

## ORIGINAL ARTICLE

# Equity in healthcare financing in Nigeria

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## ABSTRACT

Using both graphical and geometric analyses, this paper examines the extent of inequity in healthcare finance among the Nigerian population. One of the acclaimed plans in healthcare in this teeming community is the mix method of financing but the system in practise is dominated with Out-of-Pockets (OOPs) meanwhile the degree of income inequality still remain high. Using the Nigerian Living Standard Survey (NLSS) data conducted in 2004, the framework for this study relies on Kakwani Progressivity Index (KPI). A decomposition of the groups into lower and upper bound however, reveal that health payment for lower bound is regressive while payment for upper bound is progressive. Although, the upper bound result dominates the entire result which finally suggests a progressive system arising from the spending habit of the rich in seeking for healthcare services abroad.

**Key Words:** Healthcare finance, Financial inequity, Lorenz curve, Concentration payment curve, Kakwani Progressive Index, Concentration Index, Gin coefficient

## 1. INTRODUCTION

Health is among the most important conditions of human life and a critically significant constituent of human capabilities.<sup>[1]</sup> However, equity in healthcare access and financing remain vital health policy objectives. Policymakers and economists usually recognise policy objective priority of equity in the field of health care, so much so that it is suggested to take precedence over efficiency objective amongst the population at large. Financial barrier is evidently suggested as one of the limiting barriers to access to healthcare by people in the low socioeconomic bracket.<sup>[2,3]</sup> Thus effort to ensure that the entire population without exception have access to required health services without risking financial catastrophic outcome, is the thrust of universal health coverage.<sup>[4,5]</sup> A sound financing system is expected to ensure a fair distribution of the burden of paying for health services, protect households against the risks of catastrophic levels of expenditure on health services, and, together with other supply side design features, reduce barriers to health

service use and promote an equitable distribution of public expenditures.<sup>[5]</sup> Traditionally, health systems are financed through four main sources: taxation, social health insurance contributions, private health insurance premiums and out-of-pocket payments.<sup>[6]</sup> Although in developing countries' governments try to contribute their quota to health sector but not enough to cater for the facilities and services rendered by this sector. There is significant reliance on out-of-pocket payments in African countries' health systems,<sup>[7]</sup> with high incidence of catastrophic health spending by households<sup>[8]</sup> which is the potential bedrock of the inequitable health financing systems<sup>[9]</sup> in the continent. While healthcare needs are increasing, government expenditure on health in many developing countries, Nigeria inclusive appears to be on the decline,<sup>[10]</sup> which translate into increasing burden on the household, in the absence of health insurance. Thus African health systems is dominated by private out of pocket funding, which accounts for more than half of overall national health expenditures.<sup>[11]</sup> In the case of Nigeria, Out-of-Pocket (OOP)

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accounts for about three-quarters of total health expenditure (THE).<sup>[12]</sup>

Nigeria, with an estimated population of over 180 million, and largest economy (\$509 billion in 2014) in Africa, commits around 5% of GDP to healthcare financing. A World Bank assessment in 2010 reveals that the state of the Nigerian health system is dysfunctional and grossly under-funded with a per capita expenditure of US\$9.44. Nigeria operates mix method of health financing, dominated by OOP, which accounts for about two-third of THE. Coupled with high poverty incidence of over 71% in the country, this has implication on the distribution of healthcare financing burden and utilization among the populace. There is therefore every possibility that varying proportion of household income is spent on healthcare. Policy documents on health in Nigeria emphasis the pursuit of equity in health and healthcare through improved access to quality healthcare by the poor and vulnerable groups, has the key feature. These policies are geared toward eliminating all barriers (including financial) in healthcare utilization and ensuring equitable access to healthcare. Towards this end policies on “health for all” and financial reforms that accord prominence to social health insurance have been promoted in the country. Despite this, financial burden of healthcare is still disproportionately borne by different segments of the society, while many others have limited access to healthcare service. Equitable access is often interpreted as ensuring equivalent treatment is received by people in equal need of medical care, irrespective of their income or socio-economic status. Currently this issue has so far received limited attention from both academia and policy makers, in the case of Nigeria. Little is known regarding income-related vertical inequity in financing of healthcare services in Nigeria. Therefore, to inform policy intervention to correct the inequity in financing healthcare in the country it is imperative to assess in a systematic manner the prevailing healthcare financing inequity. This paper thus set out to determine the extent of inequity in healthcare financing in Nigeria.

