GREQAM

Groupement de Recherche en Economie
Quantitative d'Aix-Marseille - UMR-CNRS 6579
Ecole des Hautes Etudes en Sciences Sociales
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EQUITY IN HEALTH CARE FINANCE AND DELIVERY: WHAT ABOUT AFRICA ?

Boubou CISSÉ
Stéphane LUCHINI
Jean Paul MOATTI

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Equity in Health Care Finance and Delivery : What about Africa ?[†]

Boubou Cissé[1,2] Stéphane Luchini[3] Jean Paul Moatti[1,4]

1. INSERM Research Unit U379, Social Sciences Applied to Medical Innovation, Marseille, France
2. World Bank, Washington DC, USA.
3. GREQAM-CNRS, Marseille, France
4. Faculty of Economics, University of the Mediterranean, Marseille, France

Abstract

This paper applies concentration curves and indices, that have been previously used to analyze progressivity in health care finance and horizontal equity in health care delivery in developed countries, to a 1998-1999 household survey about health care expenditures and utilization carried out in four francophone West African capitals (Abidjan, Bamako, Conakry and Dakar). The paper also uses statistical inference for testing stochastic dominance relationship between curves, a technique already applied in the literature about equity in taxation, as the criterion for making rigorous inequality comparisons. In all four capitals, the results strongly suggest a regressive pattern of payments for health care, with lower income groups bearing an higher burden of health expenditures as a proportion of their income than do the higher income segments of the population. As soon as dominance between concentrations curves is statistically tested, results appear less conclusive, notably for the groups of population affected by severe morbidity, on the issue of horizontal inequity in health care delivery, which requires that persons with similar medical need be treated equally. Some recommendations are made for the use of equity measurements in access to care for future evaluations of the impact of health care reforms in Africa.

Keywords : Equity, Health care, progressivity, inequality, stochastic dominance.
JEL Classification : : C14, D63, I19

[†] Corresponding author : Jean- Paul Moatti, INSERM U-379, 23 Rue Stanislas Torrents, 13006 Marseille, France. E-mail : moatti@marseille.inserm.fr ; Tel :00 33 (0) 491223502 ; Fax : 00 33(0) 491223504

1 Introduction

In recent years, international debates about foreign aid for development have expressed an increased concern for the health of the poor and for a reduction of inequalities in both health status and access to health care between developed and developing countries on the one hand, and inside developing countries themselves on the other hand [1-3]. There has been consequently a great deal of interest among economists, decision makers, as well as international organizations, about the relationships between health status of the population, social inequalities, income distribution and macroeconomic growth in developing countries [4-6]. It is obvious that poverty remains the most important cause of premature death, disease and disability. It is also obvious that, although the so-called law of inverse care can be found in developed countries [7], the most striking examples of its existence today are seen in the developing world : whereas poor people shoulder the greatest burden of disease, they receive a smaller share of health care resources than do healthy and better-off people [8]. Finally, it is well-established that the efficiency of government systems – including national health-service systems – has gradually declined over the past decades in most African countries [9]. The need for a pro-poor health reform agenda in low income countries, especially in Africa, is therefore increasingly getting worldwide support [10-11].

In parallel, new methodological tools have been developed to improve the measurement of equity in health [12-14]. Unfortunately, the application of these tools has remained focused on health care systems of developed countries. To date there has been very few empirical investigation of the equity characteristics in both health care finance and delivery in African countries [15]. Previous empirical research in African countries has ignored the now well established distinction in the health economics literature between vertical and horizontal equity [16-18].

Vertical equity in health care finance refers to the extent to which households of unequal ability to pay make appropriately dissimilar payments for health care, whereas horizontal equity in health care utilization concerns the extent to which, on average, persons in equal need of medical treatment receive similar health services regardless of their income and wealth (or of other non health social and personal characteristics such as gender, race, age, etc.). A rigorous measurment of these two dimensions of equity is a prerequisite to inform the often controversial policy debates about the extent to which reforms aimed at increasing the efficiency of health care systems do not simultaneously increase inequities in access to health care [19-21].

The household survey "Projet Santé Urbaine" (PSU), carried out in 1998-1999 in representative samples of the general population of four African capitals with the support of UNICEF and the French Ministry for International Cooperation, gave us the opportunity to investigate both vertical equity in health care finance and horizontal equity in health care

delivery. By providing detailed data, which are often not available in African populations, about household consumption, health care seeking behaviors and health care expenditures of members of the household who sought for care, this survey has allowed us to apply the concentration curves and indices approach that has already been used in previous studies about equity in health in developed countries. Our paper also tries to incorporate recent developments in the public finance literature on tax progressivity and extends the scope of progressivity and horizontal equity measurements in health in a number of aspects. Firstly, we report our estimation of these equity indices with their asymptotic standard errors in order to better take into account sampling errors. Secondly, rather than simply comparing the aggregated summary indexes of progressivity and horizontal equity, we use a dominance criterion and perform statistical inferences to measure progressivity or horizontal equity not only at the level of different income ranges but also in the overall distributions. This allows to draw conclusions which go beyond a general summary measure of progressivity and inequity that may be sensitive to the sample structure. Such methodological developments may be specially informative in the context of African systems in which private out of pocket funding accounts for more than half of overall national health expenditures [22], and in which user fees for health services may very differently affect heath care utilization in some specific vulnerable groups of low socio-economic status than in the rest of the population [3, 10, 23].

The remainder of the paper is organized as follows. In section 2, the methodology to measure progressivity and horizontal equity in both finance and delivery of health care is presented with the stochastic dominance research methodology used. Following, a description of data sources and variables is done in section 3. The main empirical results are reported in section 4. The last section (5) contains some discussion of the limitations of our results and some perspectives for future research on these issues.

