PROGRESSIVITY, HORIZONTAL INEQUITY AND RERANKING IN HEALTH CARE FINANCING IN NIGERIA

BY

CHUKWUEDO SUSAN OBUROTA

B.Sc. Economics (Calabar); M.Sc. Economics (Ibadan)

Matric. No. 153700

A Thesis in the Department of Economics,

Submitted to the School of Economics

In partial fulfilment of the requirements for the Degree of

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN

February, 2020

CERTIFICATION

I certify that this thesis was carried out by Chukwuedo Susan Oburotaunder my supervision in the Department of Economics, School of Economics, University of Ibadan, Nigeria.

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Supervisor
Prof. Olanrewaju Olaniyan
B.Ed. (Educ. Mgt. & Econ), M.Sc. (Econ), Ph.D (Ibadan)
Professor,Department of Economics,
University of Ibadan, Nigeria.

DEDICATION

To the Holy Spirit the giver of all wisdom, knowledge and Understanding

ACKNOWLEDGMENTS

I appreciate the Trinity, for their grace and guidance granted to me towards the completion of this thesis. Without whose presence, love, care, protection, provision and stabilizing power I would never have come this far. All praises be to your holy and unfailing name.

My sincere appreciation goes to my supervisor and chairman of the thesis committee, Professor Olanrewaju Olaniyan for his mentorship, guidance and untiring effort towards making this thesis writing a success. His supervision is a gift to me from God Almighty. I am grateful to the other members of the thesis committee, Dr. Alarudeen Aminu for his suggestions and advice. Dr. Noah Olasehinde for his encouragement andguidance towards the successful completion of this thesis.

I acknowledge and appreciate Professor Olawale Ogunkola, Professor Festus Egwakhide, Professor Omo O. Aregbeyen, Dr. Muitu Oyinlola, Dr. Tosin Adeniyi, Dr. Samuel Orekoya, Dr. (Mrs) Patricia Ajayi and all other Professors and lecturers in the Department of Economics for their assistance throughout my Ph.D programme.I am also deeply grateful to friends and colleagues at the University of Ibadan notable among them Stanley Akachukwu, Festus Osagu, Dr Daniel Onisanwa, Dr Nike, Dr Uche Abamba, Ewere Okungbowa, and the HPTRP family. I also appreciate my colleagues at the University of Calabar especially Professor (Mrs) F.N Obafemi, Professor Rex Ogbuagu, Dr Felix Eke, Mrs Ihuoma Eke, FridayAgala, Peter Offum and Margaret. I am grateful to Professor Abdulkareem Araar of the University of Laval Canada he provided guidance during the estimation of the DJA methodology. My sincere appreciation also goes to Professor Owen O' Donnell of Eramus University Rotterdam he provided the ados file for conducting the disaggregated analysis of progressivity estimates. Thanks to Professor Bilger of University of Singapore he introduced me to the Adept software.

I love and appreciate my dear mother, Mrs. Elizabeth Oburota, Ithank her for being not just being a good mother and my confidant. Her love, unceasing prayers and support pulled me through tough times. I am also grateful to my brothers Presley, Josiah,mummy Fumilayo Olowojoba and her family, every member of the Umeri's family, Professor Olumide Ayodele, the Kalu family, Ven. Professor. Nneoyi Egbe and Ven. Stanley U. Ukachukwu for your payers and words of encouragement God bless you all. Thanks to my Church family at Ibadan, The Glory Tabernacle Ministry for all the love and fellowship God bless you all. I fondly remember Rev. Dr. Barr. Geoffery Onyemachi Agbo. Thanks for being a loving, caring, supportive husband and for believing in me. I deeply miss him.

ABSTRACT

Progressive health care financing, which occurs when the non-poor pay more for health care than the poor, becomes regressive by Horizontal Inequity (HI) and Reranking (RR). The HI implies that individuals with similar income make different health care payments and RR addresses the changes in the position of individuals on the income distribution due to health care payments. The HI and RR induced by out-of-pocket health payment and health insurance co-payments made out-of-pocket could result in the financial impoverishment of the household who are left with insufficient resources to meet their subsistence needs. Previous studies have examined the extent of horizontal inequity and reranking caused by Out-Of-Pocket (OOP) health care payments excluding insurance, while the horizontal inequity and reranking induced by insurance co-payments made out-of-pocket ($OOP_{insurance}$) had not received adequate attention. This study was designed to investigate the extent of HI and RR induced by the OOP and $OOP_{insurance}$ in Nigeria.

The Equity Theory of Taxation provided the theoretical underpinning for the study. Two measures of health care financing usedwere the OOP and $OOP_{insurance}$. The ability to pay measured by household consumption expenditure. The Kakwani Progressivity Index (KPI) was estimatedto ascertain the level of progressivity in the OOP and $OOP_{insurance}$ using the Convenient Regression while the Kernel Regression was used to estimate HI and RR. Data were obtained from threerounds of the General Household Survey 2010, 2012and 2015 by the National Bureau of Statistics with each survey covering 5,000 households. The analysis covered 2,836 households (920 urban and 1,934 rural) in 2010, 3,999 households (1,278 urban and 2,721 rural) in 2012 and 4,051 households (1,305 urban and 2,746 rural) in 2015. The households covered by health insurance were 176, 344 and 416 for the 2010, 2012 and 2015 periods, respectively. Result estimates were validated at$\alpha \leq 0.05$.

The average consumption expenditure for the poorest and wealthiest households respectively were ₦24,705 and ₦486,511 in 2010, ₦3,450 and ₦195,765 in 2012 and ₦4,403 and ₦145,595 in 2015. Coefficients of the KPI for the OOP weresignificantly negative and regressive (-0.12and -0.09) in 2012 and 2015, respectively. The KPI for the $OOP_{insurance}$was regressive in 2010 (-0.16) and2015 (-0.18). Individuals on lower income levels were bearing the burden of health care financing using the OOP and $OOP_{insurance}$. The OOP induced only significant reranking (0.48%, 0.08% and 0.4%) in the income distribution. The $OOP_{insurance}$ produced significant horizontal inequity (0.30%, 0.33% and 1.2%) and reranking (0.15%, 0.28% and 1.59%). Higher estimates of reranking were associated with the $OOP_{insurance}$ which worsened income inequality.

Out-of-pocket health care payment excluding insurance and health insurance co-payments made out-of-pocket are sources of inequitable health care financing. Thus, the coverage of health insurance should be expanded to provide financial protection for poor households.

Keywords: Health Care Financing, Horizontal Inequity, National Health Insurance Scheme in Nigeria, Progressivity, Reranking

Word Count: 457

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List of Acronyms

AE	Adult Equivalent Scale
AJL	Aronson Johnson and Lambert
ATP	Ability to Pay
CCET	Convenient Covariance Estimation Technique
CDs	Communicable Diseases
CI	Concentration Index
DJA	Duclos Jalbert and Araar
FFC	Fairness of Financial Index
FSHIP	Formal Sector Social Health Insurance Programme
FMOH	Federal Ministry of Health
GHO	Global Health Repository
GHS	General Household Survey
HI	Horizontal Inequity
HHIZE	Household Size
KPI	Kakwani Progressivity Index
MECT	Multiple Comparison Estimation Technique
NC	North Central
NCDs	Non-Communicable Diseases
NDHS	Nigerian Demographic and Health Survey
NE	North East
NW	North West
NHIS	National Health Insurance Scheme
OECD	Organization for Economic Co-operation and Development
OOP	Out-of-pocket Health Payment
$OOP_{INSURANCE}$	Out-of-pocket Health Insurance Contribution
RE	Redistributive Effect
R	Reranking
SE	South East
SHI	Social Health Insurance
SS	South South
SW	South West
UL	Urban and Lambert
USHIP	Urban Self-employed Social Health Insurance Programme
VAT	Value Added Tax
VE	Vertical Equity
VCL	Van de Ven Decomposition
WDI	World Development Indicators
WHO	World Health organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

An equitable health care financing arrangement is one of the panaceas for achieving an efficient health care system and improved health outcomes. This realization has generated scholarly interest about equity in the financing of health care. The World Health Organization's guideline for assessing health systems functioning identifies fairness in the funding of health care as an intrinsic goal of health systems (Murray *et al.,* 2000). Financing of health care involves the generation, accumulation and allocation of funds to meet the health care needs of a country's citizens both individually and collectively (WHO, 2000; Preethi, 2017). Health care is generally financed through private expenditure, public expenditure or donor support. Public expenditure on health is obtained from tax revenue and social health insurance contributions. On the other hand, private expenditure on health is gotten from payments for healthcare that are made out-of-pocket and private health insurance premiums (Uzochukwu *et al.,* 2015). Most countries particularly developing nations, fund their health care expenditures from more than one of these sources (Hsaio and Liu*,* 2001).

The World Health Organizationreport on health systems financing identified various goals of health care financing. These include the mobilization of adequate financial resources for health care activities, overcoming financial barriers that exclude the poor from accessing health care services and providing an equitable and efficient mix of health care resources (WHO, 2010). However, there is growing consensus that health care systems fulfill the goal of equitably raising sufficient financial resources to meet the health care needs of their citizens. This should be carried out in such a way that people can access the muchrequired health services without the risk of financial impoverishment (WHO, 2010). This is because regardless of the financing mechanism adopted by the government,householdsultimately bear the burden of health care financing (O'Donnell *et al,* 2008).

Studies on equity in health care financing borrow extensively from the subject of tax equity. Two views of equity in health care financing existin the literature.These are the egalitarian and redistribution views (Murray *et al*., 2000). The egalitarian notion of equity in health care financing requires that payments for health care be linked to individuals' abilities to pay and not to their utilization of health care services. The Ability To Pay (ATP) principle entails that people who have different abilities to pay (income) make different health care payments, while those with similar ability to pay make similar health care payments. The former refers to the concept of vertical equity while the latter connotes the concept of horizontal equity. The principle of vertical equity in health care financing is synonymous with progressivity.

Aprogressive health care financing system is one where the non-poor contribute a higher share of their income than the poor as health care payments (Munge and Briggs, 2014). Thus, the burden of health care payments is shifted up the income distribution and borne by the non-poor, while the post-payment income is shifted down from the non-poor to the poor. This makes pre-payment distribution of income smaller than the post-payment distribution and closes the income inequality gap (Ichoku and Fonta 2006). The progressivity of any nation's financing system as it relates to health care, is determined by the tax structure progressivity. If the distributional burden of taxes is borne by those on the upper tail of the income distribution, there will be increased revenue for the provision of public goods such as health and education and a corresponding reduction in inequalities in the pre-tax distribution of income (Lambert, 2001). All things being equal increased inequality in the distribution of income calls for greater degree of progressivity in the fiscal system and this could also necessitate redistribution (Holst, 2017; Slemrod, 1993).

On the other hand, the redistribution view focuses on extending the progressivity analysis to address the subject of the income redistributive effects of health care funding. The income redistributive effects of health care funding sources measure the extent of inequities induced by various health care funding options and the impact of these inequities on the income distribution (Bilger, 2008). It focuses not only on the progressivity or vertical equity of health care contributions but also on the extent to which individuals with similar ability-to-pay make dissimilar health care payments, the notion of horizontal inequity and changes in the position of individuals on the income distribution following health payments referred to as reranking (Abu-Zaineh, 2009).

The proponents of income redistribution in financing health care argue that a progressive health care financing arrangement contingent on the degree of reranking and horizontal inequity associated with it, can give a distorted information about the overall income inequality orchestrated by the health care payments (Ataguba, 2012). They assert that like taxation, health care payments constitute deductions from the income of economic units, which could alter their post-financing distribution. For example, different payments for health by households who have equivalent income will result in a reduction of the redistributive effect of a progressive tax system or health care financing system. Equally, making different payments for healthcare in a regressive financing system could worsen its regressive redistributive effect. This makes the post-payment distribution of income less equal than the prepayment distribution. Focusing only on the progressivity characteristics of the financing system would provide only a partial representation of the degree of fairness present in the health care financing system (Ataguba, 2012).