### Literature review

The concept of equity is inherently normative (value based), and simply refers to “fair” distribution of benefits across the population. Equity differs from equality, though it is an objective measure in terms of equal distribution of benefits across the population. WHO<sup>[11]</sup> defines inequity in health as differences (in health status), which are unnecessary and avoidable, but in addition are considered unfair and unjust. Providing operational definition<sup>[13]</sup> define equity in health as minimizing avoidable disparities in health and its determinants – including but not limited to health care – between

groups of people who have different levels of underlying social advantage.

Issue of equity in healthcare financing has often been investigated along the vertical equity dimension. The underlying theory used is commonly based on the egalitarian approach. Vertical equity is attributable to egalitarian approach in areas of healthcare financing. According egalitarian view, a public financed system should offer equal opportunity of access for those in equal need, independent of ability to pay.<sup>[14]</sup> 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. Vertical equity can be interpreted as the requirement that healthcare payments be connected with ability to pay, in which households of unequal ability are required to pay make appropriately dissimilar payments.

The vertical principle explains the notion that unequal treatment should be treated unequally i.e. treatment should be according to ability to pay.<sup>[15]</sup> in their study of Organisation of Economic Cooperation and Development (OECD) countries’ equity in financing established the concepts of regressivity (i.e. decreasing healthcare payment share of income as income increase, which disproportionately affect the poor) and progressivity (i.e. increasing healthcare payment share of income as income increase, which disproportionately affect the rich).

According to Wagstaff et al.,<sup>[15]</sup> the concepts of progressivity (whereby payments, as a proportion of income, increase with income) and regressivity (when payments, as a share of income, decrease with income and therefore disproportionately affect lower income groups) have been established in seminal studies on equity in financing in OECD countries.

The extent of vertical inequity is usually measured by Kakwani Progressivity Index (KPI), which indicates the extent to which a payment schedule departs from proportionality and health care finance according to abilities to pay. It presumes that each individual has an identical utility function with diminishing marginal utility.<sup>[16]</sup> It measures the extent to which health care payments are distributed proportionately to the income. However, it is an extremely summary measure, and its information can be sometimes misleading if the distributions underlying the Kakwani index are not considered alike.<sup>[17]</sup>

A useful property of Kakwani’s index is that the overall index for a financing system consisting of two or more sources of finance is a weighted average of the indices for the individual sources, where the weights are the proportions of each source in total revenue.<sup>[15]</sup>

While many developing countries have adopted health policy measures considered to be capable of reducing barriers to health care, issue of equity in financing still remain prominent in health debate discuss. While a variety of healthcare access-promoting policies have been adopted by many countries, achievement of equity in healthcare financing remains unguaranteed. Apart from the scarce volume of literature on equity issues, there are pockets of studies that have identified examples of countries with decline in inequity, and those lagging behind.

Given the increasing share of progressive financing sources for healthcare,<sup>[5]</sup> found the Thailand health system to be more equitable in the distribution of financial burden, with a low catastrophic health spending, and a pro-poor distribution of service utilization and public subsidies. Supporting decline in inequity healthcare finance in Thailand with the extension of insurance coverage, both Limwattananon et al. and Vasavid et al.<sup>[18,19]</sup> observed a considerable decrease in household spending on health especially among poorer deciles, while Limwattananon et al.<sup>[20]</sup> reported reduction in the incidence of catastrophic health expenditure during the period 2000-2004, with increased utilization over time among the rural population. Using data from Ghana Living Standard Survey, Akazili et al.<sup>[21]</sup> found healthcare financing in the country to be progressive due progressivity of taxes.

