Income Redistributive Effects of the Health Care Financing System in Nigeria

A Research Proposal*

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Abstract:
The extent of progressivity inherent in a country’s health care financing system has great potentials for redistribution of resources. A regressive health care financing system would imply that the poor are paying proportionately more than the rich to sustain the health care system in the country. This has the potentials to escalate the resource gap between the poor and the rich particularly if the poor are also more needy of health care services. In many developing countries there are widening inequalities between the subsistent poor and the affluent rich. In the past one and half decades, rising inequality between the rich and the poor in Nigeria has become a major source of national and international concern. This study intends to examine whether or not the exiting health care financing arrangement and the structure of the health care market in the country contribute income inequalities between the rich and the poor and the poverty level in Nigeria. It is expected that the outcome of the research will provide useful information for policy makers concerned with bridging this gap.

Introduction
Reforming the social sector in many developing countries that have experienced severe fiscal constraints has often implied back rolling the state by cutting down on social expenditure. Since health care is not easily one of the most volatile political issues, politicians have often found it convenient to transfer health care financing responsibilities to other stakeholders in the economy in the process of such reforms. Unfortunately, the near–total absence of third party mechanisms for financing of health care in many developing countries means that households must increasingly take on the responsibility for the health care of its members. Very often the only means of financing health care available to these households is through out-of-pocket payment.

On the other hand it is well known that huge inequalities in income characterize most of the developing countries. There are larger disparities in the income of the rich and poor within developing countries than within developed countries. In many developing countries deep and widening poverty exist side by side with affluence. In addition to struggling on low income most of the poor have to also contend with greater burden of disease arising from malnutrition, disease and ill-health.

In the past two decades, the Nigerian government has undertaken a number of socioeconomic reforms all of which have tended to transfer greater responsibility for financing of social services to the private sector, particularly the households. In the health sector particularly, the policy of cost
recovery in public health institutions through user charges and the prevalence of for-fee private health care providers have tended to lessen government responsibility for health care and increased the health care finance burden for households. It would seem, therefore, that the system of health care financing system in Nigeria has potentials to contribute substantially to the worsening of the pattern of income distribution in the country which, with a Gini coefficient of over 0.5 is among the highest in the world.

The purpose of this research is to examine the extent the dominant health financing option used in Nigeria – the out-of-pocket payment - reinforces the widening income gap between the rich and the poor. It is of course true that no matter the system of health care finance adopted by the government, it is the households that ultimately pay the price. Nevertheless, the different health care financing options and the structure of the health care market would suggest different implications for income distribution in the society.

This research aims to assist policy makers by examining the extent of income redistribution brought about by the prevailing system of health financing in Nigeria. Unlike other previous research carried out in this area, this research intends to pay particular attention to the relative income redistributive effects of the different health care market structures. The income redistributive effects of health care payments under public health care system will be compared with income redistributive effects of health care finance in the private health care sector.

Furthermore, unlike most other research, this research will adopt a broader definition of health care payments to include the monetary and non-monetary costs of financing health care. For example, the distance a health care seeker travels to obtain health care, the opportunity cost of waiting for care, and other economic costs of seeking treatment will be considered along with treatment cost as part of this broader definition of health care payment.

A progressive health care payment system will ensure that post payment income distribution is more equal than the prepayment income distribution and therefore closing existing income inequality gaps. The extent of progressivity and the average rate of payment will determine to a large extent how much the poor have left in the post payment period to spend on non-health
welfare enhancing goods such as food and education. Redistributive effect in this context tells us how much more unequal (or equal) health care payments make the distribution of income.

In many developing countries especially in Africa, because of the underdeveloped nature or complete absence of third party intervention in the health care market, it may be plausible to assume that the decision about health care utilization approximates the decision to finance health care. In Nigeria for instance, the near absence of social and private health insurance, and other forms of sickness funds and the minimal health care funding of health services through general taxation implies that much of the health care funding is through out-of-pocket funding. In fact, over 80% of health care finance in Nigeria is through out-of-pocket. All public health facilities charge user fees. The implication is that the system of health care financing has great potentials for redistribution of income. Therefore, unlike most other analysis of equity in health care financing in developed countries, this analysis will focus on the distributive effects of out-of-pocket payments.

