_1 or point x_2 due to the fact that the payment system has treated equals unequally. This is a source of uncertainty and risk factor. The average post-payment income among the set of prepayment equals with x is μ_x^a . However, a risk-averse individual may prefer to have ξ_x^a with certainty rather than take a gamble that may give her x_1 at the worst and x_2 at the best with respective probabilities. Thus, the H index measures the risk premium:

$$H_x = \mu_x^a - \xi_x^a \quad (7)$$

For the policy-maker, H_x represents the amount that has to be given up among those with post-payment income W_x so as to remove the uncertainties in the post-payment income of this group without loss of welfare.

To obtain the global measure of H involves aggregation of the form: $\sum H_x \phi_x$, $\forall x \in R$ and where ϕ_x denotes the population share with income x . In the DJA framework, like in Lambert and Ramos (1997b) but unlike the AJL framework, the weight chosen is pure weight: the proportion of the population at the given x . In other words, the weighting factor is independent of the income at point x . This is important because it ensures that horizontal inequity at point x is not contaminated by vertical considerations as is the case with the AJL framework where the weighting factor is the product of the population and income shares at point x . R index, measures the reranking effect. R arises because individuals may move out of their prepayment income class to other classes due to effects of payment. It arises as a result of any changes in rank induced by the healthcare payment system (or fiscal policy).

The DJA approach estimates H as loss in social welfare arising from the fact that the payment system generates uncertainty and is a source of dis-utility. Inequality itself is a loss of utility to the social welfare because it generates resentment and a feeling of deprivation among peers (Runciman, 1966). It is the cost of these resentments that is captured by H .

The empirical estimation of the DJA framework is based on the Gaussian kernel function which is nonparametric because of the well known properties of the Gaussian distribution. For example it does not need a priori assumptions about the distribution of income of the sample population. However, it seems that, in general, the choice of the kernel function is not as important as the choice of the window width which determines the smoothness of the distribution (Yatchew, 1998, Silverman 1986, *Stata Reference Manual*, 2002). By adopting this statistical approach, therefore, the DJA framework transfers the normative decision of determining income equals from the decision maker to statistical exercise: the choice of the window width is now determined by the optimal trade-off between bias and minimization of the squared mean error. The only assumptions required are statistical assumptions such as the smoothness and continuity of the joint distribution of gross and net incomes.

3.2 Social Determinants of Values of ε and ν

For direct health payments, the values of ε and ν may be determined by, among other things, the health system bureaucracy. The cost of removing such inequalities are suggested to lie between 0.25 and 1.0 of the total amount, implying that ε may lie between this range (i.e., $0.25 \leq \varepsilon < 1$). More efficient health systems would have the value of ε near to the minimum while inefficient system would have values of ε close to 1. On the same basis, the social value of ν is suggested to range between 1 and 4. In the estimation that follows we follow the Duclos et al. (2003), example where they used the value of $\varepsilon = 0.4$. But we also estimate for $\varepsilon = 0$, which amounts to the assumption of the null hypothesis: $H_{DJA} = 0$; where H_{DJA} refers to the value of horizontal inequity obtained under the DJA framework. As was noted earlier on, the DJA approach generalizes the value of ν implied by the standard Gini index which is $\nu = 2$. For the following estimations we use a broad range of values of ν from 1.5 to 5.0.

4. The Data

The study used a cross-sectional survey data generated between April and August 2004. The data set was part of a large set of data aimed at generating information on a wide range of social welfare issues including household health-seeking behavior, general household welfare and access to social services, health financing, self-assessed health, among others. The absence of such vital health statistics necessitated a field survey in order to generate a fresh set of data that could be used to inform health policy in the state. However, instead of a national survey, the survey was limited to one of the 36 states in Nigeria, Enugu state with a population of about 3 million in 2004. The selection of the state was among other things, based on cost considerations.

Also, familiarity of the researchers with the terrain of the state was an added impetus as this knowledge assisted in no small measure in the survey design and its actual execution. Furthermore, the state mirrored in many ways the health problems of most states in Nigeria: heavy disease burden, heavy out-of-pocket financing, dominance of the small-size private for-profit health facilities, and general lack of purchasing power among the population, among others. The state tier of governance also plays a core role in health policy decisions as it has responsibility for primary and secondary care in Nigeria.