On the other hand, it has been shown that, while low-income people shoulders greater burden of illness in countries like South Africa, Ghana, and Tanzania, the richer people in these countries appears to be better favoured by the distribution of healthcare services.<sup>[22]</sup> In a study of four francophone West African capitals (Abidjan, Bamako, Conakry and Dakar), Cisse et al.<sup>[23]</sup> found a strongly 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. However, Glied et al.<sup>[24]</sup> found the redistributive effect of that universal, publicly-funded health insurance to be modest across OECD countries.

## 2. METHODOLOGY

### 2.1 Data and sources

This study employed secondary data analyses of the 2004 Nigerian Living Standard Survey (NLSS), which is a nationally representative cross-sectional household survey on household expenditure (including on health), income, and socio-economic status. The NLSS sample design is a As a two-stage stratified sampling design, the first stage of the NLSS made up of clusters of 120 housing units referred to as Enumeration Area (EA) were randomly selected to cover all the 36 States and Abuja.

In the second stage, 5 housing units are randomly selected from each selected EAs, making a total of 600 households from each of the 36 States and FCT, translating to a total of 22,200 households in all.<sup>[25]</sup> However, only 19,158 households were eventually covered as fully completed instrument, implying the data set from the survey contains information from 19,158 households.

### 2.2 Model for Estimating Progressivity of health care finance

This study adapts<sup>[17]</sup> framework in which we estimate the Gini coefficient and the payment Concentration Index (CI) to generate the degree of variation in the payment proportionality. Basically, we adopt the CI and the concentration curve to appraise equity in each household's health care payments. This is presented as the Lorenz curve to measure the distribution of household ability to pay, which is the cumulative distribution of household wealth. Lorenz curve for gross income is 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, while the concentration curve for health care payments is the relationship between the cumulative proportion of the population (ranked by income) and the cumulative share of payments for health.

This study employs the Kakwani's index, commonly used for study of healthcare financing to measure the progressivity of health care payments. According to Salari,<sup>[26]</sup> the index is computed as the difference between the CI (post medical income) of each financing source and the Gini index calculated on the (equivalent disposable) household income before considering any health-related expenditures (pre-payment income). Perfect equity is achieved when the CI and the Gini index curves coincide, such that the difference between them is zero, meaning the financing sources is proportional to income.

Mathematically, it is defined as twice the area between the concentration curve of healthcare payments and the Lorenz curve (see Equations 1-3):

$$KPI = 2 \int_0^1 [L_X(p) - L_T(p)] dp \quad (1)$$

$$KPI = 2 \int_0^1 [p - L_T(p)] dp - 2 \int_0^1 [p - L_X(p)] dp \quad (2)$$

$$KPI = CI - Gini_{pre} \quad (3)$$

Where CI is the concentration coefficient of payment and Gini<sub>pre</sub> is the Gini coefficient of gross income. A progressive system is signified by a positive KPI, in which Lorenz curve lies above the concentration curve, and vice versa for a negative KPI. A zero value of KPI implies payments proportionality, with both Lorenz and concentration payments curves coinciding.

Determination of whether equity in finance concentrates more among the poor or the rich is premised on the CI, being negative or positive, respectively. The concentration is more among the poor (rich) if the concentration curve lies above the equality 45° line, with CI negative (positive) value.

Gini coefficient is calculated as of the form (see Equation 4):

$$Gini\ coefficient = \frac{AreaA}{AreaA + AreaB}, 0 \leq Gini \leq 1 \tag{4}$$

The Gini coefficient can assume values between 0 and 1 (or 100%). For a society where perfect equity applies, that is income is equally shared, the Gini coefficient will be equal to zero, with the Lorenz curve and the line of equality being the same. The extent of deviation between the Lorenz curve and the equality line signifies the degree of inequity. Extreme case of perfect inequity exists for a society when the Gini coefficient is equal to 1 or 100%, in which one individual or a group of individuals earned all the income.