It is also important to state from the outset that the analysis will be a partial equilibrium analysis in the sense that the health care finance decisions and redistributive effects are assumed not to influence work incentives, savings and other economic behavior of individuals and households.

**The Nigerian context**

Nigeria is an extremely heterogeneous society (Zartman, 1984). It is geographically, culturally and ethnically diverse. Nigeria as a state comprises about 250 ethnic nationalities with Hausa, Yoruba and Igbo as the dominant ethnic groups. Welfare distribution is unevenly distributed. A major factor accounting for the unequal distribution of resources is prebendal political economy that prevails in the country. Joseph (1987) defines prebendalism as “the intensive and persistent struggle to control and exploit the offices of the state”. Soon after independence in 1960, ethnic rivalry led to military coups and counter coups and subsequently to 30 months civil war between 1967 and 1970. The effect of this was the progressive concentration of power and resources on the central or federal government. Thus, with the rise of oil as the single most important source of revenue and the concentration of this revenue at the federal level, the struggle to control the government at the federal level became intensified resulting in six successful military coups and
several unsuccessful ones. Thus, between 1960 and 2000 military leaders that came to power through coups had ruled the country for thirty-four years.

Politics even under democratic governments became fundamentally the struggle for the control of the enormous resources concentrated at the center and often used for patronage by the government in power. Government increasing became “a magnet for all facets of political and economic life, consuming the attention of traders, contractors, builders, farmers, traditional rulers, teachers, as much as that of politicians or politically motivated individuals” (Ayogu, 1999:170). Access to state resources or being ‘politically connected’, therefore, became a major determinant of income and wealth distribution in Nigeria. Those with access to state power corruptively enriched themselves and those connected to them while being poor defines lack of access to state power and resources. Indeed an editorial in one of Nigeria’s top newspapers (citing a recent UN study) put it “Nigeria is a rich country in which 75% are poor while the top 1% usually those with strong links to the corridors of power rival the affluence anywhere in the world. Income disparity between the top 1% and the bottom 75% in Nigeria is the worst in the world according to a U.N study” (p.16)

**Poverty and Income Inequalities in Nigeria**

It is difficult to ascertain the exact level of income inequality in Nigeria but a number of studies show that inequality has worsened over time. For example Teriba and Philips (1971) estimated the gini coefficient to be about 0.47. Aboyede (1973) indicates the concentration to be about 0.58. Fajana (1979) estimated a figure of 0.51 (see Zartma 1981) while Omorogiwa (1982) calculated a Gini coefficient of 0.39 and World Bank 2001 estimates a Gini coefficient of 0.515. Using two national consumer surveys 1985/6 and 1992/3 Canagarajan et al (1997) shows that income distribution worsened between the two periods. For example, they show that the bottom five percent of the population had a large declining mean per capita expenditure of about 40.5 percent between the two periods while households in the second 5 percent had a decline of 20 percent. In contrast, households in the third decile had a mean per capita increase of 5 percent while those in the tenth decile had an increase of 47.5 percent between the two periods. A recent and a comprehensive study by Okojie et al. (2000) shows that inequality was exacerbated by the introduction of the Structural Adjustment Program (SAP) in 1986. Their study shows that between 1980 and 1985 the national Gini coefficient for consumption expenditure declined from 0.502 in
1980 to 0.423 in 1985 and then worsened again between 1985 and 1992 to 0.507 before declining to 0.465 in 1996.

The number of Nigerians living on less than $1 per day rose dramatically from 27% in 1980 to about 42% in 1992 due to the combined effects of mismanagement by military dictatorship and the introduction of SAP. The failure to actualize the democratic transition in 1993 led to political upheavals and economic crises that accelerated the rise in the poverty profile of the country. By 1999 when the democratic transition eventually took place about 70% of Nigerians was living in poverty.

The paucity of social support programs is reflected in the low priority given to social welfare programs in the public expenditure over the decades. For example, health spending averaged mere 1.9% of total federal government expenditure in the 1980s (Ogunbekun 1991). Government health care funding is only about 0.2% of GDP (UNDP, 2000). This amounts to $2 health care subsidy per capita whereas health care expenditure per capita is $15. This implies that social safety nets for the less advantaged members of the society are virtually non-existent. Consequently, life expectancy is very low. It is estimated to be about 52 years (CIHI, 1996). Infant and child mortality rates are very high: 75 and 140 per 1000 respectively (NDHS, 2000).