2 Methodological issues

2.1 Measuring progressivity in financing and horizontal equity in utilization

The progressivity of a health care financing system refers to the extent to which payments for health care rise as a proportion of a person's income when his/her income rises. There are different ways to capture this progressivity, among which are the elasticity of payments with respect to pre-payment income (Liability Progression), and the elasticity of post-payments income with respect to pre-payment income (Residual Progression). Another approach, that we adopted in this study, is to calculate progressivity indices [12-14, 18]. The literature on tax progressivity has already proposed a variety of such indices [24],

but in the case of our study, we employ the most commonly used in studies about health care financing, namely that of Kakwani [25]. It consists on denoting π_T^K as the Kakwani's Index of Progressivity (KPI) of health care payments on gross income, which is defined by twice the area between the Lorenz curve for gross income, $L_X(p)$, and the concentration curve for health care payments, $L_T(p)$ [the p in parentheses here indicates the person's or household's rank in the gross income distribution]. $L_X(p)$ shows the relationship between the cumulative percentage of income and the cumulative percentage of the population, where the individuals (or households) are ranked according to their income, whilst $L_T(p)$ is formed by plotting the cumulative proportion of the population (ranked by income) against the cumulative share of payments. Thus we have

$$\begin{cases} \pi_T^K & = 2\int_0^1 \left[L_X(p) - L_T(p)\right].dp \\ \pi_T^K & = 2\int_0^1 \left[p - L_T(p)\right].dp - 2\int_0^1 \left[p - L_X(p)\right].dp \end{cases} \tag{1}$$

and

$$\pi_T^K = C_T - G_T \tag{2}$$

The degree of progressivity of the health care financing system can be assessed by calculating the difference between the concentration coefficient of payments, C_T, and the Gini coefficient of gross income, G_T. A positive Kakwani index ($\pi_T^K > 0$) indicates that the system is progressive, so that the Lorenz curve of income lies above the concentration curve of payments, and vice versa it is regressive when ($\pi_T^K < 0$); a zero value of π_T^K indicates proportionality of the payments, and therefore coincidence of the Lorenz and concentration payments curves. A progressive system is one in which health care payments rise as a proportion of income as income rises, whilst a regressive system is one in which payments fall as a proportion of income as income rises. A proportion system is one in which health care payments account for the same proportion of income for everyone, irrespective of their income.

The concept of horizontal equity applied to the delivery of health care services refers to the requirement that persons with equal needs be treated equally, irrespective of their income. According to this principle, we measure the degree of horizontal equity in health care delivery by using the method previously proposed by Wagstaff, Van Doorslaer and other colleagues [12, 18]. It compares the observed distribution of medical care by income group with the distribution of need. The distribution of medical care by income is captured by the medical care concentration curve, $L_M(p)$, which graphs the cumulative proportions of the population (ranked by income, beginning with the poorest) against the proportions of total amount of medical care received. The concentration index, C_M, corresponding to $L_M(p)$ indicates the degree of inequality in the distribution of health care utilization and is measured as twice the area between $L_M(p)$ and the diagonal, or equivalently as

$$C_M = 1 - 2\int_0^1 L_M(p).dp \tag{3}$$

The distribution of need can be analogously captured by the concentration curve of need, $L_N(p)$, which plots the cumulative proportions of the population (ranked by income, beginning with the poorest) against the proportion of persons reporting an illness. Based on $L_N(p)$, a concentration index of need, C_N can be obtained and measured in a similar way :

$$C_N = 1 - 2\int_0^1 L_N(p).dp \tag{4}$$

The extent of horizontal equity can then be assessed by comparing each income group's share of need with its share of medical care. If the treatment concentration curve lies entirely above (underneath) the need concentration curve, it is said that pro-poor inequity (pro-rich inequity) applies. An index for the extent of horizontal inequity can then be defined as twice the surface between the need and utilization concentration curves, that is :

$$HI = 2\int_0^1 \left[L_N(p) - L_M(p)\right].dp \tag{5}$$

which is numerically computed as differences between the treatment concentration index, C_M, and the need concentration index, C_N :

$$HI = C_M - C_N \tag{6}$$

A negative (positive) value of HI indicates horizontal inequity favoring the poor (rich), whilst a zero value indicates that the medical care and need are proportionally distributed across the income distribution.

2.2 Asymptotic inference of progressivity and horizontal inequity dominance

Given that concentrations curves and indices are computed from sample data, comparisons between them should be statistical. Therefore we use the distribution-free techniques of statistical inference, as already documented in the literature about taxation [26-29], to examine and test the dominance relation (i.e. whether or not there is a significant difference) between concentration curves that may indeed be correlated.

Assuming that data are available from two datasets (with sample sizes N^A and N^B) it is demonstrated that under the null hypothesis (H_0) of no difference between ordinates of two different concentrations curves (A and B), the statistic

$$Z_i = \frac{\theta_i^A - \theta_i^B}{(\sigma_{ii}^A/N^A + \sigma_{ii}^B/N^B)^{1/2}} \tag{7}$$

is asymptotically distributed as a standard normal random variable [28-29], with θ_i^A and θ_i^B referring to the estimates of the indices of the two samples. In our case, expression (7) can be used to test respectively for differences in the ordinates of $L_X(p)$ and $L_T(p)$, or $L_N(p)$ and $L_M(p)$ at given percentile points, p.

However, a major interest of expression (7) is that it also allows statistical inference of stochastic dominance between entire concentration curves. The test is based on a simultaneous inference approach which consists of using t-tests for the difference between set of ordinates (at the quintiles of income, in our case) of two concentration curves (see for example [26, 30]). It then requires comparing the largest positive and negative values obtained using equation (6) $[Z_+, Z_-]$ to the critical value from the Studentized Maximum Modulus (SMM) distribution (the tests statistics are selected from $Z_+ = max0, Z_i$; $Z_- = min0, Z_-$; $i \in [1, 5]$). In the case of two curves (A and B), representing either $L_X(p)$ or $L_T(p)$, or $L_M(p)$ and $L_N(p)$, four possible situations can arise as described in Table 1. Such approach allows to clearly distinguish the cases in which a dominance relationship is clearly identified (H_1 and H_2 in Table 1) from those in which it can either be rejected (H_0) or remains ambiguous (H_3). It is therefore very useful to inform a global judgment about vertical and horizontal equity in health care finance and delivery.