1.2 Statement of Problem

A critical evaluation of redistribution associated with each source of health care funding is crucial for a developing country like Nigeria with a poverty prevalence rate of approximately 54 percent and the Gini coefficient of approximately 43 per cent. These figures are indicative of the high levels of poverty and income inequality that exist in the country (WDI, 2017). The nation's income distributive share by income quantile revealed that, approximately 49 percent of the nation's income rest with the highest 20 percent of the population, 46 percent of the nation's income with 40 per cent of the nation's population, while only 5 is concentrated amongst the poorest 20 percent of the population (WDI, 2017). These figures further confirm the wide income disparities that exist between the poor and non-poor in the country.

The performance of health indicators in Nigeria has been poor. The average life expectancy for Nigeria was 55 years in 2019,this has been ranked as the third lowest life expectancy figure in the world. This estimate fell below the global and Africa figures of 72.6 and 63 years respectively (UNFPA, 2019). Under-five mortality ratioper 1,000 livebirths in 2018, was 120 deaths (WDI, 2019). This figure was below the Sustainable Development Goals (SDGs) target of reducing under-five mortality to 25 deaths per 1,000 live births (WHO, 2019). About 20 percent of all global maternal deaths occur in Nigeria where the maternal mortality ratio per 100,000 live births was an estimated 917 deaths in 2017 (WHO, 2019). In 2018, the prevalence of the Human ImmuneDeficiency Virus (HIV) was 1.3 percent for the active population aged 15-49 years (WDI, 2019). Despite this poorhealth indicators, public health care funding remains grossly inadequate and private health care payments constitute the largest share of health care financing in the country.

Public health care funding accounts for an estimated 20-30 per cent of total health expenditure in the country. This estimate is lower than that of Ghana where public funding of health care accounts for an estimated 65 percent of total health care expenditure (Odeyemi and Nixon, 2013). In line with the 2001 Abuja declaration, African heads of states pledged that 15 per cent of total government budgetary allocation would be devoted to funding of their respective health sectors (National Health Financing Policy, 2006). Despite this pledge the budgetary allocation to the Nigerian health sector from the period of 1995-2014, did not exceed an average of 6 percent (WDI, 2017). This figure worsened with the reduction in global price of crude oil from an estimated of $ 105 per barrel in the year 2013 to an estimate of $ 40 per barrel in 2016 (OPEC, 2016). This resulted in a reduction in foreign exchange earnings, government revenue and a decline in fiscal spending. Subsequently, in 2016 only an estimated 4.6 per cent of the total budgetary allocation was apportioned to the financing of the health sector. This estimate fell short of the Abuja declaration (Nigerian Health Watch, 2016).

Private health care finance accounts for about 70 to 80 per cent of all health payments in the country (Omotosho and Ichoku, 2016).The growth in private health care financing occurred due to the introduction of user fees in public health care institutions and the poor state of public hospitals. This has led to the increased commercialization of health care services with the private for-profit health care institutions providing more than 70 per cent of all health care services within the country (Frisbe, 2018). These private health care facilities charge exorbitant user fees that are not affordable by the lower income group of the society who are forced to pay for health care out-of-pocket (Ichoku, *et al.,* 2010). These out-of-pocket payments for health care accounts for approximately 69 per cent of health care funding in the country. This estimate far exceeds the 15 per cent threshold beyond which household risk being pushed into poverty (Uzochukwu *et al.,* 2015). Olaniyan*etal.,* (2013) revealed that given the limited public funding of health care, the incidence of direct health care funding in Nigeria rest disproportionately on the poor households. These poor households in comparison to their wealthy counterparts spend about 9 times more of their per capita total expenditure on out-of-pocket health care. This is an indication that inequities could exist in the Nigerian Health care financing system.

Attempts at reducing these inequities prompted the introduction of the National Health Insurance Scheme (NHIS) by the federal government of Nigeria in 2005. The NHIS was established as an inclusive form of financing but its operations are at variance with this objective. Benefits of the scheme accrue mainly to persons employed in the formal sector of the economy. Those working in the formal sector constitute 3 per cent while individuals working in the informal sector comprise over 65 per cent of the working population (Onilude, 2017). Although the NHIS was supposed to promote universal access to health care for all Nigerians, the informal sector workers that comprise a larger share of the nation's population are excluded from the scheme. They do not have access to any form of financial protection and are forced to make catastrophic health care expenditures[1]. These issues create the attendant problem of vertical inequity in the health care financing system. Vertical inequity also occurs because of flat rate insurance co-payment made at point of service. The proportional rates imply that in real terms the poor who are on lower income levels make more insurance contributions as a share of their income than the better-off.

The NHIS of Nigeria is a voluntary social health insurance scheme. The scheme's voluntary nature implies that the healthy and wealthy can opt out of the scheme. Resulting in a limited pool of funds which might not be enough in providing comprehensive benefit packages. Currently the benefit packages provided by the scheme are not wide-ranging. The cost of antiretroviral drugs, treatments of terminal

[1]Catastrophic health expenditure occurs when out-of-pocket payments for health services consume a large portion of household's available income causing such households to be pushed into poverty.

disease such as Acquired Immune deficiency Syndrome (AIDS), cancer, and other diseases such as diabetes, renal dysfunction and hypertension are not covered by the scheme (Odeyemi and Nixon, 2013, Onilude, 2017).Members of the scheme who are on the same income level and suffering from any of these life-threatening health conditions would have to pay for their treatment directly out-of-pocket. Culminating in differential health care payments or horizontal inequity. Reranking would invariable occur because in the absence of savings or avenues for borrowing, the sick may lose their original position on the income distribution. Households risk being pushed below the poverty line or further below it due to the expensive treatment cost and the limited benefit package.

In a bid at expanding the NHIS, the community based health insurance scheme was established in 2010. The scheme, which is targeted at those in the rural areas and informal sector, is yet to become fully operational. The federal government has failed to expand the schemes activities despite the launch of pilot schemes in some states. Most poor households located in the rural communities and working in the informal sector are denied access to the income protection mechanism of health insurance (Omotosho and Ichoku, 2016). These impoverished households are forced to forgo the utilization of health care services and when they choose to seek medical attention due to their worsening health conditions, they are forced to make health care payments beyond their financial capabilities resulting in vertical and horizontal inequities. These inequities adversely affect their socio-economic capabilities in the post-financing period.

Out-of-pocket payments for health care are perceived as detrimental for the poor due to the combination of their greater financial burden and their profound need for the utilization of health care services. Studies on the relationship between socio-economic conditions and health status (Worku and Woldesenbet, 2011; Holst, 2017) have established empirically that those on lower income levels tend to contend with a larger disease burden and need more health care services. This increases their direct spending on health care especially in the case of Nigeria where public health institutions charge exorbitant user fees, prepayment mechanism of health insurance is not widespread and the private-for-profit health institutions provide over 65 percent of all health services in the country (Eme *et al.,* 2014).

The effect of health care financing sources on the household's post payment distribution of income is of immense policy concern because the post payment income is an important determinant of the households' welfare. Empirical evidence reveals that a health care financing mechanism though progressive may be associated with varying levels of horizontal inequity and reranking issues and the presence of these inequities could have harmful effects on the household's well-being after payments for medical services (Abu-Zaineh, 2009; Ichoku *et al.,* 2010). Moreover, illness is random occurrence that can afflict any member of the society irrespective of their socioeconomic circumstance (Wagstaff and Van Doorsaler, 1997; Abu- Zaineh, 2009) and inequities in health care financing could create income insufficiency that may endanger the survival of the household in the post-payment period (Ichoku, *et al.,* 2011). The poor households may be forced to neglect consumption of other basic life necessities such as food, clothing and payment of children school fees or avoid utilization of health care services.

Ultimately, inequities in the post-payment distribution of income induced by health care financing, would aggravate the level of poverty, widen the income gap between the wealthy and the poor and worsen the already poor health outcomes in Nigeria. Thus, this study is an attempt at empirically investigating equity dimensions in health care financing with particular reference to progressivity, horizontal inequity and reranking of the Nigerian health care financing system. This is given the current health care financing policy shift among developing countries, which is focused on eliminating the financial barriers that prevent the poor from assessing the required health care (Holst, 2017).

1.3 Research Questions

Resulting from the statement of the research problem, the questions this study seeks to answer are as follows:

(i) What is the progressivity of health care financing sources across income quantiles in Nigeria?

(ii) What are the estimates of the income redistributive effects of health care financing sources in Nigeria?

1.4 Objectives of the study

The overall objective of the study was to determine the level of progressivity, horizontal inequity and reranking in the Nigerian health care financing system. The specific objectives of this study are to;

(i) Quantify the progressivity of health care financing sources in Nigeria.

(ii) Estimate the income redistributive effects of health care financing sources in Nigeria.

1.5 Justification for the study

The Kakwani (1984) decomposition model assumes that the income redistributive effect of a health care financing system has just two components the vertical and reranking effects. This assumption has been adjudged to be rather restrictive because the income redistributive effect of a fiscal system does not depend only on vertical equity and reranking but also on the level of horizontal inequity (Ataguba, 2012). In Nigeria, given that payments for health care out- of-pocket is the major means of health care financing and the prepayment health care financing mechanism of the National Health Insurance Scheme (NHIS) covers just 3 per cent of the population, horizontal inequities might exist in the health care financing system. To fill this theoretical gap, a variable that measured horizontal inequity which is the weighted sum of the Gini coefficient of post-financing consumption expenditure, was included in the model for estimating the income redistributive effects of health care payments. This was carried out following the approach Aronson Johnson and Lambert decomposition methodology (AJL), which introduced a measure of horizontal inequity in the income redistribution model of taxation.

There exist a number of studies on progressivity in health care financing in Nigeria; Ichoku, (2005), Olaniyan *et al.,* (2013), Lawanson and Opeloyeru, (2016), Omotosho and Ichoku, (2016). These studies utilized the aggregation estimation method and the Kakwani Progressivity Index (KPI) in measuring the progressivity of the health care finance. The Kakwani Progressivity Index is a summary measure of progressivity which does not provide progressivity estimates of health care funding sources across various socio-economic groups in the income distribution. To fill this methodological gap in Nigeria, the disaggregated analysis to measuring progressivity was applied in the study. The disaggregated analysis involves obtaining estimates of the burden of health care funding sources for various income levels on the income distribution. It is also an improvement over the KPI because it allows for testing the statistical significance of the progressivity estimate. The disaggregated analysis was conducted using the Multiple Comparison Estimation Technique (MCET).

Few studies on the interrelationship between progressivity, horizontal inequity and reranking are available in Nigeria. The studies available for Nigeria Ichoku, (2006) and Ichoku *et al.,* (2010) were conducted for just one state in the South-Eastern part of Nigeria. These studies were not representative of the inequity issues prevailing in the country. Two nationally representative studiesare available on the redistributive effect of out- of- pocket in Nigeria these are Ataguba et al., (2019) and Ichoku *et al.,* (2011). Ataguba et al., (2019) utilized the Shapley Value Decomposition approach to analyse how health financing affectsbetween and within group inequality. The limitation of this methodology is that it does not address the issue of inequities in the health care financing sources that eventually produces income inequality. Ichoku et al., (2011) and Onyema et al., (2019)study conducted for the South East zoneof the country examined the vertical and reranking components of income redistribution in health care financing using the Lerman Yitzhaki methodology. This method does not address the notion of horizontal inequity. Considering only the vertical and reranking dimensions of the redistributive effect of health care contributions does not provide an inclusive measure of the inequity issues that might be prevalent in the nation's health care financing system. A comprehensive assessment of the effects of health care financing sources on the distribution of income involves the measurement of vertical equity, horizontal inequity and reranking induced by health care financing sources in the health care financing system (Sanwald and Theurl, 2015). This study provides empirical evidence on the level of vertical equity, reranking, and horizontal inequity present in the Nigerian health care financing system and the resultant income inequality.