**The Structure of the Nigerian Health Care Market**

There are three levels of health administration corresponding to the three tiers of government in Nigeria. These are: the Federal Ministry of Health (FMOH), State Ministry of Health (SMOH) and Local Government Health Department (LGHD). The FMOH is the ministry in charge of national health services. It is the apex health policy-making body for the country. In this capacity, it lays down guidelines and principles for health services in the country as a whole. FMOH provides technical assistance to SMOHs and LGHDs. It also oversees those tertiary health institutions – teaching hospitals of federal universities and colleges of health technology – which belong to the federal government. However, the teaching hospitals have separate management boards. The FMOH also coordinates the activities of the 36 SMOHs and 774 LGHD but it has no direct control over them and they are functionally autonomous.
The states have their own general hospitals and comprehensive health centers that provide curative and preventive cares to the citizens. In addition, some states have teaching hospitals, schools of medical technology, nursing training schools etc. These institutions are regulated and supervised by SMOHs. Decentralization efforts in the 1970s led to creation of health management boards (HMBs) in each state to oversee the management of state hospitals. There have also been attempts to create district health boards but these have made little impact. This is perhaps, as Ogunbekun notes, due to the fact that these DHBs control little resource. The SMOHs also provide technical assistance to the LGHDs. The LGHDs have the responsibility for the provision of primary health care in their areas. The organizational structure largely conforms to the constitutional principles of autonomy of federating units. It enables each level of government to identify its health priorities and pursue them with minimal intervention from the other levels.

A very important aspect of the national health system is the private medical practitioners (for-profit hospitals). In 1985 medical doctors were required to have had at least five years post qualification experience before they could open their own private practice. Doctors who were in public practice were also prohibited from operating private practice. These restrictions were subsequently removed and there fore giving rise to unfettered growth in the private medical practice in Nigeria. It accounts for over 80% of health service provision. Most of these are curative based. They range from private clinics to specialist hospitals. The private hospitals are integrated within the referral system. Patients often get referred from the hospitals to he specialist and teaching hospitals.

Other important segments of the health care market are the pharmacy shops, the patent medicine shops and the traditional health care providers. Until recently, these health care providers were largely unregulated and mushroomed in every nook and corner of even the remotest villages. New regulations have not outlawed their existence, particularly the patent medicine stores and the traditional practitioners but only prohibited them from selling certain categories of drugs over the counter. They still remain the first port of call for most Nigerians who are poor and are unable to afford formal health care from the more established formal practitioners.
The national health system officially incorporates these informal health care providers and regulates their practice through licensing and also through their national association. There are also a number of non-governmental organizations that are involved in health care provision in the country. Prominent among these are the churches.

The picture that emerges from this characterization of the Nigerian socioeconomic environment is the failure of existing policy framework to guarantee improvement in the social welfare of the majority of the people. In the midst of abundant resources poverty is spreading and deepening. Health indicators are worsening. Skewed resource distribution has been a major source of political and economic instability.

**Objectives of the Study**

This study has two main objectives:

(a) To determine the extent the dominant health care financing system in Nigeria contributes to unequal income distribution in Nigeria. In other wards, the purpose is to analyze the income distributional significance of the system of health care financing with the purpose of ascertaining its equity implications

(b) To compare the relative income redistributive effects of the public and private health care markets with respect to vertical and horizontal equities¹ and re-ranking using a long term perspective definition of cost of health care finance

(c) To assess the sensitivity of horizontal inequity and re-ranking (if they exist) with respect to alternative definitions of ‘equal income class’

**Justification of the Study**

In general, empirical studies show that inequality in the distribution of resources is a major problem in Nigeria. The research is particularly germane in the Nigeria context because highly uneven distribution of income is perceived to be behind the socio-economic and political instability in the country (Egwu,

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¹ Vertical equity may be operationally defined as unequal health care expenditure for unequal ability to pay or progressive health care financing based on ability to pay. Horizontal equity is similarly operationalized as equal health care expenditure for equal ability to pay
These socioeconomic and political instability is evidenced in frequent riots, crime and violence, incessant strikes by labor unions, ethnic conflicts and youth restiveness especially in the oil bearing regions of the country, ethnic accusations and counter accusations of economic and political marginalization. These have often burst the social fabrics at the seams, and they arise from unfair distribution of resources among different classes of people and geographical locations. Minimizing avoidable income inequalities is an essential factor in forming a stable polity and building a progressive economy and poses a major challenge to policy makers. More specifically, Nigeria lacks universal public system of health care financing and is therefore likely to experience worsening income redistribution on account of the system of health care financing where 70% of the people live in poverty and yet over 70% of the health care finance is through direct payment. A reformed health care financing system in Nigeria has, therefore, potentials for pro-poor redistribution if health care utilization is according to need and payment is according to ability. By so doing the poor can use the money they spend on health care to provide themselves other households necessities.