The actual field survey was conducted after series of preparation that included design of questionnaire, ethical approval from the Enugu State Ministry of Health, training of fieldworkers, and pre-testing of the survey instrument. The standard multi-stage sampling design was adopted. The entire state was stratified along urban-rural divide. Pre-existing clustering arrangements used by the Federal Office of Statistics (FOS)⁸ and the National Population Commission (NPC) were adopted and this provided the frames not only for the clusters but also for the

⁸ The Federal Office Statistics has been reorganized and renamed Nigerian Bureau of Statistics (NBS)

households. The urban and rural clusters served also as the enumeration areas (EAs) or primary sampling unit (PSUs). One hundred EAs were selected at random and sampled intensively.

The decision on the sample size of 1500 households for this study was largely guided by Yamene (1967) in which the sample size depends both on the size of the population and the researcher's acceptable margin of error. For this survey, given that the average household size in the state was about 4 (Nigeria Demographic and Health Survey - NDHS, 2003), the margin of error was fixed for 0.01%. In other words, our confidence interval was more than 99%. Each EA was made up of approximately 20 households. Fifteen households were selected from each cluster making a total of 1500 households with about 5814 individuals.

The heads of household or, in their absence, their spouses were the main respondents on household level questions however; adult household members were also required to respond to individual level questions. The main variables used for the estimation include household gross expenditure defined as the total expenditure of the household inclusive of healthcare expenditure in the four weeks preceding the interview. Current literature suggests that expenditure is a better reflection of a household's permanent income (Bollen et al. 2001; Deaton 1997; Hentschel and Lanjouw, 1996 and Stevenson et al., 1988). The healthcare expenditure variable was defined as the cost of healthcare to a household in the four weeks preceding the interview. This includes cost of treatment, cost of consultation card, transportation to and for the treatment facility, and any other incidental expenses connected with ill-health in the household. The net household expenditure is the gross expenditure defined above net of healthcare costs. While there are arguments for considering household scale economies in studies of this nature, there are equally strong arguments against (Deaton, 1997). This study uses households' per capita expenditure for the estimations and the results that are presented in subsequent section.

In consideration of the multi-stage sampling design and the potential negative effect of improper weighting on point estimates, and the effects of stratification and clustering on estimated standard errors, the data analysis adopted the bootstrap method in Distributive Analysis software (DAD). The results, therefore, provide information also on bootstrapped asymptotic standard errors.

4.1 Empirical Results

4.1.1 Descriptive Statistics

The total number of households interviewed was 1500; three households were dropped because of inconsistent and incomplete information. Thus, the analysis is based on 1497 representing almost 100% of the total. About 65% of the respondents in respect of household questions was male and about 20% was urban households. In analyzing the effect of household health care expenditure we used the representative individual in each household. 522 representing 35% of the total sample reported financing healthcare during the reference period. The headcount poverty index on prepayment and based on updated poverty line in Aigbokan (2000) was 57.3% and the postpayment headcount poverty was about 61.4%, implying that out-of-pocket increased poverty by about 7%. The sample shows that 38% of poor households incurred out-of-pocket while 30% of the non-poor reported out-of-pocket during the period. Mean out-of-pocket for different quintiles for the sick-only and for all households are shown in Figure 1 while Figure 2 reports the percentage of total household expenditure spent as out-of-pocket by different income quintiles of households. However, as would be expected, the mean amount spent on healthcare financing by the poor and non poor differed widely. The poorest 75% of the households spent on average N342.4 while the top richest 5% of households spent on average N2389.40 or 700% of the amount by poorest 75% of households.

Figure 1 indicates that among households that reported incurring out-of-pocket the poorest quintiles spent less than \$1.00 on health care while the richest quintile spent nearly \$40 per capita on health in the preceding 4 weeks of the interview. The graph is flatter when the populations that reported no out-of-pocket were included. Figure 2 similarly shows that relative burden of out-of-pocket measured by the proportion of total household income spent by each quintile as out-of-pocket and indicates that the rich spend the larger proportion of their total expenditure as out-of-pocket.