Studies on progressivity, horizontal inequity and reranking in health care in Nigeria; Ichoku and Fonta (2006), Ichoku *et al.,* (2010), Ichoku *et al.,* (2011), Onyema et al., (2019), Ataguba et al., (2019) have utilized household's total out- of-pocket health care payment as the measure of health care financing. This study extended the studies conducted for Nigeria by providing empirical evidence on the income redistributive effects of the out-of-pocket health care payment and the health insurance co-payments. This is given the growing need for evidence-based research on the equity implications of the use of the prepayment mechanism of public health insurance as a means of ensuring widespread health coverage and financial protection for all especially the poor in the society (Odeyemi and Nixon, 2013).

The only available national study for Nigeria on income redistribution induced by financing of health care utilized one data set, the Harmonised Nigerian Living Standard Survey (HNLSS) 2009 to obtain estimates of vertical equity and reranking for the out-of-pocket health care payments. This study extended the literature by providing empirical evidence on the components of the income redistributive effect of payments for health care; vertical equity, horizontal inequity and reranking using three rounds of the General Household Survey (GHS) data 2010- 2011, 2012- 2013 and 2015- 2016. These three sets of data are relevant for assessing the trend of changes and dynamics in the components of the income redistributive effects of the payments for health out-of-pocket and the health insurance co-payments. Additionally, these data are important for establishing overtime the extent of inequities induced by these health care financing options and the effect of these inequities on the nation's income distribution. This is relevant for policy formulation regarding ensuring equity, financial and social protection for the poor through health care financing.

1.6 Scope of the study

This study concentrated on measuring the magnitude of health care financing progressivity with emphasis on who bears the burden of health care financing in Nigeria. The study also addresses the issue of the income redistributive effects of health care financing which focused on the issues of vertical equity, horizontal inequity and reranking generated by health care payments and the effect of these inequities on the income distribution.

Two health care financing variables were employed in the analysis. These are the out-of-pocket health care payment excluding insurance because it is the predominant mode of health care financing in Nigeria and the health insurance co-payments made at the point of service. The ability to pay (ATP) measure was the household total consumption expenditure. This study on progressivity of health care financing options was conducted for different income groups in the rural and urban areas of the six geopolitical zones of Nigeria. The study analysed the income redistributive effects of payments in health care for the entire population distribution using three rounds of the General Household Survey (GHS) data 2010-2011; 2012-2013 and 2015- 2016 are employed in the analysis. These sample periods were chosen based on availability of data for the periods and examine the trend of the variables utilized in the study. The Generalized Household Survey (GHS) Panel does not cover the period 2011-2012; 2013-2014.

CHAPTER TWO
LITERATURE REVIEW

2.1 Brief Overview of the Nigerian Economy

Nigeria is a middle-income country located in West African region of Sub-Saharan Africa with an estimated population of 201 million people and an annual population growth rate of 2.5 per cent. 69 per cent of the population live below 1.25 dollars a day (UNFPA, 2019; WDI, 2019). The Nigerian economy is oil dependent with the petroleum industry accounting for 80 per cent of foreign exchange earnings and about 80 per cent of its budgetary expenditure (Olaniyan et al., 2018). The annual GDP growth rate for the year 2000 and 2013 were estimated at 5.3 and 5.4 percent, respectively. The growth of the Nigerian economy has been affected adversely by external shocks, in particular a fall in the global price of crude oil. Growth dropped abruptly from 6.2% in 2014 toa negative estimate of -1.6%in 2016 when the country entered into recession. The Growth rate of the economy improved to 1.8% in 2018 an indication of gradual economic recovery (ADB,2019). Inflation rate increased from 7.8% to an estimated 15.7% between 2014 and 2016. The estimate although maintaining a double digit, in 2019 it declined to 11.37% (WDI, 2019). Slowdown in economic activity has been identified as the major cause of sluggish growth. The reduction in economic activity within the country has been attributed to the inadequate supply of foreign exchange,lack of bank credit for the small and medium scale enterprise activities, rising debt profile, lack of clear policy direction of the central bank. This has resulted in cuts in production and outright downsizing of the labour force in most sectors of the economy.Cumulating in stagflation within the economy and decline in government expenditure on social services, including the health sector. Inequality of income and opportunities continues to rise resulting in high levels of poverty. An estimated 80% of Nigerian still live below 1.25 dollars a day they do not have access to basic welfare services. An indication that inclusive development is lacking in the country (World Bank, 2019).

2.1.1 Overview of the Health Care System in Nigeria

The health caresystem in Nigeria is structured into primary, secondary and tertiary healthcare. Primary healthcare provision is carried out by the Local Government Areas (LGAs), provision of secondary health care is performed by the State Government. The Federal Government has the responsibility for provision of tertiary care, policy formulation and regulation of the activities of all stakeholders in the health sector. Funding of and organization of primary health care has been very poor due to the poor revenue allocation to the Local Government Areas (LGAs) thus, creating a very weak foundation for the Nigerian healthcare system. The federal government primarily performs the funding of the tertiary health care.Over 60 per cent of the government budget on health is spent on defraying salaries and allowances of health workers, leaving little funds for research and development, procurement of new equipment, upgrade of medical services to be at par with the best practices in the world or provision of the needed infrastructure. This has largely hampered the provision of specialised medical care and thus leading to increased patronage of private-for-profit health care providers and creating a huge market for medical tourism in the country (Pharm Access Report, 2015). The private sector provides over 70% of all healthcare services in the country (Frisbe, 2018). Among the private sector providers, pharmacies and patent medicine vendors (PMVs) play a prominent role in providing health care services especially among households in the lower income group.Pharmacies and patent medicine vendorsofferedan estimated 54% of their services to children suffering from malaria, compared to public clinics 28% and private clinics 4% (NDHS, 2018).

The Nigerian health system has been grossly underfunded at all levels. Government spending on health as a share of the gross domestic product (GDP) did not exceed 2 percent (WDI, 2019). This has resulted in decaying infrastructure, lack of modern health equipment and technological expertise, absence of vital specialist services, a continuous decline in the ratio of health workers per population and a loss in the confidence of the health care system regarding the management of the mounting problem of non-communicable diseases (Eme *et al.,* 2014).There are about50 consultant oncologists to over 180 million Nigerians (Omeje, 2018). Specialist care for patients suffering from cancer is only available in seven states of the federation: Sokoto, Kaduna, Ondo, Edo, Lagos, Oyo, and the FCT. There are an estimated 40 neurosurgeons and 50 neurologists in the country these specialists are resident in

Lagos, Abuja, Ibadan and Sokoto also only four forensic pathologists exist in the entire country. Only about 600 consultant paediatricians are available in the country to provide care for an estimated 70 million children (Pharm Access Report, 2015). This very grim statistic has led to a rise in medical tourism in the country.Nigerians who can afford it have resorted to medical tourism especially for surgeries (mostly, orthopaedic and cancer), cardiology, neurology and management of cancers. Nigerians spent an estimated USD260 million on medical bills in India alone and 40% of all visas to India were for medical reasons (Abubakar et al., 2018). The Nigerian Medical Association (NMA) estimates that Nigerians USD1.6 billion yearly on medicaltourism. Besides India, other major medicaltourism destinations forNigerians are Turkey, South Africa, Saudi Arabia, USA, UK and Germany. Key services sought are oncology, orthopaedic surgeries and cardiology(Frisbe, 2018;Pharm Access Report, 2015).

2.1.2 Health Indicators for Nigeria

Nigeria is currently grapplingwith an epidemiological transition of the double burden of disease comprising of both communicable (CD) and non-communicable disease (NCD). Communicable diseases (CD) being the main reason of illness and death(Usoroh, 2012). The Nigerian health sector grapples with some CDs of major public health concern. These include diahorrea, malaria, respiratory problems, human immunodeficiency virus/acquired immune-deficiency syndrome (HIV/AIDS), tuberculosis (TB), meningitis, cholera, and measles (WHO, 2010). Life style alterations in the country has led to the increase in the prevalence of Non Communicable Diseases (NCDs) such as cardiovascular disorders, cancer and diabetes which serve toescalate the disease burden for the nation (Frisbie, 2018).

Overall, the health indicators for the countryhave fallen short of internationally standardsespecially the health targets set for the Millennium Development Goals (WHO, 2014).The country still has some of the poorest health indicators in the worldin spite of the Health Policy Framework and other such health programmes. The health outlook in the country has continued to worsen with attendant corollaries of trauma and death for the lowest income segments whereas, the wealthyopt for medical treatment abroad (Okafor, 2016). Table 2.1 indicates that the average life expectancy of a Nigerian in the 1990s was estimated at 46 years the figure improved in 2005 to 49 years and between the periods of 2010-2014, it was estimated at 52 years. The life expectancy figures improved to an average of 52 years in 2018 (WDI, 2019).

The maternal mortality ratio (this is the ratio of maternal deaths per 100,000 live births) in the 1995 was estimated at 1250 the figure improved slightly in 2005 to 1080 deaths per 100,000 live births and in 2010 the figures were 978 and seven years later the estimate was 917. The Rate of Infant Mortality which (number of children deaths at less than 1 year of age per 1,000 live births) in the 1990s was approximately 125 and between the period of 2000 – 2010 fell from 111 to 84 deaths and with the close of the millennium development goals (MDGs) and the introduction of the Sustainable Development Goals (SDGs) infant mortality reduced further to an estimated 75 deaths in 2018. Under-Five Mortality Ratio isdefined as the number of deaths of children under the age of 5 per 1,000 live births. The Under-five mortality ratio was approximately 200 deaths in the 1990s. Over a ten-year period from 2000 to 2010, it fell by 30 per cent but declined slightly between the periods of 2011-2018 to an estimated 119 deaths. According to the World development indicators (2019), the HIV prevalence (% of the population aged 15 -49 years) stood at 1.7 % in 2000 and between the period of 2010- 2018 figures fell marginally from 1.6% to an estimated 1.5%.

Wide regional disparities exist in health indicators across the various geopolitical zonesof the country. Infant and under-five mortality figures were highest in the North West zone (80 and 187 deaths respectively per 1,000 live births) while these estimates were lower in the South West (43 and 62 deaths per 1,000 live births respectively) (NDHS, 2018). These indicators clearly depict an obvious shortfall in the realization of the health-related Sustainable Development Goals and targets of reducing child and maternal mortality, combating HIV/AIDS, tuberculosis and malaria(Okafor, 2016).

Table 2.1: Health Indicators for Nigeria

Year	Life expectancy	Maternal mortality ratio (per 100,000 live births)	infant mortality rate (per 1,000 live births)	Under five mortality rate (per 1,000 live births)	Prevalence of HIV, total (% of population ages 15-49)
1990	46.11	1350	125.90	210.9	0.7
1991	46.09	1320	125.80	210.5	0.9
1992	46.07	1300	125.50	209.8	1
1993	46.07	1280	125.10	209	1.2
1994	46.09	1270	124.40	207.8	1.3
1995	46.11	1250	123.40	205.9	1.4
1996	46.16	1250	121.90	203.3	1.5
1997	46.22	1240	119.90	199.6	1.6
1998	46.32	1220	117.50	195.2	1.7
1999	46.44	1200	113.70	192.1	1.7
2000	46.62	1200	110.9	184.8	1.8
2001	46.88	1200	107.8	179.2	1.8
2002	47.22	1180	104.8	173.4	1.7
2003	47.64	1170	101.6	167.5	1.7
2004	48.13	1130	98.6	161.7	1.7
2005	48.67	1080	95.6	156.2	1.7
2006	49.24	1040	92.8	151.1	1.6
2007	49.81	1010	90.2	146.3	1.6
2008	50.36	996	87.9	142.0	1.6
2009	50.87	987	85.9	138.3	1.6
2010	51.33	978	84.1	135.2	1.6
2011	51.74	972	82.7	132.5	1.6
2012	52.11	963	81.5	130.5	1.6
2013	52.44	951	80.5	128.6	1.6
2014	52.75	943	79.6	126.9	1.6
2015	53.11	931	78.7	125.4	1.6
2016	53.54	925	77.9	123.9	1.5
2017	53.95	917	76.9	122.1	1.5
2018	54.50	-	75.7	119.9	1.5

Source: World Development Indicators and Global health observatory (GHO), 2019.