**Brief Literature Review**

While there is a considerable amount of theoretical literature on the redistributive effects of taxation, very few empirical researchers have attempted to investigate the income redistributive effects of health care financing. Many of those who did have used simple tabulation methods to analyze the redistributive effects of health care financing [see for example, Hurst (1985), Cantor (1988), Wolfe and Gattschalke (1987), Gattschalke et al. (1989), Baker and van der Gaag, 1993, Pannarunothai and Mills (1997)] In comparing the progressivity of health care payment systems in the UK, Canada and US, Hurst (1985) used tables to indicate how average payments for health care varied according to income groups in each country. Surprisingly, these payments were analyzed in terms of there absolute values rather than in terms of proportion of the household income spent on health care services.

This approach excludes the possibility of comparing the progressivity of health care payments across the countries included in the study. Cantor (1988) represents substantial improvements on the preceding study by Hurst. Using the US data and tabulation method, this study showed that proportions of income contributed to health care financing by various income categories declined as one moved from the lowest to the highest income categories. This study shows that there were substantial income redistributions in the US health financing system. This redistribution is,
unfortunately, pro-rich implying that the poor bear the greater burden of ill-health are also likely to make greater contribution to the health care system.

Wolfe and Gottschalke (1987) and Gattschalke et al (1989) like Hurst (1985) did cross country comparative analysis of income redistribution arising from the methods of financing health care services. Wolfe and Gottschalke studied the patterns of health care contributions among the elderly in the USA using the simple health care contribution to income ratio as basis for progressivity. Their result showed extensive regressivity in health care contributions. For instance they found that elderly people in the lowest income decile contributed about 64 percent of their pretax income to the health care system. Gottschalke et al analyzed the progressivity of health care payment in UK, the Netherlands and US using the same tabulation method as Wolfe and Gottschalke. Their findings confirmed the results from Cantor (1988). They showed that US had a regressive health care financing system while the other two countries generally have progressive health care systems. However the simplicity of these methods does not permit a more in-depth analysis of the redistributive effects of health financing. For example none of the methods used in these studies could inform policy about the extent of horizontal equity or reranking inherent in these health care systems. They do not provide information as to the degree of progressivity or regressivity of different health care financing systems.

Recent methodological improvements in the analysis of the redistributive effects of health financing have been largely due to a group of European researchers under the aegies of COMAC project on Equity in the Finance and Delivery of Health Care. These recent studies have gone beyond the descriptive analyses of the previous studies to develop a single measure of progressivity. They have relied extensively on Kakwani (1977), which developed the mathematical model for analyzing tax progressivity, and Aronson, Johson and Lambert (1994) which developed the method for decomposing redistributive effects of taxation. Wagstaff and Van Doorslaer have extended applied these models in the field of health care financing. Wagstaff et al (1989) used the Kakwani index of progressivity to confirm the descriptive results of the previous studies based on USA, UK and the Netherlands using 1981 data. They showed that total contributions to health care financing in USA and Netherlands were regressive, but more regressive in USA (-0.15) than in the
Netherlands (-0.06). It was progressive in the UK (0.03). Out-of-pocket payment was even more regressive in USA (-0.39) but surprisingly progressive in the Netherlands (0.12).

Van Doorslaer and Wagstaff (1993) did not apply the Aronson-Johson-Lambert method of decomposition but it could be said to represent a threshold in the analysis of the redistributive effects of health care financing. The study basically attempted to compare progressivity of different conventional forms of health care financing among ten OECD countries, namely, Denmark, France, Ireland, Italy, Netherlands, Portugal, Spain, Switzerland, UK and US. Instead of tabulating proportions of income spent on health care payment by different categories of income earners as in the previous studies, the authors applied the Kakwani and Suite’s indices of progressivity which made it possible to compare the progressivity of health care financing across countries.