INSERT TABLE 1

3 Data and variables specification

The calculation of the equity indices described above requires the availability and the measurement of appropriate information, including household income, the household expenditures for health, illness prevalence and utilization of health services.

3.1 Data

The data used in this study are from the PSU, a multidimensional household survey in four west African capitals (Abidjan in Ivory Coast, Bamako in Mali, Conakry in Guinea, and Dakar in Senegal) performed in 1998-99. Questionnaires and sampling methodologies were identical in all four cities. The key feature of the survey was therefore the standardization and the harmonization of both its methodology and its data, thus providing comparable information across countries. The study methodology for these household surveys called for a two-stage sampling design. In the first stage, a sampling frame was constructed of all the census sections in the four sites. This information included the number of households and population in each census section and was obtained from the most recent general

census of each country. From this frame, a list of census sections was randomly selected. The sampling frame for the second stage of sampling consisted of all households in each of the selected census sections, from which a set of households were randomly sampled.

The survey gathered extensive information on household socio-economic characteristics including number of members in the household, information about lodging, household goods and consumption expenditures, sex, age and education attainment of household's members. The questionnaires were identical in the four studied sites and included information on the individual's self-reported illnesses and injuries, actions taken by those who reported illness, as well as information on the type of provider consulted, if any, and direct expenditures on health care for those seeking care, during the month prior to interview. It should be noted that all data analyzed from these surveys are based upon a one-month recall period and may be subject to some recall bias.

After correcting for missing information and values, the sample contains 1903 households in Abidjan, 1561 in Bamako, 613 in Conakry and 2335 in Dakar. The response rates for the different household interviews were 95% or better, and there was no statistical difference for demographic and major socio-economic variables between the different samples and the latest data from the corresponding Census in each city (see [31] for detailed information).

3.2 Variables specification

3.2.1 Income

In a developing country context, given the lack of organized labor markets and the high variability of income over time, the PSU chose to use a consumption-based approximation of income (rather than direct questions about total amount of income which can be strongly affected by either recall bias or social desirability bias). This method had already been used in standard economic surveys in Africa, including the Living Standards Monitoring Surveys (LSMS) of the World Bank [32]. Household heads were asked about consumption expenditures for the following main categories : food, transport, lodging, utilities (water, fuel, electricity, etc.), school fees, health, clothing, and other non-food items. Questions were tailored to the appropriate interval for each type of expenditure : for example, expenditures on lodging were estimated for the last month, school fees for the last year, etc. All estimates were then annualized and summarized by household to generate an income status per household. Average adjusted income status per equivalent-adult was calculated by dividing the income by an equivalence scale in order to adjust for differences in size and age structure of household [32-33]. We used the equivalence scale that has been proposed by WHO and FAO for developing countries : it assigns a weight of 1 to the adult man, 0.8 to the woman, and 0.5 to each child under fifteen years of age [34].

We used quintiles to examine income-related differences in need for health services, and utilization of health services. The quintile with the lowest consumption expenditure per equivalent adult is quintile one (characterized as the poorest) ; consumption expenditures increase for each successive quintile until the fifth quintile (characterized as the richest), which has the highest consumption expenditure per household equivalent adult.

3.2.2 Health care expenditures/ payments

Health care payments correspond to the monetary actual payments that those who sought for care have spent to receive treatment in either modern health care sectors (including both public or private providers and pharmacies) or traditional care providers. It should be noted that although necessary to estimate households' total income devoted to health care, asking about the use of both sectors in the same questionnaire may induce some under-reporting of visits to traditional healers due to social desirability bias. Health care expenditures also included payments for transportation to health care delivery centers or practitioners, consultations fees, medicines (including self-medication) and laboratory tests expenditures.

Because households' total monetary payments for health care in the previous month were collected, this measure takes into account the fact that users may have faced different tariffs and/or prices for services according to the type of facility (public, private not for profit, private) and practitioners who delivered care to them. However, it must be recognised that such monetary measure ignores other aspects which may undoubtingly affect either actual health expenditures (like waiting times for accessing health care and its related loss of income) [35-36] and/or equity in access (like quality of provided care which may differ according to the type of facility and provider used) [37].

3.2.3 Need

The variable "need" used in this study is based on self-reported morbidity. Each respondent who reported at least one episode of acute illness in the month prior to interview, or declared a chronic illness, was asked to judge the severity of this health condition on a 3 -point scale from not severe (not serious) to very severe (very serious).

Although relying on individual's self perceptions of their health status, this measure is considered in many studies to be a good predictor of effective morbidity, at least in developed countries [38-40]. It must also be noted that, although this measure remains subjective, an illness was classified as "very severe" only if the individual reported that the illness episode had forced him/her to stay at home and refrain from work (adult) or play (children).

4 Empirical results and main findings

4.1 Sample description

Table 2 presents detailed data about sample size in each income quintiles. Not surprisingly, size of households tended to decrease with increasing income (column3 of Table 2). Table 2 also shows (column 4) that the proportion of individuals who declared an episode of illness (or a chronic disease) in the prior month was similar (circa 20.0%) in all four cities. Self-reported morbidity was similar across income quintiles in both Abidjan and Conakry while there was a trend for the two highest income quintiles to report less morbidity in Bamako and Dakar.

INSERT TABLE 2

In all four cities, the vast majority (90% or more) of those who declared some morbidity sought for either formal or informal health care, and the proportions of those who did not were similar across income quintiles. As shown in table 2, ill individuals mainly chose to combat their ailment by going to modern health facilities and providers (public or private) [52.5% in Abidjan, 47.0% in Bamako, 43.5% in Conakry and 59.5% in Dakar] or by practicing self-medication [41.9% in Abidjan, 47.4% in Bamako, 40.7% in Conakry, and 29.1% in Dakar]. It must be noted that there was little reliance on traditional health providers which constituted less than 5% of the health seeking behavior across all income quintile, with the exception of Conakry (8.5% on average).