This seems to indicate that out-of-pocket could indeed be progressive; however, when the health needs of the various quintiles are taken into account, it would seem to show that the poorer households were grossly under spending on health, probably because they could not afford the cost of care.

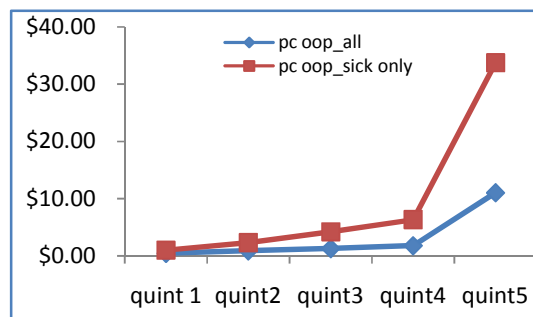


Figure 1: Per capita out-of-pocket (all) and per capita out-of-pocket (sick only)

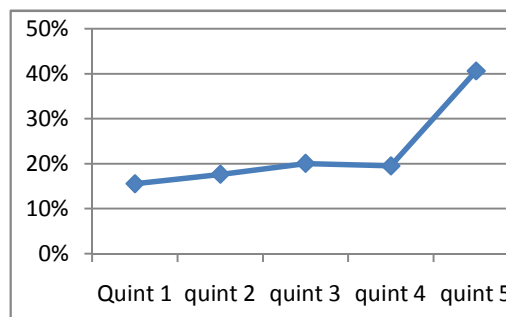


Figure 2: Distribution of out-of-pocket as % of per capita expenditure (sick only)

4.1.2 DJA Decomposable Results

Results of the DJA Model decomposition based on an assumed value of aversion to uncertainty in net payment income $\varepsilon = 0.4$ and aversion to inequality $\nu = 1.5, 2, 3, 5$ are presented in Table 1.

Table 1: Decomposition Results Based on DJA Framework ($\varepsilon = 0.4$)

<i>Indices</i>	$\varepsilon = 0.4, \nu = 1.5$	$\varepsilon = 0.4, \nu = 2$	$\varepsilon = 0.4, \nu = 3$	$\varepsilon = 0.4, \nu = 5$
G_X	0.3807** 0.1173	0.4966** 0.1498	0.6145** 0.1849	0.7150** 0.2169
G_N	0.3829** 0.1182	0.4999** 0.1503	0.6201** 0.1871	0.7224** 0.2199
RE	-0.0033 0.0055	-0.0033 0.0040	-0.0056 0.0054	-0.0075 0.0071
V	0.0284** 0.0102	0.0334** 0.0120	0.0398** 0.0133	0.0509** 0.0158
H	0.0202** 0.0059	0.0253** 0.0076	0.0342** 0.0104	0.0473** 0.0144
R	0.0103** 0.0031	0.0114** 0.0036	0.0111** 0.0047	0.0111** 0.0046

NB. Bootstrapped standard errors at the bottom of estimated values, ** Statistically significant at 5% level

Column 1 of Table 1 presents the parameters. Columns 2 through 5 report the estimated parameters under the different simulations around the values of ε and ν and their respective bootstrapped standard errors. Since the definition of income band is statistically determined in the DJA framework, it obviates the need for the arbitrary definition of income bands which is one of the major concerns in the AJL framework. The estimated prepayment Gini Index for $\nu = 2.0$ represents the implicit value assumption in the conventional Gini Index. Under this assumption the policy maker is inequality-neutral. It does not matter whether inequality favours the rich or the poor. The estimated inequality is close to the estimated Gini Index of 51 obtained by Okojie et al. (2000) and 50.6 by Adams (2004). When $\nu = 1.5$, the policy maker in fact favours inequality and so perceived less inequality as

reflected in the Gini Index value of 0.38. On the other hand, when the policy maker is averse to inequalities disadvantaging the poor as would be the case when $\nu \geq 0$, then she/he perceives more inequality for every given value of ε . This is reflected in the higher estimated prepayment Gini Index (G_X) as the value of ν increases beyond 2. The same result holds for the estimated postpayment Gini Index (G_N). For all the values of ν (given ε), it is observed that despite their negative magnitudes, the overall redistributive effects are actually not different from zero because, as noted earlier in the descriptive statistics, richer households actually seem to devote relatively higher proportion of their total expenditure on out-of-pocket. This also accounts for the statistically insignificant values of vertical inequality particularly at low values of ν . On the other hand the estimated values of horizontal inequality and reranking effects are statistically significant for all the values of ν .