This study will differ from existing studies in this area by using the long run perspective of ability to pay rather than the short run ATP. In this respect most of the existing studies have used the health expenditure-income ratio as the measure of ATP. In these studies health expenditure is often defined in terms of monetary cost of health care. In this study, the long run perspective which considers the costs of health care in terms of economic costs to the household of treating illness will adopted. These costs include foregone consumption of essential health producing items, investment in education and other productive investments that may otherwise threaten the future earning ability of the household (Russell 1996). This long run perspective will be proxied by the economic costs of seeking health care such as monetary payments, transport costs, households’ loss of income and man hours due to ill health.

Secondly, previous studies have not separated between inequities arising from financing of health care in public and private health care facilities. It is important, for policy purposes, to know whether households’ health care expenditure in private and public health facilities embody the same level inequities if such inequities indeed exist. In other words existing literature has not addressed the question: do the economic costs of seeking health care in public and private health care facilities embody the same level vertical and horizontal inequities if these inequities exist at all? Information on the relative inequities embodied by these two categories of health care supplies
will be important, for example, in ascertaining the extent to which the public sector is satisfying the needs of the poorer groups of the population.

Methodological Framework

Measuring Progressivity And Redistributive Effects Of Health Care Financing:

As the development of the methods for measuring progressivity and redistributive effects have borrowed largely from the theoretical insights from the tax literature, it is on the letter that this section will depend.

Analogous to tax progressivity, the progressivity of a health care payment system is the “extent to which payments for health care rise or fall as a proportion of a person’s income as his or her income rises or falls” (van Doorslaer and Wagstaff, 1993). A system of health care payment is progressive if health care payment rises by a higher proportion in response to a proportional increase in income. If the percentage or proportionate increase in payment is equal to the percentage increase in income, then health care payment is a proportional system. On the other hand, if the percentage increase in health care payment is less than the percentage increase in income then the system is regressive. This implies that for a progressive health care payment system the lower income group bears a proportionately lesser cost of financing the health care system. Conversely, the topmost class bears a disproportionately higher cost of health care financing.

One simple way to measure the progressivity of health care payment is to compare the share of each income decile with its share of health care payments. However, while the method is sufficient to indicate whether or not progressivity is present, it is hardly useful for estimating the degree of progressivity especially when we need to compare the progressivity of health care payment in two different economies. A measure of progressivity that has become both standard and conventional is the one developed by Musgrave and Thin (1948). They defined a measure of “effective progression” as an index that measures the “extent to which a given tax structure results in a shift
in the distribution of income towards equality”. The conventional method to measure redistributive
effect (RE) using the Lorenz and Gini coefficients in this case would require the subtraction of the
post-payment Gini from the pre-tax Gini coefficient. If the value is positive then the health
payment system is progressive. It reduces income inequality in the after payment period. If the
value is zero, then the payment system is proportional while a negative value will suggest a
regressive health care payment mechanism.

**Kakwani’s Index Of Progressivity**

Kakwani (1977) defined progressivity in terms of the elasticity of the tax function $T(x)$ with
respect to income $x$. It is derived from the principle of Lorenz curve. Let $Lx(p)$ be the Lorenz for
pre-payment income. Let $Lc(p)$ be the payment concentration curve obtained by plotting the
cumulative percentage of the population ranked according to pre-payment income on the $x$-axis,
and the cumulative percentage of health care payments on the vertical axis. For a proportional
health care payment system, then the $Lx(p)$ curve and $Lc(p)$ curve must coincide. Progressivity is
then measured by departures of $Lc(p)$ from $Lx(p)$. Thus the Kakwani index of progressivity of
health care payment on prepayment income is:

$$
\pi^k = Lc(p) - Lx(p) \quad \text{or} \quad \pi^k = \int_{0}^{1} Lc(p) - Lx(p) dp \quad \text{.................(27)}
$$

For a progressive health care payment system $\pi^k$ is positive. For a proportional system $\pi^k$ is zero
and for a regressive system $\pi^k$ is negative. $\pi^k$ has limits between – 2.0 and 1.0. It is – 2.0 when
all pre-payment income is concentrated in the hand of one individual while the payment burden
falls on somebody else. It is 1.0 when pre-payment income is shared equally while the payment
burden falls on someone else.