With the exception of Dakar, individuals in the bottom income quintile were more inclined to use self-medication than were those in the top income quintile [45.7% vs 34.1% in Abidjan, 55,2% versus 37,5% in Bamako, 43,1% versus 33,6% in Conakry]. On the reverse, with the exception of Conakry, they were less likely to seek care in private for profit facilities [11.5% versus 31.8% in Abidjan, 8.8% versus 24.8% in Bamako, 3.1% versus 13.1% in Dakar]. Finally, it must be noted that no significant difference was found across income quintiles for proportions of those who seeked medical care in public facilities.

4.2 Progressivity in health care finance

Table 3 presents the distribution of income in the global sample of respondents in each of the four cities. Not surprisingly, it is characterized by a high degree of income inequality : the top 20% of the households represent nearly half (more than half in the case of Bamako and Conakry) of total income while the poorest quintile receive less than 7% of total income. Table 3 presents in parallel the share of total out-of-pocket health care

expenditures according to income quintiles. It shows that the share of total health care expenditures in the highest quintile is lower than its share of total income while it is the reverse for all other quintiles. This disproportion in the relative distributions of income and of household expenditures for health care is specially marked for the lowest quintiles. In each of the four capitals, the lowest income quintile paid proportionally much more to receive health care than the highest quintile, whereas their share in total gross income is far more inferior than the highest income group. Table 3 intuitively suggests that direct payments used to finance health care in these four cities are thus regressive. The graphs reported in Figure 1, where the Lorenz curve of income $L_X(p)$ and the concentration curve for health care payments $L_T(p)$ are plotted, also give a visual sense of this regressiveness, with $L_T(p)$ always laying above $L_X(p)$.

This is confirmed by the negative values obtained when calculating the KPI indices ($\pi_T^K < 0$) which are also presented in Table 3 along with their asymptotic standard errors. Due to the relatively large sample sizes, these errors are quite small compared to the estimate ; the various indices are thus estimated with considerable precision. It must however be noted that there is some substantial variations across cities on the regressivity of the health care finance system : household direct payments to finance health care appear to be a lot more regressive in Bamako and Conakry (-0,22 and -0,52 respectively) than in Dakar (-0.08) although this difference may be partly due to differences in the socio-economic characteristics of the populations and not only to the health care system per se.

Finally, Table 3 presents the estimations of the differences between the ordinates of the Lorenz income curve $[L_X(p)]$ and the concentration curve for health care payments $[L_T(p)]$ at the level of each quintile according to KPI. For all income quintiles below the highest one, the Z-statistics from (6) exceeds the critical value of the SSM at the 95% level (2.02). When comparing the highest positive and lowest negative values of the Z-statistics in each case (respectively [0, -56.2] for Abidjan, [0, -18.7] for Bamako, [0, -48.1] for Conakry and [0, -7.3] for Dakar), one can positively conclude about stochastic dominance of the entire concentration curve of health care payments (case H_2 of Table 1).

INSERT TABLE 3 & FIGURE 1

4.3 Horizontal equity in health care delivery

Concerning horizontal equity in health care delivery, the general results from the country case studies are reported in Table 4 and Figure 2. While the proportion of those reporting morbidity tends to be similar across income groups (as confirmed by the low non significant values of the concentration index of need - C_N), the two richest quintiles tend to concentrate the majority of health expenditures with the exception of Conakry (as suggested by the

positive values of the concentration index of health care payments - C_M). In each capital, results presented in Table 4 correspond to positive values of the Horizontal Inequity index (HI) and consequently suggests a pro-rich bias in access to health care at similar level of expressed medical need. For three out of four cities in Table 4 (Abidjan, Bamako and Dakar), the Z_+ statistics for the hypothesis that one set of ordinates dominates the other is more than the 2,02 critical value of the SMM distribution, whereas it is not the case for the Z_- statistics. Thus, the null hypothesis can be rejected in favor of dominance (case H_1 of Table 1) : it confirms that the distribution of illness lay statically above that of health care expenditures at each ordinate (differences are statistically significant at all quintiles). In the case of Conakry, the diagnostic of pro-rich horizontal inequity however remains ambiguous to the extent that the curves cross at some points (Z_- and Z_+ simultaneously significant in Table 4 corresponding to situation H_3 in Table 1).

INSERT FIGURE 2 and TABLE 4

Table 5 and Figure 3 show that when concentrating on the respondents who declared "very severe" illness, a diagnosis of pro-rich inequity is confirmed in that subsample for Dakar and Conakry. On the reverse in Bamako, the difference between concentration curves of need for "very severe" morbidity and of health expenditures in this subsample is clearly non significant (Z_- and Z_+ simultaneously not reaching statistical significance in Table 5 corresponding to situation H_0 in Table 1, i.e. equality between curves). In the case of the sub-sample with severe morbidity in Abidjan, the diagnostic of pro-rich inequity remains ambiguous to the extent that the curves cross at some points (Z_- and Z_+ simultaneously significant in Table 4 corresponding to situation H_3 in Table 1).

INSERT TABLE 5 and FIGURE 3

5 Discussion

This paper has extended to reliable data from a large household survey in four West African capitals the approach based on concentration curves and indices to estimate the progressivity and horizontal inequity of health care financing and delivery systems that had been previously applied to developed countries [12-14] . To our knowledge, very few studies have adopted a similar approach in other parts of the African continent [41]. the research presented here represents a preliminary attempt to provide a sound basis for debates about equity in access to health care in the context of francophone African countries. In addition, this research was one of the first attempts to "transfer" to the international literature about equity in health some methodological advances [42], that have been already applied in the

taxation literature [28,30,43]. These advances provide the statistical basis for testing for inequality dominance between concentration curves in order to reduce the risk of biased interpretations due to sample structures.