- indicates that the estimates for the maternal mortality ratio are not currently available.

2.1.3 The Structure of Health Care Financing in Nigeria

The major sources of funding for the health sector in Nigeria are revenue accumulated through direct and indirect taxation collected by the Federal, State and Local Governments, private health insurance, social health insurance, out-of-pocket health care payments and donor contributions (Uzochukwu *et al.,* 2015). Evidence from the National health accounts of Nigeria report revealed that public funding for health care was an estimated 24 per cent of the entire health care funding in Nigeria. The federal government allocated an estimated 12 per cent of the nation's budget to the health sector, while the states and local governments combined allocated an estimated 12 per cent of their budgetary allocation to funding of health care sector. The private sector health care funding was approximately 76% of which out-of-pocket health care payments by households accounted for an estimated 69 %. Firms and donor financing accounted for 4 percent and 3 per cent of overall health care funding in Nigeria (Uzochukwu *et al.,* 2015; Soyibo *et al.,* 2009).

The overriding objective for providing universal health care (UHC) is to ensure that individuals irrespective of their socio-economic status have access to propermedical services without having to make substantial out-of-pocket payments. This can be achieved through pooling of financial resources from either tax or public health insurance premium (Uzochukwu *et al.,* 2015). In 2005, the federal government in Nigeria, launched theNational Health Insurance Scheme (NHIS) as a means of providing universal health care coverage for Nigerians. Since the launch of the scheme, only those employed in formal sector, an estimated 3 million Nigerians have been registered. The NHIS contribution to health care financing in Nigeria is about 2 per cent of total health expenditure. The NHIS performance has been hindered by poor coverage and restrictive benefit packages. Plans to expand the national health insurance scheme at both the state and community levels to cover state government workers, those employed in the informal economy and rural areas has remainedrelatively slow. The coverage of community based insurance scheme has been affected by low enrolment rate, premium unaffordability and lack of confidence in the fund's managers (Omotosho and Ichoku, 2016).

The private health insurance scheme (PHI) which is a voluntary prepayment mechanism, covers an estimated 1 million Nigerians and provides approximately 4 per cent of overall health care spending in Nigeria (Uzochukwu *et al.,* 2015).

The pattern of health care funding in Nigeria where an estimated 69 percent of overall health care funding is out-of-pocket possess a major limitation in the nation's bid to achieve universal health care coverage for all Nigerians. With the attendant user fees charged at Nigerian public and private hospitals and absence of effective prepayment mechanism poor households might be further impoverished due to direct payments for health care. Culminating in poor health seeking behaviour and widening of the income gap between poor and non- poor in the country.

2.1.4 Core Indictors of Evaluating Health Care Financing Performance in Nigeria

The core indicators for evaluating health care financing performance are grouped into the following categories based on the World Health Organisation recommendation (WHO, 2000).

i. Indicators that provide information on overall availability of funds:
   - Total government health expenditure as a proportion of gross domestic product.
   - Total health expenditure as a proportion of gross domestic product.
   - Government health expenditure as a proportion of total government expenditure.

ii. Indictors that provide information on the extent of financial risk protection:
   - The ratio of household out-of-pocket payment for health as a proportion of total health expenditure.
   - The ratio of household out-of-pocket payment for health as a proportion of private health expenditure.

Government spending on health as a percentage of total government spendingshown in table 2.2, was an estimated 5.9 per centbetween the years 1995- 2005. Despite the rise in oil prices in the year 2014, government budgetary allocation to the health sector was only 3.5 percent of its total budgetary provision. The decline in the global price of crude resulted in a decline of the estimate to 5 per cent in 2016. Theseestimate fell short of the 15 per cent of government budgetary provision for health agreed upon during the African Union Abuja declaration of 2001.Government health expenditure as a percentage of GDP over the twenty-year period (1994-2016) did not exceed 1 per cent as against the 12 percent threshold endorsed by the Commission on

Macroeconomics and Health (Sachs *et al.,* 2001). Overall health spending as a percentage of GDP, between the periods of 1995- 2005 was an estimated 3.5 per cent. In 2016, it rose slightly to 3.7 per cent.In Nigeria, out- of- pocket expenditure comprises the majorshare of overall expenditure on health. It constituted an estimated 68per cent of the total expenditure on health between 1995 and 2016. This figure further confirms that out-of-pocket payment for health constitute the major source of healthcare financing in Nigeria especially when compared to government expenditure as a share of total health expenditure which was an estimated 29 per cent for the same period.

Furthermore, out-of-pocket payment for health between the periods of 2005-2016 constituted the bulk of private health care expenditure approximately 95 per cent of private health care expenditure. This trend of out-of-pocket expenditure for health constituted the greater part of health care financing in Nigeria and could invariably culminate in poor health seeking behaviour and inequality in the income distribution.This often poses serious problems to the poor when specialised care which are rather expensive are needed by them. (WHO, 2012; Wagstaff and Van Doorsaler, 2000).

Table 2.2: Core indictors of evaluating health care financing performance in Nigeria(1995-2014)

Year	Government health expenditure (% of GDP)	Government health expenditure (% of Total government expenditure)	Total Health expenditure (% of GDP)	Government Health expenditure (% of total health expenditure)	Out-of-pocket health expenditure (% of total expenditure on health)	Out-of-pocket health expenditure (% of private expenditure on health)
1995	0.66	6.09	2.77	23.76	72.09	94.55
1996	0.60	6.09	2.92	20.59	75.23	94.74
1997	0.72	6.09	2.92	24.61	71.31	94.59
1998	0.91	6.09	3.47	26.14	70.17	95.00
1999	0.98	4.46	3.38	29.12	67.16	94.76
2000	0.53	2.15	2.84	33.46	72.93	92.65
2001	0.53	1.70	3.25	31.35	74.31	91.39
2002	0.33	1.71	2.43	25.58	77.23	90.43
2003	0.59	2.54	4.05	22.40	83.14	96.22
2004	0.82	4.47	4.33	32.69	75.05	95.34
2005	0.68	3.57	4.11	29.17	77.73	95.80
2006	0.71	5.77	3.66	32.94	77.38	95.62
2007	0.85	4.72	4.47	32.92	73.23	95.83
2008	0.83	5.79	4.00	36.77	72.54	95.66
2009	0.65	4.20	4.24	31.28	75.62	95.80
2010	0.45	2.69	3.47	26.18	77.75	95.67
2011	0.48	2.76	3.69	31.23	75.43	95.66
2012	0.54	3.87	3.30	31.32	73.43	95.53
2013	0.49	3.66	3.70	23.83	71.42	95.77
2014	0.45	3.52	3.67	13.15	72.29	95.74
2015	0.59	5.32	3.57	16.48	72.08	95.72
2016	0.47	5.01	3.65	13.02	75.21	95.73

Source: World Development Reports, 2017 and 2019.

2.1.5 Sources of Health Care Funding in Nigeria

On average, most states in the country spendno more than7 % of their total budgetary allocation on healthcare this is shown in figure 2.1. Funding for health care from federal government amounted to an estimated 12%.The state and local governments combined also allocated an estimated 12 per cent of their budgetary allocation to funding of health care services. Consequently, total government expenditure accounts for about 24% of total health spending in the country. The remaining health care funding of approximately 76% was provided by the private sector of which out-of-pocket health care paymentsby households accounted for 69 % of total health care funding. Firms and donor expenditure accounted for less than 10% of health care funding (Uzochukwu et al., 2015).

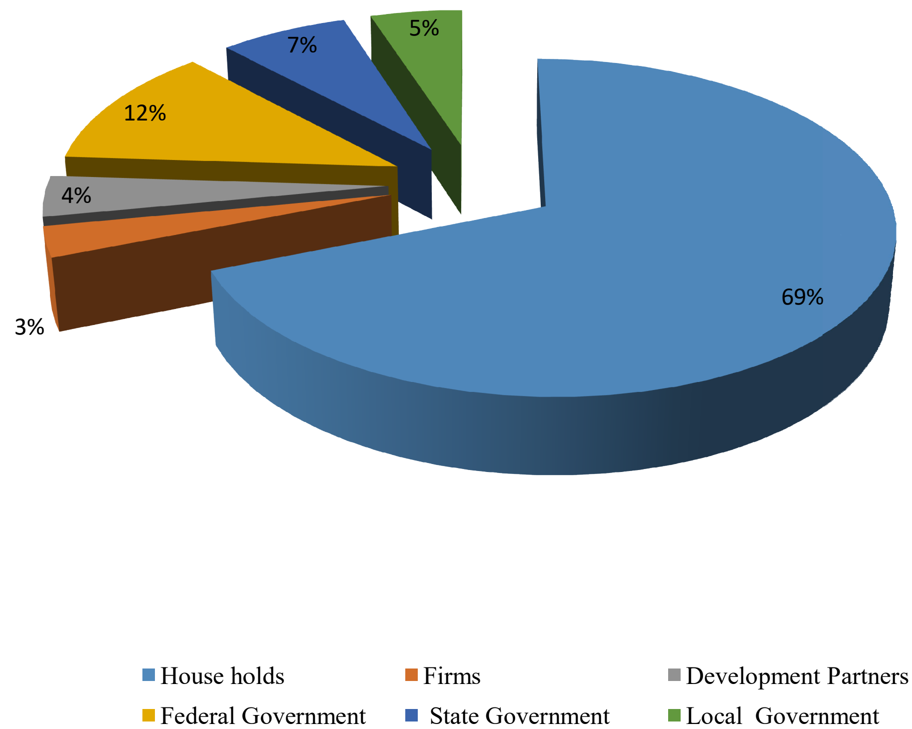

Figure 2.1: Sources of health care funding in Nigeria

Source: National Health Accounts main report (Soyibo et al., 2009).

2.1.6 Sources of fund for health care among Nigerian households

The disaggregated breakdown of the sources of funding for health care by Nigerian households for the year 2010-2011,is presented in Table 2.3a.The estimates confirm that approximately 79.9 percent of all health care funding come from the household. From this estimate 45.8 percent was contributed by the male individuals, and 23.8 percent by the female. Across the zones the largest households' health care payment (93.6 percent) was from the South West (Male 54.6 percent and Female 38.0 percent) and the least funding (44.4 percent) was from the North East (male 36.6 percent and female 7.8 percent). Male parent on behalf of their sick children contributed 47.3 percent and the mothers contributed 40.3 percent.Employer's contribution was an estimated 0.2 percent and the government contribution was nil. Private health insurance contribution to household health care expenditure was nil.

Table 2.3b,provides the disaggregated estimates of the source of funding for health care by households for the period 2012-2013. The findings indicatedan increase of 1.25 percent in the household contribution to the funding of health care to 80.9 percent. The contribution by the male parent rose slightly by 1.3 percent to an estimate of 48.6 percent while the contribution by the female parent was 40.8 percent. Across the zones, household's funding of health care was greatest in the South West 87.2 percent (Male 50.1 percent and Female 37.1 percent) and least in the South East 27.6 percent (Male 0.3 percent and female 27.3 percent). Employer's and government contributions were nil. Private health insurance contribution was only 0.1 percent. These estimates confirmed that the bulk of funding for medical care in the country comes from the households.