**REYNOLD’S-SMOLENSKY (RS) INDEX OF REDISTRIBUTION**

Redistributive effect may be conceptualized as the equalizing or disequalizing effects associated
with a transition between the pre- to post-payment periods. In this sense, a progressive payment
system is essentially redistributive. In effect a policy of redistribution is compatible with a
reduction in total income in the post payment period. Or as Lambert (1993: 180-181) notes, “a
progressive income tax can be redistributive in its own right, regardless of what is done with the
revenue” (See also Podder, 1993: 53). Jakobsson (1976) and Kakwani (1977) have also proved this theoretical result.

A measure of redistributive effect that has gained a substantial attention in literature is the Reynolds-Smolensky index (Reynolds and Smolensky 1977). They defined redistributive effect as

$$\pi_{RS} = 2\int_0^1 [L_{x-T(p)} - L_{x(p)}]dp = G_x - C_{x-T} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (28)$$

Where $\pi_{RS} = \text{Reynolds-Smolensky redistribution index defined as twice the area between the Lorenz curve for pre-payment incomes } L_x(p) \text{ and the concentration curve for post payment income } L_{x-T}(p)$. $G_x$ is the prepayment Gini coefficient while $C_{x-T}$ is the post payment concentration curve.

Fig. 1
Lorenz Curve of Prepayment Income and Concentration of Postpayment Income

The index is positive if the pre-payment Lorenz distribution curve lies below the concentration curve for post payment concentration curve. In this case payment reduces income inequality on prepayment income distribution. If the pre-payment Lorenz lies above the post payment concentration curve, then, $\pi_{RS}$ is negative and in this case health care financing system worsens inequality on prepayment distribution.
The Kakwani progressivity index and Reynolds-Smolensky redistributive index are linked by the following mathematical relationship:

\[ \pi^{Rs} = \frac{g}{1-g} \pi^R \]  

………………………….(29)

Where \( g = \frac{T}{x} \) i.e. average tax rate or proportion of prepayment income taken up health care payment.

Equation (29) suggests that redistribution is an increasing function of Kakwani index of progressivity. The higher the proportion of income individuals and households spend on health care the more income equalizing will be the payment system.

**Decomposing The Redistributive Effects.**

Reynolds-Smolensky measure of redistribution indicates that total redistribution is made of two components – average payment rates and index of progressivity. However, there is a fundamental assumption underlying the Reynolds-Smolensky index. It assumes horizontal equity (i.e. equal treatment of equals). Everyone at a particular income level is assumed to contribute the same amount to the financing of health care system. But this can hardly be said to be a plausible assumption since in practice households at the same level of income may vary widely in their health care payments due to the stochastic nature of illness. Horizontal inequity is more likely to be the norm than the exception.

Furthermore, there is the problem of re-ranking that is not considered by the Reynolds – Smolensky index. In many developing countries and in Nigeria particularly, it is a common experience to see that catastrophic health care payments may push an average income family below the poverty line behind families that it ranked higher than before – illness (See for example, Sauerborn et al 1996; World Bank, 2001).

This re-ranking effect leads to people having different ranks in the pre- and post-payment periods. This horizontal inequity may in certain respect be considered more invidious and more damaging than vertical inequity and thus deserves no less attention than vertical inequity. Thus, it is important to include these two elements - horizontal inequity and re ranking - occasioned by health
care payments. Unfortunately, the Reynolds-Smolensky index assumes there is no horizontal inequity and no re-ranking occurs in the transition from pre- to post-payment income periods.

The Aronson-Johnson-Lambert Decomposition

Aronson et al (1994) showed that the distributive effect of taxation (health care payment) can be decomposed into four components: progressivity effect, average tax effect, horizontal equity and re-ranking effects. This method of decomposition is particularly germane for cross sectional data such as will be used for this study (Lambert and Aronson, 1993). In an important theorem Aronson et al established that:

\[ RE = V - H - R \]  

(30a)

That is, redistributive effect (RE) is determined by vertical progressivity effect which is composed of two separate effects – average tax level \( t \), and Kakwani index of progressivity \( \pi^k \), the classical horizontal inequity and index of re-ranking \( R \). The redistributive effect may be more fully expressed as (Aronson et al 1994)

\[ RE = \left( \frac{g}{1-g} \right) \pi^k - \sum \alpha_x G_{F(x)} - G_{x-T} - C_{x-T} \]  