Area A is calculated using Trapezoid (see Equation 5):

$$Area\ A = \sum \left[ \frac{a+b}{2} h \right], \text{ between } 45^0 \text{ and Lorenz curve} \tag{5}$$

where “a” and “b” are the two parallel sides of the trapezium, and “h” is the height.

In the normal trapezoid,  $\sum$  is not included but because the area required involves different trapezoids (see Equations 6 and 7).

$$Area\ B = \frac{1}{2}bh, \text{ entire area below } 45^0 \text{ line} \tag{6}$$

$$CI = 1 - \frac{1}{2} \int_0^1 L(p)dp \tag{7}$$

**2.3 Estimation techniques**

Both graphical representations and geometric analysis were used to explain KPI. A negative (positive) Kakwani Index

indicates a regressive (progressive) financing mechanism, Kakwani index of zero is indicative of proportional financing.

The graphical illustration of the index is typified with the Lorenz curve and payment concentration curve. The degree of income inequality in a society is indicated by the Lorenz curve, while the concentration payment curve is the ranking of the population cumulatively along the lowest to the highest income, in relation to the cumulative proportion of healthcare payments. With the cumulative proportion of income and payments measured on the vertical axis, and the cumulative proportion of the population measured on the horizontal axis, the financing inequity is indicated by the relative position of the Lorenz and concentration payments curves on graph. While the coincidence of the Lorenz curve and the concentration payments curve signifies equity in healthcare financing, an inequitable health finance system against the poor exists when the Lorenz curve (Gexp) lies below the payment concentration curve (Gpay). On the other hand, inequitable health finance system in favour of the poor exists when the Lorenz curve (Gexp) lies above the payment concentration curve (Gpay). However, a mixed inequitable healthcare financing system exists when the Lorenz curve and concentration payments curve crosses one another, signifying existence of both regressive finance for some and progressive finance for others. In this case the overall healthcare financing inequity is ambiguous.<sup>[27]</sup>

**3. RESULTS**

This section discusses the results of the analysis carried out in this study. The results are presented both in tables and figures.

The distribution of income and health expenditure by income quintile, as well as the healthcare expenditure as share of income is presented in Table 1. A wide income disparity among the socio-economic groups in Nigeria is observed, with the least poor income group accounting for about half (44.8%) of the total income. The share of the least poor is more than double the share of the next quintile, and as high as more than seven-fold of the poorest quintile share. In reference to healthcare expenditure, the bulk of the expenses is undertaken by the least poor quintile, accounting for about two-third of total healthcare expenses. The health expenditure share of income initially declines from 12.5 for the poorest to 1.11 for the middle quintile, but increase to 13.6% for the second least poor quintile, and about 30% for the least poor.

**Table 1.** Income distribution, health care expenditure and share by income quintile

Quintile	Per-capita total income (₹)	Quintile share of total expenditure (%)	Per capital healthcare expenditure (₹)	Proportion of total income spent on healthcare (%)
Q <sub>1</sub> (poorest)	14,410.05	6.1	1,797.36	12.5
Q <sub>2</sub>	26,332.76	11.2	3,015.40	11.5
Q <sub>3</sub>	37,285.48	15.8	4,135.42	11.1
Q <sub>4</sub>	51,891.25	22.0	7,070.68	13.6
Q <sub>5</sub> (richest)	105,429.07	44.8	31,525.63	29.9
Total		100		100.0

Data source: NLSS 2003/2004; Q<sub>1</sub>- poorest quintile; Q<sub>2</sub>- 2<sup>nd</sup> quintile; Q<sub>3</sub>-Middle income quintile; Q<sub>4</sub> -2<sup>nd</sup> richest quintile; Q<sub>5</sub>-richest quintile