In all four capitals, the results strongly suggest an inequitable (regressive) pattern of payments for health care, with lower income groups bearing an higher burden of health expenditures as a proportion of their income than do the higher income segments of the population. Previous empirical studies about health care financing systems in the US [44], Finland [42], and several OECD and European Union countries [14, 45], had also identified regressive patterns of financing. However, in contrast to the situation in developed countries, where the extent of regressivity (as captured by the Kakwani index for out-of-pocket payments) remains limited in magnitude, the overall regressivity indexes in our selected cities (with the exception of Dakar) appear to be much more exacerbated. This is not surprising considering the heavy burden of health expenditures on households in general (particularly, on lower socio-economic groups), and the absence of private or public health insurance mechanisms for the majority of the population in African countries.

Delivery of health care was also found to be biased in favor of the higher income quintile (better-off) indicating that richest income group actually receives a greater proportion of health care resources in relation to their need than the poorest income group. While most of the HI indices are significantly different from zero and dominance orderings are found (except in the case of Conakry) when taking into account all those who expressed a need for health care, the picture was quite different when focusing on the sub-sample who declare "very severe illness". The lack of dominance orderings in Abidjan and Bamako suggests that horizontal inequity is too small to account for any significant differences in the curves : the distributions (of both need and treatment) are sufficiently similar that they appear to coincide most of their length in the case of severe morbidity.

So, whereas results are unambiguous on the existence of strong vertical inequity in health care financing in all four African capitals, they appear less conclusive when dealing with the issue of horizontal equity. In particular, in two of the four capitals, it seems that some degree of horizontal equity is accomplished for the groups of population affected by severe morbidity or chronic illness.

Some limitations of our data must however be ackowledged because they may affect the interpretation of our results and call for caution in their generalization as a basis for informing the policy debate about health care reforms in Africa. As any other household health interview survey, data collection in the PSU project may have been subject to respondents' recall and social desirability biases. However, a particular effort was carried out in this project to minimize these biases at least through standardization and strict similarity of questionnaires in the four sites of the survey.

It is well-known that the relationship between the amount of out of pocket private payments by the population and the volume and structure of services delivered in developing countries is strong [3]. Our measure of vertical equity in financing was based on health care out of pocket payments which takes into account price differentials related to different patterns of health care consumption (as the fact that the groups with the highest income tend to consult more frequently private for profit facilities and providers who charge higher fees for medical services). However, this measure ignores other costs and financial contributions that households incur for health care and which may somewhat be progressive with income. Firstly, although the level of taxation remains low in Africa, higher income groups may additionally contribute to health care financing of public facilities through the share of their taxes that governments allocate to the public health sector. In addition, opportunity cost of time, and the loss of income related to the time households'members spend to seek care, is logically higher for those who have a higher level of wealth [46]. In all four cities, higher income groups used public facilities in the same proportion than low income groups : if one makes the hypothesis that all socio-economic categories are confronted to the same queues and waiting times in the public health system, and if higher prices in the private for profit sector were not associated with significant reductions in waiting times, some progressivity in time costs for accessing care may have partially compensated for the regressivity we have found in monetary payments. It is however unlikely that high income groups' contributions through taxation and time costs may suffice to reverse our diagnosis of regressivity of health care financing in the four capitals under study.

Because proper medical diagnosis of morbidity is hardly feasible in the context of an household survey, we used self-reported illness as an indicator of health need. This may have affected our measure of horizontal equity. Of course, self-reported illness often presents a good correlation with effective morbidity in developed countries. Moreover, proportions of those who reported illness in the prior month were strikingly similar (20%) in all four samples. Finally, self-reports may present more validity when limiting the analysis to those who reported a "very severe " illness episode (forcing them to stay at home). We however cannot exclude that, in the African context, cultural differences related to variations in socio-economic status may have influenced respondents' ability to interpret some symptoms as markers of an episode of illness. Individuals in different income groups may have disparate evaluation about what normal health status should be : therefore, it can be argued that variations in self-reports may rather reflect differences in propensity to report illness than "true" differences in morbidity. The poorest sections of the population may under-report actual morbidity simply because they can't afford to be ill, or they may tolerate higher thresholds of pain/illness before considering themselves "sick", in comparison to wealthier groups. Quite a number of studies have indeed shown high levels of under-reporting of ill-health among the poorest groups in low and middle income Countries, particularly in Africa [47-49]. Thus, we may have underestimated relative differences in 'need' for health services and consequently the actual degree of horizontal inequity in health care use.

Although they should still be taken with caution, our results pointed out some important cross-country variations : regressivity in out-of-pocket payments seemed more pronounced in absolute and relative terms in Conakry and Bamako than in Abidjan and Dakar ; in Conakry, horizontal inequity was unclear for the general population who declared morbidity ; in Abidjan and Bamako, the health systems seemed to better guarantee horizontal equity for the most severely ill patients. Unfortunately, the PSU household survey did not collect any detailed data about the effective functioning of the health care facilities that were used by households'members, making impossible any appreciation of the quality of care delivered.. This has strongly limited our capacity to propose some interpretation of the extent to which national differences in organization of health care delivery (including heterogeneity of pricing and tariffs policies between and inside countries) may account for these cross-countries variations.

Following the so-called "Bamako Initiative" that was launched at a meeting of African Ministers of Health in Bamako in 1987 [50-51], the four West African countries where the PSU survey took place had either introduced or expanded user-fees and cost recovery policies for public health services in the previous years before the survey. Cost-recovery policies were an attempt to supplement government's budgetary resources for the health sector and to motivate users to better exercise their "consumer sovereignty" in their relationship with health care providers [19-20]. Since then, these policies have remained a matter of controversy about their impact on both efficiency of health care systems and equity in access to health care [52].