(30b)

The first term on the right of equation (30b) estimates the level of inequality reduction that would have obtained had everyone made equal contribution to the health care financing system, (that is, the counterfactual reduction in inequality under equal payment). This counterfactual reduction can easily be computed by noting that (following van Doorslaer et al., 1999)

\[ \frac{RE}{RE} = \left( \frac{g}{1-g} \right) \pi^k - \sum \alpha_x G_{F(x)} + (G_{x-T} - C_{x-T}) \]  

(31)

Or \( \frac{RE}{RE} = \frac{V}{RE} - \frac{(H + R)}{RE} \Rightarrow V^100 = 1 + \frac{(H + R)}{RE} \)

The expression \( V^100 = 1 + \frac{(H + R)}{RE} \) makes it clear that \( \frac{(H + R)}{RE} \) is the percentage by which the payment system would have been more redistributive if everyone had made equal contribution to the health care system. That is the payment system would have been more redistributive by \( \frac{(H + R)}{RE} \% \) if everyone paid the same amount. This counterfactual reduction in income
inequality is composed of progressivity of payment $\pi^K_T$ (Kakwani 1977) and the average level of taxation $g$. This Kakwani index is obtained by using the average payment made by individuals in a pre payment income class rather than each individual actual payments and then recomputing RE. The term $G_{F(X)}$ is the Gini coefficient that measures inequality in the post payment period that arises solely from the fact that individuals at the same pre payment income level are now less equal in the post payment than they were at pre payment period. This is because households or individuals at the same pre-payment period have contributed unequally to finance the health care system.

The horizontal inequity in each income level or group is weighted by $\alpha_{(X)}$ which is the product of the fraction of the population in the $j$th class and the post payment income share of the individuals with income $x$. The $R \equiv G_{X-T} - C_{X-T}$ measures the difference between the Gini index for post payment income and the concentration index for post payment income ($X - T$). Where the $R$ takes the value of zero, then we know that no re-ranking actually took place in the transition from pre-payment to post payment periods. Van Doorslaer et al (1999) have correctly observed that positive values of $H$ do not necessarily imply positive values of $R$. Obviously so because two individuals in the same income group may pay different amounts for health care

The two terms $H$ and $R$ are non-negative. For example a tax rate in excess of 100% may lead to re-ranking even without horizontal inequity. However, since such taxes do not operate in reality, horizontal inequity will lead to re-ranking. But again, it may be noted that in grouped data, income levels may be demarcated as bands of income. This implies that positive value of $H$ may not necessarily imply a positive value of $R$ since health care payment differences between two individuals within the same income band may not be sufficient to re-rank them. From equation 30a it is clear that having computed the value of $V$, we can either compute $H$ or $R$ first, and compute the other as residual. To compute $R$, it is important to determine the question: who are the income equals? The robustness of the value of $R$, will be tested using different definitions of income bands or ‘income equals’.
It is clear from the AJL decomposition method that the total contribution of health care payment system to income inequality (measured by the Gini coefficient) can be decomposed into four main components: (i) vertical equity component represented by the degree of progressivity of the health care financing system. If payments are progressive on prepayment income then we conclude that the health care payment system exerts equalizing effect on post-payment income. That is there is greater parity in households’ ability to purchase other basic life needs at the post-payment period (ii) the percentage of total income that is used to finance health care. This is represented by $g$ in (30) and (31) A rise in proportion of income devoted to health care payment raises the degree of vertical inequity (iii) When households are grouped according to their income categories, the horizontal inequity (i.e. within category inequity) arising from the health financing system is estimated by the level of inequality in the post-payment income. This within category inequality in post-payment income is estimated by the within-group Gini coefficient. The population-weighted sum of the within-group Gini coefficients gives the level of horizontal inequality $H$ in the post-payment distribution. Thus the $H$ has a negative sign (since within-group Gini coefficient at the post-payment period cannot be less than zero, some groups may have positive Gini in the post-payment distribution) so that $H$ necessarily reduces the redistributive effect.