Households provided approximately 78 percent of funds for health care with the male contributing 42.1 percent and the female 26.3 percentas shown in Table 2.3c. The findings also reveal that in the North East households contributed the least expenditure among the zone 42.8 percent (Male 35.6 percent and Female 7.2 percent)towards defraying the cost of health care while households in the South East contributed the most 82.7 percent (Male 44.6 percent and Female 28.4 percent). Employers contributed 0.3 percent to the health care funding in the country.

Table 2.3a:Sources of fund for health care among Nigerian households (2010-2011)

	North central		North East		North West		South East		South South		South West		Nigeria	
	Male	Female	Male	female	Male	Female	Male	Female	Male	Female	male	female	male	female
Self	44.8	20.2	36.6	7.8	43.3	7.8	44.4	32.1	47.2	27.9	54.6	38.0	45.8	23.8
Spouse	1.7	30.5	1.6	35.7	1.5	34.3	2.2	19.1	1.0	23.3	1.3	21.2	1.5	26.4
Parent	49.4	44.5	58.7	51	52.4	49.7	43.6	33.1	47.2	41.2	37	28.7	47.3	40.3
Other relative	3.5	3.7	2.2	4.1	2.6	6.7	8.4	13.2	2.9	4.8	5.6	10.1	4.3	7.6
Employer	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.2	0.5	0.2	0.3	0.1	0.2
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.2	0.1	0.0
Private Health	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.2	0.9	0.6	0.9	0.2	1.2	1.2	2.5	1.4	1.9	1.1	1.6	0.8	1.6

Source: General Household Survey Panel Report 2010/2011

Table 2.2b: Funding for Health Care Among Nigerian Households (2012 -2013)

	North central male	Female	North East male	Female	North West male	female	South East male	female	South South male	Female	South West male	female	Nigeria male	female
Self	43.5	18.3	36.3	11.9	42.6	12.14	0.3	27.3	46.4	30.7	50.1	37.1	44.6	26.3
Spouse	1.4	30.2	1.9	28.8	1.3	37.9	1.3	16.0	1.6	19.0	0.7	18.1	1.3	23.2
Parent	52.8	46.2	56.5	50.5	51.6	45.2	45.5	33.8	47.7	41.2	44.1	36.7	48.6	40.8
Other relative	1.7	4.2	4.1	7.5	4.0	4.3	11.8	20.5	3.9	7.1	3.5	6.2	4.7	8.2
Employer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Private Health	0.0	0.0	0.1	0.0	0.0	0.2	0.6	0.4	0.0	0.0	0.0	0.0	0.1	0.1
Other	0.7	1.0	0.0	0.3	0.0	0.2	0.5	2.1	0.3	1.6	1.1	1.3	0.5	1.2

Source: *General Household Panel Report 2012/2013*

Table 2.3c Funding for Health Care Among Nigerian Households (2015 -2016).

	North central Male	Female	North East male	Female	North West male	female	South East male	female	South South Male	Female	South West male	female	Nigeria male	female
Self	42.7	23.8	35.6	7.2	39.4	9.6	44.6	38.1	44.1	28.4	44.6	28.6	42.1	26.3
Spouse	1.5	25.2	0.5	31.2	1.0	40.3	1.4	11.4	1.2	18.9	1.3	20.0	1.2	23.2
Parent	51.1	44.0	58.1	51.6	53.8	45.0	44.8	34.8	48.0	43.3	47.5	42.2	50.2	40.8
Other relative	4.4	5.6	5.6	9.6	4.2	4.5	7.4	13.2	3.6	5.7	4.3	8.5	4.8	4.8
Employer	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	12	0.3	0.3	0.3
Government	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Private Health	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.3	1.0	1.0	0.4	0.2	0.2	1.4	2.3	0.2	1.7	1.1	0.4	0.6	0.6

Source: *General Household Panel Report 2015/2016*

2.1.7 Absolute and Relative Out-of-Pocket Health Care Expenditure by Quintile.

Figure 2.2 shows the mean out-of-pocket expenditure by quintiles of household consumption expenditure. The lowest income quintile had the lowest out-of-pocket expenditure for the three-year period it was on the average N 2,200.00. It fell to a mean value of N 1,330.0 in the second period. By 2015-2016, it rose slight to an average of N1,900. These figures rose slightly for households in the second quintile. In 2010-2011, the mean out-of-pocket for the second income quintile was an estimate of N 4,440. It fell to about N4,000.0 in the second period and by the third year it rose marginally to an average of N 4,500. On the average for the 5th quintile the highest out-of-pocket expenditure was N 25,677.3.In the first period the mean out-of-pocket payment was N26,941. The estimates fell marginally to N 24,704.6 and N 25,387.6 respectively in the second and third periods. On the average the out-of-pocket payment for the entire income quintiles were N 9, 900, N 9, 33.4 and N 9, 656 respectively.

Interpreting these estimates could be misleading because the results suggest that the upper income quintiles were spending more in absolute term than the lower income group on direct funding of health care. It is necessary to assess the share of pre-payment income that is spent on out-of-pocket payment by each quintile to have an insight into which income group pays more for health care as a share of their income.

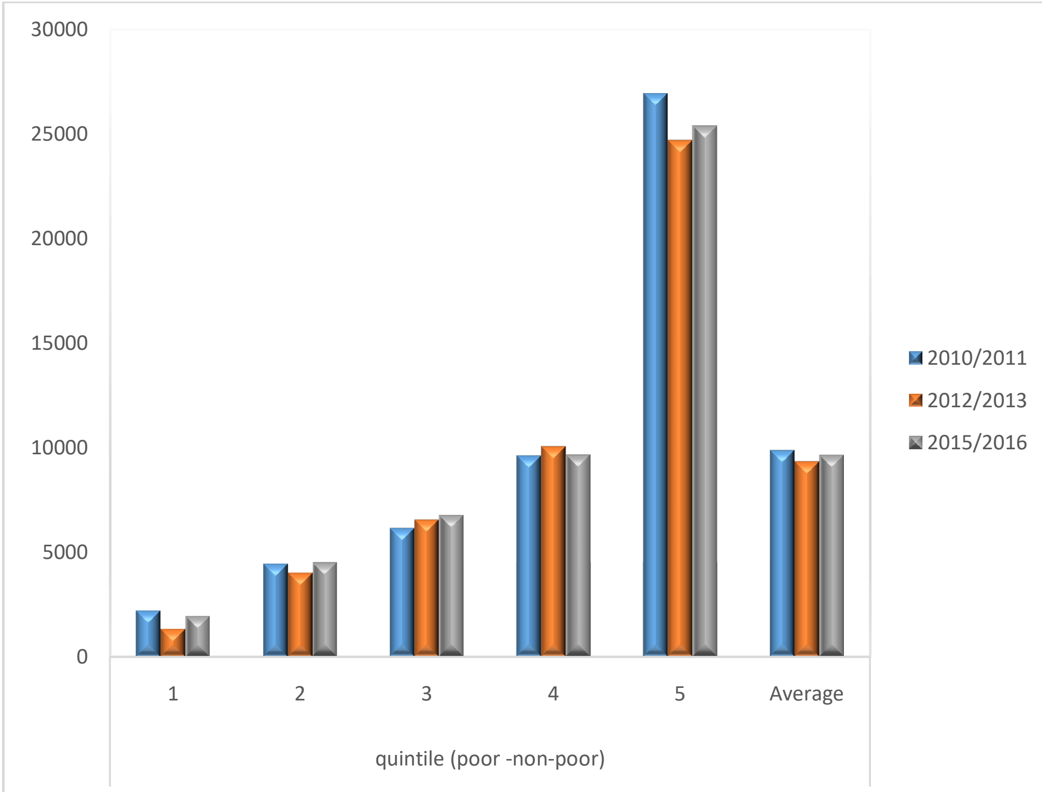

Figure 2.2:Household mean out-of-pocket payment by quintile

Source:*Author's Compilation from General Household Survey(GHS) various years.*

Note:*The quintiles groupings are based equivalised household consumption expenditure; where 1 = Lowest income quintile; 2 = Lower income quintile; 3 = Middle income quintile; 4= Higher income quintile; 5 = Highest income quintile.*

Figure 2.3contains the household out-of-pocket payment as a share of total household consumption expenditure by quintile. Figure 2.5 reveals that on the average for Nigeria the lowest income quintile spent more on out-of-pocket health care payments as a share of its consumption expenditure. The mean out-of-pocket payment as a share of prepayment income for the lowest income group was 30.7 per cent and this value was approximately three times the portion of prepayment earningsexpended on direct healthcare payment by the highest income group estimated at 11.8 per cent for the three-year period.

In 2010-2011,the lowest income group expended approximately 9 percent of the household consumption outlay on out-of-pocket payments for healthcare. The 4th and 5th quintiles spent 6 percent and 5 percent of their consumption expenditure on out-of-pocket payments. In 2012-2013, the share of direct payment in consumption expenditure had risen for all quintile groups. It was 39 percent, 20.5 percent and 12.6 percent for the first, third and fifth quintiles respectively. This estimates confirmed that households in quintile 1 (the lowest income group) had the largest share of their consumption expenditure spent on direct health care payments. There was a considerable rise in the share of consumption expenditure spent on direct health care payments in 2015-2016. The 1st, 3rd and 5th quintiles spent 44.4 percent, 23.5 percent and 17.4 percent respectively of their household consumption on out-of-pocket payments for health.

These findings overall indicate the presence of inequities in the Nigerian health care financing system. The burden of health care contributions through out-of-pocket payment is borne primarily by the lower income group who spending proportionally more of their earnings on payments for healthcare service than the higher wage groups.

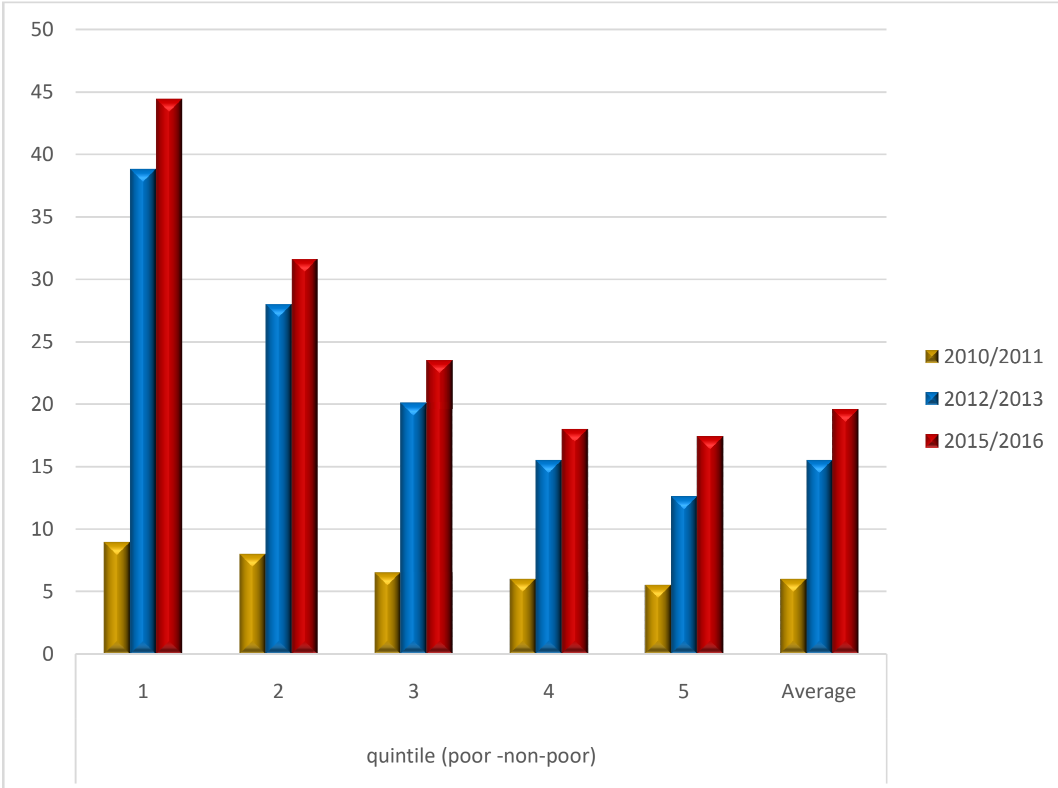

Figure 2.3:Household out-of-pocket payment as a share of total household consumption expenditure by quintile