Even more recently, health sector financing strategies have moved to the top of the international agenda. The eight Millennium Development Goals, all by the target date of 2015, now form a blueprint agreed by all the world's countries and all the world's leading development institutions : three of these goals (reducing child mortality, improving maternal health and combating HIV/AIDS, malaria and other diseases) are directly concerning health whereas the other five (including the number one goal of eradicating extreme poverty and hunger) have strong implications for improving equity in either access to health care and health status [53]. The accomplishment of these ambitious goals require a sustained attention to long term health system financing strategies. As an example, a January 2005 resolution from the Executive Board of WHO urged member states to "incorporate prepayment mechanisms into financing systems, to allow spreading risks and avoid financial catastrophe and impoverishment associated with out-of-pocket payments". In parallel, rapid scale up of programmes for HIV/AIDS care within the framework of the United Nations "3 by 5" target of having three million people living with HIV/AIDS in developing countries on antiretroviral treatment by the end of 2005, has underscored the challenge of equity in access to care both in the already HIV-infected population and by comparison with victims of other deadly diseases [54].

The cross-sectional design of the PSU survey did not authorize its use as a tool for

evaluation of the impact of health care reforms (like the introduction of cost recovery schemes in health care public systems). Some lessons can nevertheless be drawn for future health care policies in Africa as well as for their evaluation. The quite unambiguous evidence of regressivity in health care finance across the four capitals strongly suggests that any new mechanism aimed at increasing long term sustainability of health care resources should try to promote a more progressive approach of the distribution of the financing burden between the poor and richer sectors of the population ; potential trade-offs between such goal of improving vertical equity in health financing and the one of improving the allocative efficiency of health systems should be made more explicit to inform the policy debates at both national and international levels. The more contrasted picture emerging from the PSU survey in terms of horizontal equity in access to care for those who are severely ill suggests that the degree of horizontal equity that can be achieved may be quite sensitive to specific modalities of health care delivery and financing. This should be fully taken into account when deciding priorities about access to costly treatments and health technologies in low-resource settings, as it is currently the case in the context of scaling up the diffusion of HIV/AIDS antiretroviral therapies. This should also be taken into account when discussing the appropriate balance between the implementation of "vertical" programmes targeting specific diseases, like AIDS, tuberculosis and malaria, versus investments in technical and human capital for improving the basic health care infrastructure as a whole [55-56].

In any case, this research has confirmed the feasibility of using concentration curves and indices approach (as well as stochastic dominance approach to make inequality comparisons between these curves) to analyse equity in health care finance and delivery in the African context. For future debates about the impact of health care reforms in Africa, rigorous measures of the objective situation in vertical and horizontal equity in access to care are an absolute necessity. Such measures could easily be incorporated in future research designs better tailored, than the PSU survey was, for evaluating the impact of alternative mechanisms for health care finance and delivery in Africa. The analytical methods employed in this paper could be applied, in the format of a pre- and post-test, to measure the impact of specific policy changes (such as the introduction of user fees, risk pooling for health care insurance, etc.) on equity in African countries. They could also be applied to analyse the impact on equity of variations in pricing, financing, private/public mix or institutional policies for health care between countries and/or between sites inside the same country if quasi-experimental study design could be implemented in this context [57].

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TABLE 1 : Testing for stochastic dominance between concentration curves

	Z_+ significant	Z_+ not significant
Z_- significant	The two curves cross $\longrightarrow H_3$	B dominates A (the reference) $\longrightarrow H_2$
Z_- not significant	A (the reference) dominates B $\longrightarrow H_1$	The two curves are equal $\longrightarrow H_0$(null hypothesis)

TABLE 2 :Households' self-reported morbidity and health seeking behaviors in the population of four West African cities (PSU Survey-1997/98)

					Health seeking behaviors of individuals who reported morbidity in the prior month (4)*					
Cities (nb of surveyed hholds)	Income Quint.	Nb of Ind. in sample	Nb of Ind. reporting morb. in the prior month	Nb of Ind. reporting "very severe" morbid.	No Care (%)	Self Medic. (%)	Public health facil. (%)	Privat. for profit health facil. (%)	Priv. not for profit health facil. (%)	Traditional healers (%)
(1)	(2)	(3)	(4)	(5)						
	Q1	3,018	607(20.1%)	69	2.7	45.7	30.1	11.5	5.5	4.5
	Q2	2,608	537(20.6%)	51	1.2	43.3	31.9	13.9	6.0	3.7
ABIDJAN	Q3	2,271	456(20.1%)	39	1.9	45.9	27.4	14.7	5.7	4.4
($N = 1,903$)	Q4	2,074	402(19.4%)	38	1.4	40.2	34.0	15.2	4.4	4.8
	Q5	1,706	338(19.8%)	49	0.7	34.1	28.5	31.8	2.3	2.6
	Total	11,677	2,340(20.0%)	246	1.6	41.9	30.4	17.4	4.7	4.0
	Q1	3,193	754(23.6%)	46	1.9	55.2	13.7	8.8	17.1	3.3
	Q2	2,955	624(21.1%)	42	2.8	55.7	12.0	9.0	17.9	2.6
BAMAKO	Q3	2,566	521(20.3%)	63	2.7	46.8	14.8	9.6	21.4	4.7
($N = 1,561$)	Q4	2,446	438(17.9%)	44	1.4	37.5	18.3	16.2	21.9	4.7
	Q5	2,28	388(17.0%)	55	0.9	37.5	18.0	24.8	15.9	2.9
	Total	13,44	2,725(20.3%)	250	2.0	47.4	15.1	13.1	18.8	3.6
	Q1	1,742	348(20.0%)	46	6.1	43.1	28.9	11.4	-	10.5
	Q2	1,448	292(20.2%)	49	4.3	42.6	31.3	8.7	-	13.1
CONAKRY	Q3	1,139	227(19.9%)	48	7.2	38.9	38.9	9.7	-	5.3
($N = 613$)	Q4	896	178(19.9%)	31	10.6	33.6	35.4	14.2	-	6.2
	Q5	798	160(20.0%)	39	8.6	43.6	33.3	6.8	-	7.7
	Total	6,023	1,205 (20.0%)	213	7.3	40.7	33.4	10.1	-	8.5
	Q1	4,88	1166(23.9%)	103	9.8	31.1	42.9	3.5	9.4	3.3
	Q2	4,168	979(23.5%)	88	10.6	32.7	44.5	4.9	6.5	0.8
DAKAR	Q3	3,176	730(23.0%)	92	12.4	24.1	46.3	8.0	8.4	0.8
($N = 2,335$)	Q4	2,597	410(15.8%)	46	8.6	29.1	44.6	9.1	7.4	1.2
	Q5	1,712	236(13.8%)	38	7.2	29.4	50.3	13.1	0.0	0.0
	Total	16,533	3521(21.3%)	367	10.1	29.1	45.6	7.1	6.8	1.3

* The question reported here deals with first intention health seeking behaviour following an episode of morbidity

- no private for profit health sector existed in Conakry

Table 3- Cumulative proportions of gross income and health care payments (%) by income quintiles in 4 West African cities.