Source of Data

The data set generated from household survey from Enugu State, Nigeria, will be used for the analysis. The choice of this study site is predicated on the following considerations:

(a) It is considered that concentrating on a state will provide a sharper focus to the study

(b) With an estimated population of 3.5 million people and diverse sub-ethnic groups, Enugu state to a large extent mirrors the problems of development in Nigeria as a whole. This implies that the results could easily be generalized.

(c) Recent studies show that the research of this kind that focuses on small area analysis tend to yield better results than those that attempt a large coverage (Diaz, 2001). This is also consistent with PEP research objectives of focus on small area analysis.

Based on these consideration these considerations, this study will make use of the data currently generated from a survey in the state by the author with the assistance of African Economic Research Council (AERC). This data is preferred, for this purpose, to all the other existing
secondary data sets because questions in this survey were designed precisely to generate information on household health and health care expenditure of households in the state among other important variables. It also covers the state more intensively that the other existing data sets. It uses the standard two-stage sampling technique. The at the first was the portioning of communities into urban and rural strata. The second stage was the random selection of enumeration areas within the different strata. In each stratum, the probability of selecting an EA is given by $P_{ii} = \frac{b \cdot H_i}{\sum H}$ Where $P_{ii} = \text{the probability of sampling \ ith \ EA \ in \ the \ first \ stage}$. $b = \text{allocated number of EAs to be selected from the stratum}$. $H_i = \text{the total number of households in the \ ith \ EA}$. $H = \text{total number of households in the stratum}$.

The survey includes 1500 households covering 60% of the entire enumeration areas in the state. The enumeration areas and household survey frame were made available from the Nigerian Population Commission. The random selection of households followed the probability proportional to size (PPS) method.

At the second stage, a complete household listing will be carried out. For this purpose, the NPC’s resident technical staffs are available to assist with the identification of the EAs selected in the first stage and to indicate the buildings within the EA. However, since the FOS already does this listing, this exercise need not be repeated. This list of households will provide the sampling frame for the second stage of the selection. At the second stage, systematic sample of 22 households were selected from each EA in all the strata. The probability of selecting a household at this second stage is given as follows: $P_{2ij} = \frac{m}{M_i}$ for each EA Where $P_{2ij} = \text{probability of sampling a household in the second stage}$. $m = \text{number of households selected from each EA}$. $M_i = \text{total number of households in the \ ith \ EA}$. Thus, the product of the probability of the first and second stages gives the overall probability of selecting any given household. This may be specified as: $F_i = P_{ii} \cdot P_{2ij} = \frac{b \cdot H_i \cdot m}{\sum H \cdot M}$. While the weighting factor for each EA, $w_i$, is given by the reciprocal of the overall the probability of selection $w_i = \frac{1}{F_i} = \frac{\sum H \cdot M}{b \cdot H \cdot m}$.
**Econometric Software**

The main econometric softwares to be used for this research are: the DAD that is specifically designed for distribution analysis and Stata Version 8.0

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**WORKING PLAN**

<table>
<thead>
<tr>
<th>S/N</th>
<th>ACTIVITY</th>
<th>MONTHS/WEEKS</th>
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<tbody>
<tr>
<td>1</td>
<td>Reviewing literature</td>
<td>4 weeks</td>
</tr>
<tr>
<td>2</td>
<td>Working out detailed methodology</td>
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</tr>
<tr>
<td>3</td>
<td>Data collection</td>
<td>8 &quot;</td>
</tr>
<tr>
<td>4</td>
<td>Data processing</td>
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</tr>
<tr>
<td>5</td>
<td>Estimation exercise</td>
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</tr>
<tr>
<td>6</td>
<td>Analyzing and reporting results</td>
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</tr>
<tr>
<td>7</td>
<td>Contingencies</td>
<td>6 &quot;</td>
</tr>
<tr>
<td>8</td>
<td>Dissemination of results</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>40 &quot;</td>
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</table>

**Dissemination of Results of the Study**

The results of this study will be disseminated through two primary media:

1. The results will be published in international journals (with sources of funding acknowledged)

2. The results will also be made available to policy makers particularly the state and Federal Ministry of Health. It is believed that at this period of Health Sector Reform in Nigeria, the health policy makers in the country would want share the results from studies in health care financing. The mode of the dissemination of these results would, therefore, largely depend on the ministries. However, an executive summary containing the results of the study as well as the entire report will be made available to the health care finance policy makers.
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