Source: *Author's Compilation from General Household Survey(GHS) various years.*

Note:*The quintiles groupings are based equivalised household consumption expenditure; where 1 = Lowest income quintile; 2 = Lower income quintile; 3 = Middle income quintile; 4= Higher income quintile; 5 = Highest income quintile.*

2.1.8 Income Inequality in Nigeria

Bakare(2012) addressed the issue of income inequality as a phenomenon which arises when wagegottenwithin a specified period, particularly as payment for work or interest on investment in different sizes, degrees or circumstances differ resulting in unfair difference in income ranking. Graham (1995) further defined income inequality as divide that exist between the rich and poor. The low-income group is generally identified with poverty, health care deprivation, unemployment or under employment and low level of education and even illiteracy. The high-income class is often characterized by access to adequate and affordable health care and education, absence of poverty, while the middle group shares those characteristics between the low and the higher income group. Subramanian and Kawachi (2004) opined that income inequality may result in insufficient access to medical care culminating in poor health outcome. The World Health Organization (2001) revealed that mild health conditions in general get complicated due to lack of finances to seek immediate and necessary medical care. Consequently, poor households' resort to self-medication/herbal concoctions or may utterly forsake seeking care which may result in death.

Adegoke (2013) attest that Nigeria is one of the most unequal countries in the world. The poorest half of the population controls only 10% of the national income. The unequal income distribution is largely attributable to unequal opportunities in the following areas such as health, education, employment, ethnic and religious disparities as well as diverging political ideology and unequal access to productive resources.

Table 2.4 shows the pattern of income distribution in the country from 1985 – 2009. It clearly shows for the period under review that wide income disparities exist among the socio- economic groups. The bulk of the national income is concentrated in the hands of the richest 20 % of the population. In 1992, 49.32 percent of the national income was concentrated with the richest 20 per cent of the population. This estimate was 16 times more than the income concentrated in the hand of the poorest 20 per cent of the population (3.98 percent). In 2003 and 2009 years,46.04 and 48.99 percent of the nation's incomerested with the richest 20 per cent of the population. These estimates were nine times more than the income share concentrated in the hand of the poorest 20 per cent of the population, which declined from 5.67 percent in 2003 to 5.37 percent by 2009.The Gini coefficient, which is a measure of income inequality declined from

44.98 percent in 1992 to 40.06 percent in 2003. The income gap between the poor and non-poor worsened with a rise in the estimate of the Gini coefficient in 2015, to 54 percent.

Table 2.4: Income distribution share by income quantiles and Gini index for Nigeria

Quintile Share of total income	(%) share in 1985	(%) share 1992	(%) share 1996	(%) share 2003	(%) share in 2009	(%) share in 2015
Q1 (Lowest 20 %)	6.02	3.98	3.66	5.67	5.37	-
Q2	10.41	8.93	7.72	10.37	9.70	-
Q3	15.52	14.37	12.3	15.4	14.36	-
Q4	23.04	23.41	19.79	22.53	21.58	-
Q5 (highest 20 %)	45.01	49.32	56.52	46.04	48.99	-
Gini coefficient for Nigeria	38.68	44.98	51.92	40.06	42.97	54.3

Source: World Development Indicators Statistics (WDI, 2019).

- Indicates that the values are not available in the data base.

2.1.9 National Health Care Policies for Nigeria

The mainthrust of the Nation-wide Health Policyregardingthe finance of medical care is to broadenfunding options for medical care and increase the contributions of the private sector and ex-antesources offunding. Focus is on community and household involvement in community-centredprograms for the sponsoring of primary healthcare. A practicalapproach required for promoting the development of effective healthcare financing is thePublic-Private Partnerships. Targeted approachincludesgiving more attention to primary health care (PHC) activities, increasing government funding of health activities, and promoting allocative efficiency through the redistribution of resource amongst various levels of healthcare.

National Health Financing Policy

The Federal Ministry of Health articulated a nation-wide health financing policy in 2006.The policy objectives include stimulate fairness, ensure that quality and reasonably priced medical care is available, and to promote a high amount of proficiency and responsibility in the system through the development of anequitable and sustainable financing system. The policy's primary goal is to make funds available and effectively distributed to the health sector. Thus, ensuring accessible, reasonable, proficient, and unbiased health care delivery and consumption (Uzochukwu et al, 2015). The fundsgathering and pooling methods to expand the financial space while promotingequitable financing, involving risk protection of the vulnerablepoor populacecomprises of the following:

- In line with the 2000 Abuja declaration federal, state and local governments are mandated to set asideat least 15% of their entire budget to health sector.
- Expand the NHIS through the introduction of the SHI and CBHI schemes in order to cover 70 percent of the population, as anapproach toachievingaccess to health for the poor.
- Provide under the NHIS,plans for launching health insurance schemes in various states.
- Provide support for the development of private health insurance
- Carry out activities to scale up universal coverage by categorisingand upgrade of fundingprogrammesthrough drug revolving fund schemes, deferments andexceptions.

- Synchronization of partnerships and peripheral supportfor health financing.
- Reduce the burden of out-of-pocket bypromoting funding of specific disease interventions.

National Strategic Health Development Plan (2010–2015)

National Strategic Health Development Plan commonly referred to as the National Health Plan, reveals shared desire to develop the Nigerian health system and to improve the health of the citizenry. The plan is the principaloperationalmanual for all stakeholders, which ensures that everyoneis responsible for achieving the set aims and benchmarksspelt out in the document. The health plan, which was also outlined following the principles of the National Planning Commission Vision 20:2020,is the reference material for the health sector medium term policy, its yearlyfunctioningoperations and budgetary planning (Uzochukwu et al, 2015).

The primary objectives are:

- To ensure that health financing strategies at federal, state and local levels are developed and implemented in consonance with the National Health Financing Policy
- To protect the populace from the impoverishingeffects of health care payments.
- Promoting equity and efficiency in the distribution and utilization of resourcesfor the health sector.
- To secure the needed funds required for achieving the desired developmental goals of the all levels of the health sector.

The National Health Act

The National Health Act was signed into law in 2014.Typically, the Act establishes anagenda for the regulation, expansion and the organization of the health system inNigeria.It provides a basis for identifyingsources for financing secondary and primary health care delivery in the country (National Health Act, 2014). The National Health Act is supposed to ensure increased funding for primary health care activities in Nigeria. the fund will be financed majorly from The Consolidated Fund of the federal government, international donors are to contribute not less than one percent of the funds. Included in the National Health Act is The Basic Health Care Provision Fund generally referred to as the “FUND”. The Basic Health Care Provision is expected to provide funding for health care activities in Nigeria. 50 per cent of the fund is expected to be disbursed for the delivery of "basic minimum package" of medical services to all citizens, in authorised primary and secondary health institutions through theNHIS. 20 percent of the fund will be utilized in the procurement of necessary medications, vaccines and consumables for qualified primary health care facilities. 15 per cent of the fund shall be allocated for the acquisition and upkeep of amenities, equipment and transportation for primary healthcare.10 per cent of the fund will be employed in the training of medical personnel for primary health centres; and 5 per cent of the fund shall be utilized for National Health Emergency and Epidemic Response. Funds will be allocated by National Primary Health care development agency through the states and Federal Capital Territory primary care boards for disbursement to local governments and area council health establishments (National Health Act, 2014).

2.2 Review of Conceptual Issues

2.2.1 Equity and Inequity

The notion of equity has been defined in various ways by diverse people. As expressed in the words of Hodgson (2010) *"*Equity is a subjective concept, capable of different interpretations depending on the moral and ethical frame work, the experiences and the understanding of the person making the interpretation". There are differences in the political, philosophical and economic perspective of equity and their implications because the concept of equity is generally characterised by principles and judgments. Although several definitions leave an open interpretation to equity allowing for several perceptions, the majority take an egalitarian standpoint of social justice (Hodgson, 2010). Equity with the sphere of health can be generally defined as "the extent to which differences or inequalities in health are reduced in the population", (Aday, *et al.,*1980). It also refers to providing to medical care based on need and not individual's capacity to pay (WHO, 2000).

Within the field of economics, equity is a normative subject founded on the principle of distributive justice, fairness, egalitarianism and altruism. Equity can simply be defined as the pursuance of fairness, in assess to and distribution of resources required for welfare. Much emphasis is placed on "access" and the "fair distribution" of economic welfare and benefits from health according to the needs of everyone within the society. Inequity simply means the absence of equity. Inequity occurs when health care assets are unevenly and unjustly allocated based on socioeconomic and income status ensuring in inequalities within the particular society. Inequity in health care implies that health resources are unfairly or unjustly distributed and utilized based on income and socio economic standing as well as demographic factors and on the basis of need (Ngahargbu, 2016). Inequity is further, defined as distinctions that are preventable also seen as prejudicial and unfair (Whitehead, 1985).

2.2.2 Equality and Inequality

Equality connotes equal distribution of resources such that everybody has similar amount of resources regardless of their different needs. Equality in health care implies that each person has the similar access to medical services and providers irrespective of their ability to pay and differences such as – different health care needs, ethnicity, religion and gender which could act as an obstacle to receiving care (Culyer, 2001). The notion that equality promotes similar access to care for all and assumption that all have similar health status would imply that those that face socio economic disparities which contribute to inequities and poor standard of living and varying degrees of ill health, should be giving the same treatment as those who are relatively well-off. This would create an aberration because those population groups facing varying level of socio economic and political disadvantages resulting in poverty and its attendant presence of diseases would invariable require more health and health related services such as access to safe drinking water, affordable housing, nutritious food, clean and pollution free environment. This connotes the concept of equity. Ensuring that individuals have what they need in order to sustain their health and welfare.

Subsequently, the notion of equality is seen more as an ideal because a society in which all people are treated as same equals can only be found in a "utopian" egalitarianism proposed by philosophers such as Karl Marx. The question of equity is generally pursued rather than equality as an ideal. Modern egalitarian theorist advocated for an equitableallocation of income, wealth and resources instead of the unrealistic notion of equal distribution (Hodgson, 2010). Conversely, the notion of inequality or economic inequality is defined as the disparities in the distribution of income, wealth and resources or capabilities within a society. Inequality captures absolute differences in health care financing utilization between individuals and population. Specifically, income inequality refers to the disproportionate distribution of the overall national income among households (Todaro and Smith, 2011).

2.2.3 Health and Health Care

Health can be defined as the absence of abnormal physiological function. Health is also conceived as a state of comprehensive physical, mental and social well-being and not just the lack of disease and illness-health (WHO, 2017). Health care is defined as the preventive, curative and community care that exists to achieve or maintain health of the population. It is a collective good from which all citizens of the country are expected to benefit regardless of their distinct curative and preventive care needs. From the classical economic thinking, healthcare is generally seen as a commodity which can be sold and purchase in the market. There are arguments that market provides incentives that allow more efficiency in the utilization of healthcare services and of funds allocated for health. There are four different levels of healthcare. These are preventive, primary, secondary and tertiary healthcare.