Cities	Income Quintiles	Gross income	Health payments	Cum.Gross income (A)	Cum. Health payments (B)	Difference (A-B)	Z-statistics
	Q1 Poorest	6.0	16.3	6.0	16.3	-10.3	-30,4
	Q2	10.1	14.8	16.1	31.1	-15.0	-44,3
	Q3	14.2	14.7	30.3	45.8	-15.5	-45,8
	Q4	20.6	24.1	50.9	69.9	-19.0	-56,2
ABIDJAN	Q5 Richest	49.1	30.1	100.0	100	0	0
	Total	100.0	100.0				
	GINI/CI	0.41 (0.004)	0.16 (0.032)				
	KPI		-0.15** (0.033)				
	Z+						0
	Z-						-56,2
	Q1	4.0	12.4	4.0	12.4	-8.4	-11,5
	Q2	9.7	10.6	13.7	23.0	-9.3	-12,7
	Q3	14.0	18.4	27.7	41.4	-13.7	-18,7
	Q4	20.3	19.1	48.0	60.5	-12.5	-17,1
BAMAKO	Q5	52.0	39.5	100.0	100.0	0	0
	Total	100.0	100.0				
	GINI/CI	0.47 (0.005)	0.25 (0.1)				
	KPI		-0.22* (0.106)				
	Z+						0
	Z-						-18,7
	Q1	4.7	12.5	4.7	12.5	-7.8	-8,5
	Q2	7.6	24.0	12.3	36.5	-24.2	-26,4
	Q3	10.6	29.0	22.9	65.5	-42.6	-46,5
	Q4	14.7	16.1	37.6	81.6	-44.0	-48,1
CONAKRY	Q5	62.4	18.4	100.0	100.0	0	0
	Total	100.0	100.0				
	GINI/CI	0.53 (0.021)	0.013 (0.046)				
	KPI		-0.52** (0.05)				
	Z+						0
	Z-						-48,1
	Q1	5.7	10.2	5.7	10.2	-4.5	-7,3
	Q2	9.9	9.8	15.6	20.0	-4.4	-7,1
	Q3	14.0	13.7	29.6	33.7	-4.1	-6,7
	Q4	21.1	21.0	50.7	54.7	-4	-6,5
DAKAR	Q5	49.3	45.3	100.0	100.0	0	0
	Total	100.0	100.0				
	GINI/CI	0.40 (0.004)	0.32 (0.04)				
	KPI		-0.08* (0.045)				
	Z+						0
	Z-						-7,3

TABLE 4 : Cumulative proportions of self-reported morbidity and health care payments (%) by income quintiles in 4 West African cities.

Capitals	Quintiles	% of those who reported an episode of illness	% of total health payments	Cum.share of reporting illness (A)	Cum. Share of Health payments (B)	Difference (A-B)	Z-statistics
ABIDJAN	Q1	20.1	16.3	20.1	16.3	3.8	11.4
	Q2	20.6	14.8	40.7	31.1	9.6	28.8
	Q3	20.1	14.7	60.8	45.8	15.0	45.1
	Q4	19.4	24.1	80.2	69.9	10.3	30.9
	Q5	19.8	30.1	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	-0.007 (0.0001)	0.16 (0.032)				
	HI		0.16** (0.033)				
	Z+						45.1
	Z-						0
BAMAKO	Q1	23.6	12.4	23.6	12.4	11.2	15.3
	Q2	21.1	10.6	44.7	23.0	21.7	29.7
	Q3	20.3	18.4	65.0	41.4	23.6	32.3
	Q4	17.9	19.1	82.9	60.5	22.4	30.6
	Q5	17.0	39.5	100	100.0	0	0
	Total	100.0	100.0				
	CN / CM	-0.065 (0.0007)	0.25 (0.1)				
	HI		0.31** (0.106)				
	Z+						32.3
	Z-						0
CONAKRY	Q1	20.0	12.5	20.0	12.5	7.5	8.2
	Q2	20.2	24.0	40.2	36.5	3.7	4.1
	Q3	19.9	29.0	60.1	65.5	-5.4	-5.94
	Q4	19.9	16.1	80.0	81.6	-1.6	-1.76
	Q5	20.0	18.4	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	-0.001 (0.0009)	0.013 (0.046)				
	HI		0.01 (0.05)				
	Z+						8.2
	Z-						-5.94
DAKAR	Q1	23.9	10.2	23.9	10.2	13.7	20.7
	Q2	23.5	9.8	47.4	20.0	27.4	41.5
	Q3	23.0	13.7	70.4	33.7	36.7	55.6
	Q4	15.8	21.0	86.2	54.7	31.5	47.7
	Q5	13.8	45.3	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	-0.092 (0.003)	0.32 (0.044)				
	HI		0.41 (0.05)				
	Z+						55.6
	Z-						0

TABLE 5 : Cumulative proportions of "very severe" self-reported morbidity and of health care payments in this sub-sample (%) by income quintiles in 4 West African cities.