Tables 1 and 2 also show that under a constant value of ε , the estimated values of G_X, G_{X-T} and the absolute values of RE increase consistently as the value of ν increases from 1.50 to 5.0. In none of the values of ν within the tabulated range is the redistributive effect significant. However, the increasing negative value of RE shows that as pro-poor aversion to inequality increases the redistributive effect becomes more pro-rich. In other words, the more sensitive or 'equality-minded' the policy-maker is the more pro-rich the redistributive effect appears. Similarly vertical and horizontal inequities each increase with increases in the value of ν keeping the value of ε constant. In all cases, vertical inequity is higher than horizontal inequity and reranking effect. This indicates that vertical inequity is a more serious problem in the population. But the rate of increase in the ratio V/H decreases with increase in the value of ν (keeping $\varepsilon = 0.4$); though this decrease is not very steep. This is shown in Fig 3. Surprisingly, and contrary to other studies (see, for example; van Doorslaer et al. 1999, Wagstaff and van Doorslaer 2001), it is found that vertical equity is positive and significant, implying that out-of-pocket can at times and in different contexts be progressive and redistributive in its effect but this is at a cost as shall be discussed later. This result was already anticipated in the descriptive statistics, as illustrated by Figures 1 and 2 where it was shown that the rich spend higher proportion of their total expenditure on health than the poor.

Table 2: Decomposition Results Based on DJA Framework ($\varepsilon = 0$)

<i>Indices</i>	$\varepsilon = 0, \nu = 1.5$	$\varepsilon = 0, \nu = 2.0$	$\varepsilon = 0, \nu = 3.0$	$\varepsilon = 0, \nu = 5.0$
G_X	0.3104** 0.0909	0.4474** 0.1349	0.5830** 0.1750	0.6970** 0.2088
G_N	0.3105** -0.0915	0.4482** -0.1349	0.5863** -0.1764	0.7025** -0.2108
RE	-0.0001 0.0054	-0.0008 0.0054	-0.0033 0.0061	-0.0056 0.0056
V	0.0186** 0.0092	0.0250** 0.0111	0.0314** 0.0119	0.0430** 0.0150
H	0.0056** -0.0019	0.0119** -0.0036	0.0221** -0.0068	0.0372** -0.0112
R	0.0131** -0.0045	0.0139** -0.0054	0.0126** -0.0044	0.0113** -0.0044

NB. Bootstrapped standard errors at the bottom of estimated values, ** statistically significant at 5% level

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the more sensitive or ‘equality-minded’ the policy-maker is the more pro-rich the redistributive effect appears. Similarly vertical and horizontal inequities each increase with increases in the value of ν keeping the value of ε constant. In all cases, vertical inequity is higher than horizontal inequity and reranking effect. This indicates that vertical inequity is a more serious problem in the population. But the rate of increase in the ratio V/H decreases with increase in the value of ν (keeping $\varepsilon = 0.4$); though this decrease is not very steep. This is shown in Fig 3. Surprisingly, and contrary to other studies (see, for example; van Doorslaer et al. 1999, Wagstaff and van Doorslaer 2001), it is found that vertical equity is positive and significant, implying that out-of-pocket can at times and in different contexts be progressive and redistributive in its effect but this is at a cost as shall be discussed later. This result was already anticipated in the descriptive statistics, as illustrated by Figures 1 and 2 where it was shown that the rich spend higher proportion of their total expenditure on health than the poor.

It is to be noted that contrary to what the theory suggests under the DJA assumptions, namely that when $\varepsilon = 0$, $H \rightarrow 0$, we still find that the estimated values of H_{DJA} under the different values of ν are still statistically different from zero. Thus, it seems that there is a difference between what is predicted by theory and what is obtained in actual implementation of the model⁹.