Preventive health focuses on healthy lifestyles and measures to prevent diseases and disability. It is provided through health education and/or public health services. Primary care can be defined as care of persons with regular ailments and protracted health conditions that can be handled at home or through intermittent visits to community health facilities. It is provided by personnel of health facilities located in the communities, out-patient departments and health departments of institutions and many workplaces. Secondary care covers the delivery of specialised medical care (either diagnosis or treatment) by a specialist. This is done by referral from a primary care institution. It comprises of carefor acute health conditions and emergency treatment. Finally, tertiary care covers treatment of individuals with intricate health conditions. It involves referral from either a primary or secondary health institution. Tertiary health care providers are health personnel with speciality in a specific aspects of medicine.

2.2.4 Health Care Financing and Health Care Expenditure

The modes of government health financing are general tax (direct and indirect taxes) and earmarked tax for health.Government taxes are used commonlyto finance health care services in public hospitals. The government uses general tax revenue to subsidize entirely (or almost- entirely) the cost of services in public hospitals and public clinics but if the patients are willing and able to pay more, they can seek services at higher levels that may have better quality and amenities. Governments may designate a specific tax for health. For instance, taxes on the sale of cigarettes could be allocated to cover certain cost of treatment (Preethi, 2017).

Traditionally, government health insurance is financed throughcompulsorypremium contributions made by employed workers which is a proportion of their salaries, and their employers making contributions for their employees. The premium ensure that those who are covered are eligible for a variety of benefits. In some cases, beneficiaries in addition to their premium contributions may be required to make co-payment for services received. Public insurance premiums and accruing remunerations are detailed in contracts enactedby law. Premiums and remunerations following can only be changed by a proper legislative procedure (Onilude, 2017).Both non-profit and for-profit insurance companies/plans offer health insurance to private individuals. Private hospitals or facilities can offer health insurance policies to cater for the health care requirements of those purchasing their cover. Beneficiariesare at liberty to select insurance plans that are tailored to meet their specific needs. Private insurance is available at an individuals and group level.

Out-of-pocket is the oldest of the financing methods. It is a voluntary mode of health financing where patients often pay directly out-of-pocket when they obtain health services either from public or private facilities. The amount of fee to be paid is often guided by certain principles; the amount can be the full charges, a co-payment - a flat amount allotted for each visit, and coinsurance (where patients are responsible for paying a percentage of full charge). Direct out-of-pocket payments are prevalent for services remedial care provided by private providers. Private sector providers rely on patients' direct payments for income (Uzochukwu *et al.,* 2015).

Health expenditure can be defined as the amount spent by individuals, groups, nations or private or public organizations for overall health care and itsseveralaspects. These expenditures might or might not be comparable to the exact cost of wellbeing, and it can or will not be distributed among patients, insurers and employees. Health spending refers to expenditure on goods and servicesthat enhance wellbeing. These costsare incurred bydiverse governmental agencies, non-governmental agencies including individuals and private health insurance companies (Preethi, 2017).

Overall, expenditure on healthis defined as the summation of both public and private costs. It includes the provision both curative and preventivemedical services, family planning programmes and emergency health assistance. Public health expenditure refers to all recurrent and capital spending on health by central and local governmentfrom government budgets, external borrowing and grants (such as donations from non – governmental agencies and international organizations) it also comprises social insurance contributionswhere services are paid for by taxes, or compulsory health insurance contributions either by employers or insured persons. On the other hand, private health insurance consists of all voluntary health care payments made by individuals and private organizations such as private health insurance and out-of-pocket health care payments.

2.2.5 Types of Equity in Health Care Financing

Issues on equity in health care financing are classifiedinto the distributive and redistributive dimensions. The distributive aspect addresses the issue of vertical equity. The redistributive component of equity in health care financing extends the concept of vertical equity to address the issues of horizontal inequity and reranking induced by health care payments.

Vertical Equity or Progressivity in Health Care Financing

Within the contextof progressivity two main issues arise, firstly the egalitarian perspective that health care be financed according to the capacity to pay and secondly that income groups of dissimilar ability to pay make appropriate dissimilar health care contributions. The concept of vertical equity draws attention to what the specific magnitude of the "differential treatment of unequals" should be and this gives rise to certain fundamental questions; should individualswho earn more income pay more in relative terms? Should the relationship between health care payments and income be progressive? Or should they be made to pay moreas a whole?Therefore, can an ability to pay measure and payments have a proportional or regressive relationship? If progressive, by how much?Should the wealthy spend agreater share of their earnings as health care payments than the worse-off? Are some funding sources more progressive thanother sources? Are the differences in the progressivity of health care payments evaluated across countries? (Wagstaff and Van Doorsaler, 1992).

It must be pointed out that linking health care contributions to a capacity to pay measure entails assessing health care funding progressivity. Depending on the share of wages paid by the better- off or poor, the relationship could have the better – off contributing a higher proportion of their income towards health payments (Progressive system). It could also have both the better- off and the worse- off contributing the same proportion of their income towards health payment (proportional system). The poor may be spending a larger share of their income on health care than the non – poor a (regressive system). Simply stated a progressive or regressive health scheme is one in which the mean contributory rate rises or falls with the capacity to pay (income/expenditure). Various authors have developed different methods for analysing progressivity. Irrespective of the method adopted the analysis entails two vital steps; firstly, assessing the relative progressivity of each payment source.Secondly, the comparable contribution of each funding source to the overall funding system is used in computing the progressivity of the entire health finance.

Vertical Equity, Horizontal Inequity and Reranking inHealth Care Financing.

The primary objectives of any health care financing system is obtaining resources to fund the system and promoting fairness in the health care contributions. The financing system can be usedas a means of protecting households from the impoverishing effect of such payment, while reducing inequality in the income distribution. Equity in health care financing can be assessed by the extent to which health payments contribute to the distribution and redistribution of income. This notion of equity can be supported based on two lines of reasoning; firstly, there is support for the view point that health system should be accepted as one of many tools for income reallocationand should beappraisedon the basis of how far,it attains this fundamentalobjective. The second statement is that health systems that redistribute income tendto provide thepoor with better access to medical care and resulting in improved health status (Murray et al, 2000).Health care payments can further increase the degree of inequality present in the income distributions and this has given rises to studies involving analysis on redistribution (Cavagnero and Bilger, 2010; Ichoku, Fonta and Araar, 2010; Bilger, 2008; Wagstaff and Van Doorslaer, 1997).

Redistribution entails reallocation of resources, income, and wealth from the wealthy and bestowing same on the poor and vice-versa. Such distribution may well extend beyond the allocation of resources, income and wealth to include the supply of welfare enhancing goods and services which are of a public nature (Mulenga and Ataguba, 2017). While the latter form of redistribution is believed to increase income inequality the former helps in reducing it. Therefore, health care financing systems may possesssome income redistributive properties (O' Donnell et al, 2008). The broad measure of the overallimpact of health care contribution on the redistribution of income, is one that compares the Gini estimates of household income preceding health care payments(prepayment income) with the Gini estimate of household income when health care contributions have been made (post-payment income) Kakwani, (1980).

The total re-distributive effect measures the degree to which payments for health are disproportionately linkedto earnings. It can be conceptually and quantitatively divided into vertical redistribution and horizontal redistribution. The extent of vertical redistribution is often contingenton the progressivity of the financing source; it could be either progressive or regressive. When the vertical redistributive effect is progressive it means that health financing system redistribute income from the wealthy in favour of the poor this give rise to a positive "pro-poor" redistribution. Conversely, when it is regressive this implies that health financing system redistribute income from the poor to the wealthy and this give rise to a negative "pro-rich" redistribution. A pro-poor redistribution can be defined as one in which the distribution of income excluding payments is more equivalent that the distribution of income including payments. Horizontal redistributive effect measures the extent to which households with the same prepayment income pay different amount towards health care. The presence of the horizontal redistributive effect only reduces the total redistributive effect it cannot increase it, therefore it makes the post-financing distribution of income more unequal than it would have been where it is non-existent (Murray, et al, 2000; O' Donnell et al.,2008; Ataguba, 2012).

The variation between the Gini index of income gross of taxes or health payments "prepayment income" (G_X) and the Gini Index of income net taxes or health payment "post- payment income" (G_{X-T}) is the measure of "pro-poor" or "pro-rich" redistributive effects. Generally, it is argued for the redistribution of income or resources to benefit the poor.A "pro –poor redistribution of health care funding sources could cause a decline in inequalityacross various income groups (O'Donnell*et al.,* 2008).

The decomposition of the redistributive effect of health care financing (*RE*) is credited to the work of Aronson et al,(1994). The overall redistributive effect of health care financing is subdivided into the three parts; {vertical effect (*V*), horizontal inequity (*H*) and reranking(*RR*)}. The vertical effect focuses on assessing the progressivity (regressivity) of health payments in relation to their ability to pay and this is different from horizontal effect. Horizontal inequity (H), captures the magnitude of classical horizontal inequity (the unfavourable and uneven treatment of prepayment equals), the third measure of RE which is Reranking (R), measures the extent of change in the move from pre-financing income distribution to post-financing income distribution. Zhong, (2009) expounds further dissimilarhandling of those on similar income groupings does not inevitablyproduce reranking. Conversely, reranking does not ineludiblyinduce horizontal inequity. A quantification of horizontal inequity that contains the reranking elementis not an appropriate measure of horizontal inequity in its conventionalform. Furthermore, for reranking to be perceived as unfair, itcan only be due to vertical inequity.

In recent times, there has been a paradigm shift from progressivity research to redistribution studies.This is partly because although analysis on Progressivity and the distribution of the burden of taxes and health payments could provide information about the extent of vertical equity present in the income distribution, such analysis tend to veil the extent of horizontal inequity and the rank alterations present in the income distribution which are produced by health care contributions. Majorly because progressivity analysis focuses on howpayments sources for health care or tax vary with some measure of ability-to-pay.Horizontal inequities among individuals with the same ability to pay can still occur in a vertically equitable health care payment system. This can be due to the following; disparities in payment rates or tax across regions, different sources of income, the presence of tax deductions for certain class of individuals, stochastic nature of illness and different sickness faced by people with the same ability to pay. Also,dissimilar contributions to health insurance schemes depending on the risk profile of the individuals (Ataguba, 2012).In the absence of differential treatment, a positive (negative) value of V reveals the redistributive effect of the payment mechanism on the overall level of income inequality produced by a progressive (regressive) payment mechanism. Uneven treatment of contemporaries and the inappropriate treatment of unequals arising from contributions for health care are expressed by “non- zero” values of H and R (Abu- Zaineh, 2009).

2.3 Review of Theoretical Issue

This section examines the equity theory of taxation and the various models of tax progressivity and income distribution ofequity in health care financing (Ataguba 2012; Wagstaff and Van Doorsaler, 2000).

2.3.1 The Equity Theory of Taxation

The equity theory of taxationis enshrined in the works of philosophers and economists such as Locke, Bentham and Adam smith. The basic assumption of the theory is that the tax system should be equitable and fair. There is no consensus amongst the theorist on how the equity requirement should be interpreted. Generally, two strands of thoughts on tax equityexist. These are the Benefit Principle and the Ability to Pay Principle. Adam Smith’s first Cannon of Taxation combines both principles in describing an equitable tax system. He quipped that, citizens of every country must make contributions based on their financial capabilities.This should be done based on the share of remuneration they receive as members of the country.

The Benefit principle states that an equitable tax system is one in which the tax payer contributes in line with the benefits he or she receives from public services. The approach further states that a fair tax system will also depend on the expenditure arrangement. The Benefit approach has the advantage of connecting both the tax and expenditure aspects of the budgetary policy, but this is not always implemented since the tax authorities are not readily aware of the tax payers’ assessment of government services. The approach does not address redistributional concerns in the budgetary process (Musgrave and Musgrave, 2004).The benefit principle has been criticized based on the following issues; (i) operational problems; for certain government protection involving national security, military activities, it is impossible to appraise how benefits differ from one group to another and across different individuals. While addressing these issues Slemrod, (1993) quipped that the benefit principle does not do justice to the subject of tax progressivity because probably benefits might be more for individuals on the upper income strata of society because they have more possessions to protect, but the exact relationship is vague. Also, the benefit principle is rejected on the grounds that it does not provide the necessary mechanism for the government to tackle the issue of income redistribution. Proponents of redistribution argue that the distribution or allocation of tax burden should capture the benefits of government activity without overlooking the redistribution from after tax income.