Capitals	Quintiles	% of those who reported an episode of illness	% of total health payments	Cum.share of reporting illness (A)	Cum. Share of Health payments (B)	Difference (A-B)	Z-statistics
ABIDJAN	Q1	28.0	17.0	28.0	17.0	11.0	6.2
	Q2	20.7	11.7	48.7	28.7	20.0	11.3
	Q3	15.9	13.4	64.6	42.1	22.5	12.7
	Q4	15.4	41.7	80.0	83.8	-3.8	-2.1
	Q5	19.9	16.2	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	-0.098 (0.0051)	0.086 (0.071)				
	HI		0.18** (0.072)				
	Z+						12.7
	Z-						-2.1
BAMAKO	Q1	18.4	18.1	18.4	18.1	0.3	0.1
	Q2	16.8	13.3	35.2	31.4	3.8	1.8
	Q3	25.2	25.0	60.4	56.4	4.0	1.9
	Q4	17.6	16.1	78.0	72.5	5.5	2.0
	Q5	22.0	27.5	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	0.085 (0.006)	0.09 (0.1)				
	HI		0.005 (0.1)				
	Z+						2.0
	Z-						0
CONAKRY	Q1	21.6	10.6	21.6	10.6	11.0	5.9
	Q2	23.0	21.6	44.6	32.2	12.4	6.6
	Q3	22.5	31.1	67.1	63.3	3.8	2.1
	Q4	14.6	15.6	81.7	78.9	2.8	1.5
	Q5	18.3	21.1	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	0.079 (0.014)	0.072 (0.06)				
	HI		-0.007 (0.06)				
	Z+						6.6
	Z-						0
DAKAR	Q1	28.1	10.2	28.1	10.2	17.9	10.9
	Q2	24.0	7.9	52.1	18.1	34.0	20.7
	Q3	25.1	14.2	77.2	32.3	44.9	27.3
	Q4	12.5	29.8	89.7	62.1	27.6	16.8
	Q5	10.3	37.9	100.0	100.0	0	0
	Total	100.0	100.0				
	CN / CM	-0.1 (0.009)	0.3 (0.0087)				
	HI		0.4** (0.088)				
	Z+						27.3
	Z-						0

FIGURE 1 : Lorenz and health payments concentration curves in 4 West African cities

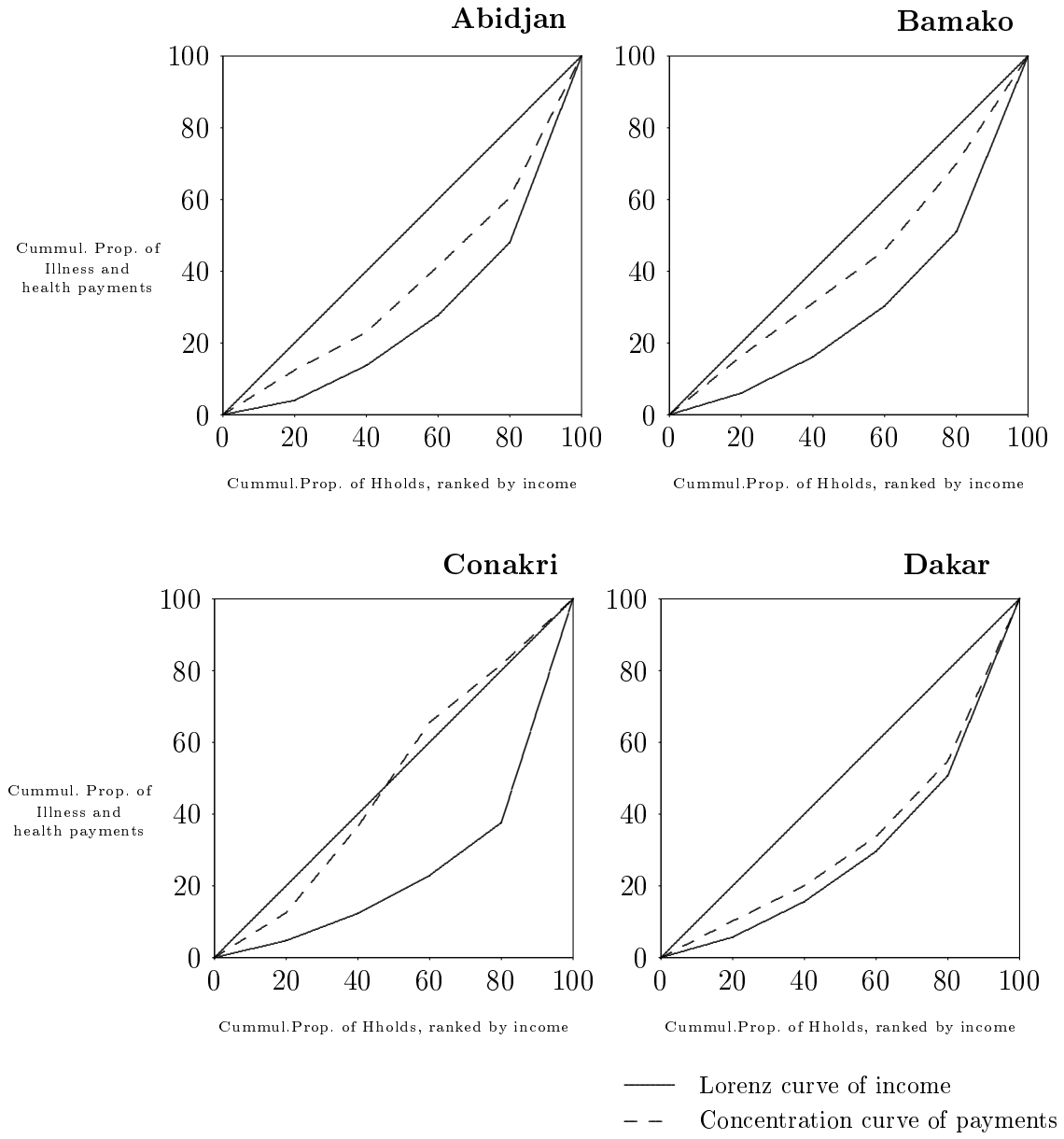

FIGURE 2 : Medical need and health care payments concentration curves (for those who declared an episode of illness in the prior month) in 4 West African cities