Comparing Tables 1 and 2, we find that for all values of ν , the value of H is greater in Table 1 with $\varepsilon = 0.4$ than in Table 2, with $\varepsilon = 0$. This is obviously so because the cost of uncertainty in post-payment income distribution given prepayment rank increases with increases in the value of aversion to uncertainty in the post-payment income measured by ε . This result can easily be seen from equation (5) and by noting the inverse relationship between ε and x . That is, the higher the level of uncertainty in net income the less the EDE. Higher values of ε are associated with higher values of H.

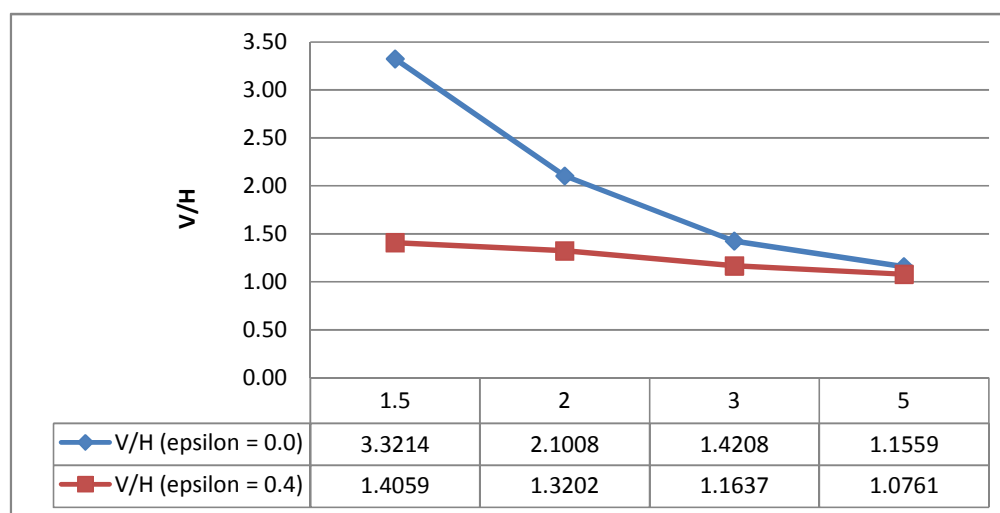


Figure 3: The Ratio between vertical and Horizontal Inequities (V/H) ($\varepsilon = 0$ and $\varepsilon = 0.4$)

Furthermore, setting $\varepsilon = 0$, is a test of the null hypothesis that $H = 0$. This constraint is rejected as can be seen from Table 2. It is to be noted that the constraint becomes increasingly non-binding as the value of ν increases. This perhaps explains why the value of the ratio V/H in Table 2 declines more dramatically than in Table 1 (see Fig. 3). The relations between V and H is exhibited when the value of ε is constrained to zero as in Table 2. The divergence between the values of V and H is even more significant at lower values of ν for $\varepsilon = 0$. However, it seems likely that increases in the value of ε must be accompanied by not only increases in the value of horizontal inequity but also increases in the value of V if marginal increases in the payment rate are also accompanied by higher levels of deadweight loss or costs of inefficiency associated with ε .

⁹ The attention of authors has been drawn to this apparent divergence between what is predicted by the theoretical model and what is obtained in actual implementation

What can be the policy implications of significance of the two components H and V? In clear way, the higher level of horizontal inequity confirms the idiosyncratic nature of health shocks for households that have practically the same level of prepayment wellbeing. It follows that the promotion of mechanism that can help to share the risk of health shocks according to household capabilities, must contribute significantly in reducing inequality coming from this stochastic distribution of health shocks. The higher level of vertical inequity confirms the need to empower poor households to expend relatively more on health-producing goods. To treat this form of inequality, the design of policies targeting the poor in the use of health services such as exemptions and deferrals should be appropriate. For instance, among the policies that can deal with these two inequity components at the same are those designed to promote or to finance partially the health risk sharing institution such community and social health insurance in poor countries or regions.