**Table 2.** Kakwani index (Gini coefficient and health payment concentration indices)

	Lower Bound (Q <sub>1</sub> -Q <sub>3</sub> )		Upper Bound (Q <sub>3</sub> -Q <sub>5</sub> )		
	Gini (Area A)	CI (Area)	Gini (Area A)	CI (Area)	
Area 1	0.031	0.033	Area 3	0.032	0.016
Area 2	0.118	0.123	Area 4	0.108	0.060
Area 3	0.253	0.256	Area 5	0.243	0.210
Sum	0.402	0.412	Sum	0.383	0.286
0.5 – Sum	0.098	0.088	0.5 – Sum	0.117	0.214
Area A+B	0.5	0.5	Area A+B	0.5	0.5
Area A			Area A		
Area A + Area B	0.196	0.70	Area A + Area B	0.234	0.48
KPI	-0.021		KPI		0.194

To further ascertain that the system experienced the regressivity and progressivity on certain income groups, we divided the 5 groups to lower bound (Q<sub>1</sub> to Q<sub>3</sub> - poor) and upper bound (Q<sub>3</sub> to Q<sub>5</sub> - Rich) to calculate Kakwani Index. In theory, the Kakwani index value can assume the extreme values of -2, in which there is severe regressivity, or +1, in which there is strong progressivity, or values between the two extremes. The results of the lower bound and upper bound are presented in Table 2.

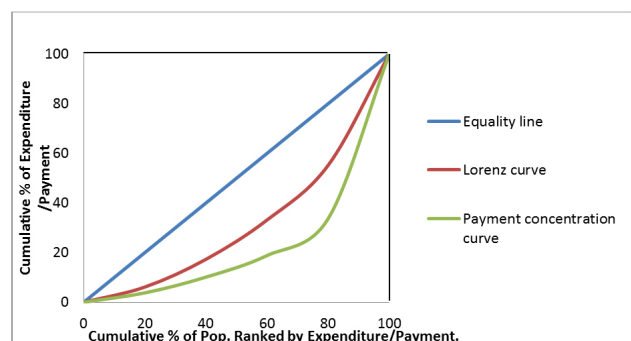
**Table 3.** Kakwani index Gini coefficient and health payment CI

	Entire Quintile (Q <sub>1</sub> -Q <sub>5</sub> )	
	Gini	Concentration Index
Area 1	0.006	0.004
Area 2	0.023	0.014
Area 3	0.050	0.029
Area 4	0.089	0.053
Area 5	0.155	0.134
Sum (Area A)	0.324	0.233
0.5 – Sum (Area B)	0.176	0.267
Area A+B	0.5	0.5
Area B		
Area A + Area B	0.353	0.534
KPI	0.182	

The Kakwani indices for lower and upper bounds reported in Table 2 reveal negative (-0.021: regressive) and positive

(0.194: progressive) values, respectively. The absolute magnitude of the obtained Kakwani indices is indicative of the severity of the respective regressivity and progressivity. The value of -0.021 implies that the disparity between the component income groups is mild, relative to the value of 0.194, which infers a progressive pattern that penalise the rich more. Thus the positive Kakwani index value of 0.182 reported in Table 3 for the entire income quintiles, confirms the dominance of the upper bound, implying a progressive pattern.

Graphically, the lower curves depict progressivity in nature since the payment concentration curve lies below the Lorenz curve. Although the two curves from the origin and at the end seems to be equal but the fact that the Lorenz curve lies above the concentration curve made the financing structure progressive (see Figure 1).



**Figure 1.** Lorenz and concentration curves

#### 4. DISCUSSION

The results of Gini coefficient obtained in this paper clearly indicate a large amount of income inequality in Nigeria. The Gini coefficient is about 0.4 which is not significantly different from 0.5 obtained for Nigeria by Olaniyan et al. and Hyacinth.<sup>[25,28]</sup> The CI result is positive and at least 0.5 in magnitude, confirming that the rich paid larger share of health care cost.

The share of each quintile healthcare expenses to their income is not consistently progressive, reflecting a quadratic pattern, in which the proportion of the first three quintile from the poorest exhibit regressive path, while the least poor group exhibit progressive pattern. The results reveal existence of inequitable distribution of income in Nigeria, as observed in the wide income disparity, which implies that individuals at the bottom of the income are greatly worse-off. This is further supported by the high poverty incidence involving more than two-third of the population. An individual in the richest group has approximately 7 times of what an individual in the first group lives on, 4 times of an individual in the second poorest, 3 times of an individual in the middle income quintile group and double of what an individual in second least poor group income shares.