The value of R appears rather constant with increases in the value of ν . This is consistent with the DJA theoretical framework: the larger the value of ν the more weight that is given to “the reranking resentment of the poorest” (Duclos et al., 2003). But giving more weight to the resentment of the poorest need not necessarily increase the reranking. Therefore, in spite of the increase in weight given to the reranking resentment of the poorest, the reranking index R changes but very little. Irrespective of this sluggish movement in R in response to increases in ν , it is clear from the results in both Tables 1 and 2 that reranking is a major effect that follows direct healthcare payment. In fact at the lower values of ν in Table 2, R has higher values than H . The question of which of these is a more serious problem to a society may depend on social values. It is clear, nevertheless, that reranking is a major problem in healthcare financing through direct payment in Nigeria.

5. Conclusion

The main conclusions from this study could be summarized as follows: It is possible to extend the decomposition frameworks developed in the context of fiscal studies to the analysis of equity effects of healthcare financing. The DJA decomposition framework has been successfully applied in this study to decompose the equity effects of healthcare financing in a developing country. Unlike the AJL model, this framework overcomes the problem of arbitrariness in defining income equals. It also offers the possibility that the healthcare financing policy maker can build into policy considerations the level of social aversion to inequality.

A healthcare financing system that is dominated by direct out-of-pocket payment has strong equity implications. It may be progressive or proportional but such progressivity or proportionality underlies the fact that some of the poor may avoid the use of health services because they cannot pay the cost. They therefore have unmet health need which may not be captured by the distributional analysis since such analysis focuses on effects of payment on prepayment distribution. Some others may be using health services at the cost of great displacement effects for other critical household needs. Thus, progressivity of out-of-pocket may be bought at a high opportunity cost. In an environment where the majority of the people are poor, the system of direct healthcare financing may lead to the exclusion of the majority of the people from the use of healthcare facilities, given that in such a system a household’s decision to use healthcare service implies the decision to finance healthcare. Therefore, it is possible that the Nigerian healthcare system is excluding proportions of the population from the use of healthcare on the grounds that they cannot afford the cost of treatment.

The results further show very mild vertical inequity under the $\nu = 2$, which is implicit in the conventional Gini Index. The perceived level of inequity becomes significant as the policy maker’s sensitivity to inequality increase with increasing value of ν . However, the levels of inequity vary with the level of the social aversion to inequity as well as the level of aversion to uncertainty in the post-payment period. The higher the level of pro-poor aversion to inequities, the more visible the vertical and horizontal inequities appear. While the elimination of all these forms of inequities and reranking is important, it is likely that policy instrument that addresses one may exacerbate the other. For example, a policy aimed at eliminating vertical equity may worsen reranking or horizontal equity. Thus, it seems that in the final analysis, there is need to prioritize among these conflicting objectives depending on the elimination of which of these would contribute more to the improvement of social welfare. This is a normative question. It is possible for example, that one society might consider reranking a more serious form of inequity

because it is not based on productive criterion while another society may consider vertical equity the more serious because it worsens the ante level of inequity based on the random misfortune of falling ill.

The DJA framework provides an alternative interpretation of horizontal inequity as different from what prevails in literature. H_{DJA} is an index of the risk premium an economic agent in a given prepayment income class is willing to pay to prevent the uncertainty that accompanies the transition from pre- to post-payment income distribution that arises from the intervention of the fiscal system. Thus, H_{DJA} seems to bring into sharper focus, the random effects of healthcare financing in a system dominated by direct healthcare payments. The higher the level of random effects in healthcare financing, the higher the risk premium a risk adverse policy maker is willing to pay to obtain the certainty equivalent in the post-payment income and, therefore, the more costly to the social fabric of such arbitrariness. This clearly suggests that prepayment schemes, and health insurance schemes that lessen the uncertainties associated with healthcare financing system are more likely to be preferred by healthcare financiers to the prevailing system of health financing through out-of-pocket. The cost to the social fabric might be higher if individuals compare themselves with those with similar productive characteristics but who have been better treated by the payment system. Thus, apart from introducing a flexible ethical parameter into the decomposition of the Gini index, the DJL framework also provides a novel interpretation of the concept of horizontal inequity.

Note finally that the proposed theoretical implementations of the DJA model in the context of financing healthcare services are made to contribute to enrich the empirical studies tools and to derive interesting results. This may assist policymakers in shaping policies designed to fight simultaneously the different negative aspects of distribution.

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