It is observed that the poorest quintile group spends almost the same share of their income with the fourth quintile group. Though the last group with the highest income spent more than 20 percent of his income on health care but this does not leave an individual in that group as poor as the lowest group. The result on the proportion of healthcare expenses to income by quintile reveals that healthcare payment is regressive from the lower Q1 to Q3 in terms of percentage share, implying that the lower income groups (Q1 and Q2) paid more than the third stratum of the income groups. The regressivity pattern between the Qi and Q3, turned to be progressive between Q3 and Q5. Meanwhile, the payment changed from regressive to progressive from the fourth income group to the fifth group, indicating that the two groups commit higher proportion of income to health expenditure than the lower bound groups.

The lower bound result confirms that the poor pay more for health care than the middle income group. The lower bound is more prone to poverty associated diseases, such as poor hygiene, poor nutrition and the like. By this, the poor are likely to be susceptible to catastrophic spending.

The obtained Kakwani index for the entire quintiles is positive, indicating that healthcare payment was progressive, the proportion of household resources absorbed by healthcare payment rises with household income. The proportion of payment skewed towards the highest income group, with a slight vertical inequity favouring the poor (i.e. a system of

positive discrimination) of about 0.2 in magnitude.

That the rich commits higher proportion of their income to healthcare relative to those with relatively lower income is contrary to a priory expectation. The peculiarity of this result is explained by the fact that most wealthy individuals in Nigeria tend to seek medical care outside the country. The associated travelling expenses such as travelling processing fee, ticket fee, hotel accommodation, communication and cost of accompanying caregiver tend to be high for medical care outside the country. The cost of medical care outside the country can be several folds of what is paid for single visit to facilities within Nigeria for similar healthcare. For example, it has been estimated that between “\$500 million (NMA president) and \$1 billion” (Sovereign Wealth Fund) is spent annually by Nigerians on medical tourism. In addition, the Nigerian High Commissioner to India revealed that 80 percent of the Indian visas granted to Nigerians between 2011 and 2014 were for the purpose of medical treatment. It has been shown that huge amount is spent by a few wealthy people and the government, which pays for its high ranking officials to seek treatment abroad.<sup>[29]</sup> As part of the medical tourism, characteristics of Nigeria public officials travelling abroad for medical care in 2014 cost taxpayers N198.95 billion (\$1 billion).<sup>[30]</sup>

#### 5. CONCLUSIONS

This study investigated the extent of equity in the healthcare financing in Nigeria, and yielded a number of empirical results for the country. Income inequality of 0.4 Gini coefficient magnitude was found among the income quintiles, with the least poor accounting for about half of total income, suggesting existence of uneven distribution of income in the country. The estimated payment CI of 0.5 magnitude indicates the better-off paid larger share for health care, with resulting positive Kakwani index from CI and Gini coefficient confirming the progressive nature of the healthcare financing system of the country dominated by OOP payments. A caveat to this is the quadratic nature (initially regressive and later turn progressive) of the health expenditure share of income among the income quintiles. Overall, there is inequity in financing of health care in Nigeria. That is a vertical inequity exists in health care financing. Though the results indicates existence of progressivity in the healthcare financing in Nigeria, this does not consistently run through the entire garment of the income group. A decomposition of the groups into lower and upper bounds reflected a switch of nature of inequality from progressive to regressive. Overall, the habit of the rich in seeking for healthcare services abroad tend to explain the overwhelming progressivity outcome for the entire income quintiles. The pro-poor strategies need to

be stepped up to rely cater for the plight of the vulnerable in the society and drastically reduce the healthcare financing burden they currently share.

## CONFLICTS OF INTEREST DISCLOSURE

The authors declare they have no conflicts of interest.

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