On the other hand, the ability to pay approach states that the tax payer should contribute to the total government revenue requirement based on his/ her ability to pay. In the Ability to pay approach the tax structure design is determined independently of the expenditure policy. This approach has been recommended as the "Equity Rule" especially in cases pertaining to the redistribution function of tax and transfer procedure (Musgrave and Musgrave, 2004). Taxation in accordance with the ability to pay approach requires that individuals with equal ability to pay should make similar payments while individuals with greater ability to pay should pay more. The former connotes the notion of Horizontal Equity and the later Vertical Equity. The Principle of "equality under the law" applies in both case. If income is applied as the ability to pay measure, the principle of vertical equity requires that people with different income should pay different amount of taxes. The horizontal equity rule implies that people earning similar income should pay the same tax.

The principle of vertical equity or the distribution of the tax burdenis assessed based on two conditions.Firstly, based on the definition accorded to the notion of Equality of Sacrifice; which could be either based on equal sacrifice, equal proportional sacrifice or equal marginal sacrifice. Secondly, it is presumed to be determined by the slope of the marginal utility of income schedules for each tax payer which is assumed comparable (Musgrave and Thin, 1948; Musgrave and Musgrave, 2004).It is uncertain whether the traditional theory of tax equity can be applied to capture the issue of the incidence of taxation because the assumption of identical and comparable marginal income utility schedule for each tax payer is unrealistic. This difficult in determining whether and how the marginal utility of income schedules can be quantified and compared, has necessitated the use of the social welfare function in capturing the distributive and redistributive burden of taxes.

Overtime there has been a growing shift from the traditional theory of tax equity to income redistribution based on the "Lorenz criterion" as the framework for examining vertical equity and horizontal equity in taxation. The argument is that this approach allows for the evaluating and comparing of different tax systems. One benchmark that can generally be employed in assessing whether a particular tax system is redistributive than another is the distribution of wages before tax deductions.When the income distribution before tax is given, this criterion could also be used to decide whether on tax system is more redistributive than the other. Assume that two tax programmesresult in after tax wage redistribution, which produce Lorenz curves that do not overlap, then the tax programcorresponding to the prevailing Lorenz curve is the most redistributive curve (Jakobsson, 1976).The basis for this approach is that if a particular tax system is everywhere more progressive than the other, it should also be more redistributive than the other (Lambert, 2001).

2.3.2 Theoretical Models of Tax Progressivity

In this section,models of tax progressivity, which are off shoots of the theory of tax equityand have been applied to studies on equity in taxation and health care financing are presented below.

Kakwani Model of Tax Progressivity

Kakwani (1977) proposed this model of tax progressivity. The model is based on two assumptions;

i. Progressivity (regressivity) is always captured by an increasing (decreasing) average tax rate.
ii. The magnitude of progressivity is unaffected if the tax liability of every individual is increased or decreased in the same proportion.
iii. Reranking does not occur in the income distribution.

Kakwani (1977) proposes that the pre-tax income x of an individual is a random variable with mean μ and probability distribution function $F(x)$. The relationship between $F(x)$ and $F_i(x)$ is the Lorenz curve for x.If the proportion of taxes paid by taxpayershaving an income less than or equal to x, *is* denoted $F_i\,[T(x)]$the relationship between *F(x)* and $F_i[T(x)]$ will be the concentration curve of taxes.

Tax elasticity is measured as the vertical distance between the curves $F_i\,(x)$ and $F_i\,[T(x)]$. The larger the difference between tax elasticity and unity, the greater the distance between Lorenz curve $F_1(x)$ and concentration curve $F_i\,[T(x)]$.If the tax elasticity is unity for all income levels, the two curves coincide.This measure is related to the concept of tax elasticity. An appropriate measure of tax progressivity must depend only on the magnitude of the difference between tax elasticity and unity, which suggests that such a measure should depend on the distance between the curves Lorenz curve $F_i\,(x)$ and concentration curve $F_i\,[T(x)]$. If C is expressed as the concentration index of taxes, and G as the Gini index of the pre-tax income, it follows thatthe measure of tax progressivity is;

$$P_T^K = C_T - G_T$$

Where: P is equal to twice the area between the curves *Fi(x)* and *Fi[T(x)]*.The Kakwani measure of progressivityP_T^K is positive (negative) if the tax elasticity is greater (less) than unity for all income x and assumes value zero when the tax elasticity is unity for all incomes. Consequently, the positive value of P suggests a progressive tax system, while the negative value implies a regressive tax system. Further, it can be seen that P increases (decreases) with the increase (decrease) in tax elasticity at all income levels. This measure satisfies axioms *i* and *ii*.

2.3.3 Theoretical Models forDecomposing the Redistributive Effects of HealthCare Financing Mechanism.

The distributional impactof healthcare financing is assessed by analysing the progressive, regressive or proportional impact of the health payment system on the income distribution. “Progressivity is a measure of vertical equity” (Abu-Zaineh, 2009), but the overall effect of health funding on the distribution of earningscannot be unmasked fully by progressivity analysis. There is need to focus on the total “(dis) equalizing effect” of healthcare contribution on the income distribution. This comprises not only the vertical equity considerations but horizontal equity and reranking. The total redistributive effect (RE) is a generally accepted measure of the redistributive consequences of a given financing mechanism.Theoretical modelsin the income redistribution literature have been applied in various empirical studies to quantitatively measure vertical, horizontal and re- ranking effects associated with tax/ health payment mechanism.These include; Kakwani (1984), Aronson, Johnson and Lambert, (1994); van de Ven, Creedy and Lambert(2001); Duclos, Jalbert, and Araar (2003) andUrban and Lambert (2005).

Kakwani Decomposition Model of the Income Redistributive Effect

Kakwani (1984) extended the Kakwani (1977) model of tax progressivity in his decomposition model. Kakwani (1984) observed that while a progressive tax narrows the income gap in the income distribution, it also induces another phenomenon referred to by Atkinson (1981) and Plotnick (1981) as the concept of "reranking".

Kakwani (1984)modelsynthesised the decomposition of the redistributive effect into two theoretical concepts – vertical equity or progressivity and income reranking effects. The redistributive effect RE is measured as the Gini coefficients of pre and post -tax incomes.

$$G_X - G_{X-T} = \frac{g}{1-g}(C_T - G_X) - (G_{X-T} - C_{X-T}) \qquad 2.1$$

OR

$$RE \equiv G_X - G_{X-T} = \frac{g}{1-g}P_T^K - R \qquad 2.2$$

where; $\frac{g}{1-g}P_T^K$ is the measure of vertical equity. R is the reranking measure which is a correcting factor.

It is a downward shift for tax estimates of $\frac{g}{1-g}P_T^K$ derived from group data. Reranking effect is capable of overstating the true redistributive effect and the vertical effect once it is omitted. Kakwani (1984) was the first to raise the issue of reranking and derive the equations stated above.

The major drawback of the Kakwani (1984), formulation is that it equates horizontal inequity with reranking. It does not make a distinction between the theoretical concepts. This causes a misspecification of the concept of inequity because horizontal inequity deals with the "unequal treatment of equals". Reranking measures the "the unequal treatment of unequals" (Urban, 2009). This issues of clearly delineating the vertical, horizontal and reranking redistributive effects of taxes/ health care payments is addressed by the Aronson, Johnson and lambert decomposition model (Bilger, 2008). Analogous to the Kakwani decomposition is the decomposition model developed by Lerman and Yitzhaki (2001). The LY model states that the redistributive effect can be decomposed into two components; "a component due to changes in ranks, and a component that arises from changes in income- Payment progressivity" (Ichoku *et al.,* 2011).

The Aronson, Johnson and Lambert (AJL) Decomposition Model of theIncome Redistributive Effects

The decomposition model developed by Aronson et al., (1994) is an upgrade of the Kakwani decomposition model. The Aronson *et al.,* (1994) modifies the Kakwani decomposition model by incorporating into the model a horizontal inequity component. Theoretically, the AJL approach allows for the decomposition of changes in income inequality caused by health care payments into vertical, horizontal and reranking effects. The vertical effect measures the effect of healthcare payments on households with different incomes, the horizontal effect capture the inequality created among households with similar prepayment income due to taxes. The reranking effect measures the change in the rank of households in the income distribution resulting from taxes) with each effect addressing a particular dimension of equity (Bilger, 2008).

The redistributive impact associated with a payment mechanism is measured under the AJL as the change in the Gini coefficient caused by the taxes. Therefore,

$$\text{RE} = \Delta\text{G} = G_X - G_{X-P} \qquad 2.3$$

Where: G_X and G_{X-P} are the prepayment and the post payment Gini coefficients respectively. *X*denotes the pre- financing income and T denote tax contributions. Aronson, Johnson and Lambert, (1994) expresses equation (2.3) as;

$$\text{RE} = \text{V} - H - R \qquad 2.4$$

Where, V represents Vertical effect, H is horizontal effect, and R, represents the extent of re-ranking effect. The vertical effect component in equation 3.4, captures the progressivity or regressivity of the financing mechanism in the absence of horizontal inequality. It also captures the extent to which a financing mechanism is either pro-poor or pro- rich.When horizontal inequity and re-ranking are reduced to zero, vertical effect becomes the sole component of redistribution and it is made up of the average tax/ payment rates and the Kakwani index of progressivity.

$$RE = V = \left[\frac{g}{1-g}\right] K_T \qquad 2.5$$

Where: g average payment rate (as a proportion of income) and K_T is the Kakwani index of payment that would arise in the absence of horizontal inequality in healthcare payments. It is computed as the difference among the between-groups concentration index for payment and the pre-payment income Gini coefficient $G_{X.}$

Equation 2.5 illuminates the role of progressivity in the redistribution of income; across income quantiles a progressive health care financing source will result in reduced inequality after healthcare payments, causing a redistribution of income that benefits the poor. The magnitude of such redistribution depends on the progressivity of the financing option and the percentage of income on the average consumed as health payments. Health care systems of nations may have similar progressivity levels and different estimates of income redistribution. This could occur because of the different share of income spent as health care payments in various countries (Wagstaff and van Doorsaler, 2000). Thus, vertical effect *V* engendered by some degree of progressivity is increased by the average payment rate (g) (O' Donnell, 2008). In the presence of differential health payment by households with similar ability to pay equation 2.5, is replaced by equation 2.6 and this captures the extent to which the presence of horizontal inequity and re-ranking actual reduce the vertical redistribution *V*.

$$RE = \left[\frac{g}{1-g}\right] K_T - \sum_k \theta_k \; G_{k(x-p)} - [G_{X-P} - \; C_{X-P}] \qquad 2.6$$

Where: K_T is the Kakwani index computed on the assumption that everyone with the same prepayment income make similar Tax/healthcare payment. θ_K is the product of the population share squared and the post-payment income share of households with pre-payment income $X.G_{k\ (x\text{-}p)}$ is the Gini coefficient for post-payment income for households with pre-payment income *X* and $C_{X\text{-}P,}$ is the post-payment concentration index obtained by ranking households first according to their pre-payment income and then within each group of pre-payment equals by their post-payment income. The first term, in equation 2.6, represents *Vertical effect (V)*, and it measures the inequality reduction (progressivity) that would have occurred if there had been no differential healthcare payment. The second term, which *horizontal inequity effect (H)* measures the extent of "classical horizontal inequity" (the unequal treatment of equals) and it is measured by taking a weighted sum of the within group post-payment income Gini coefficients $G_{k\,(x\text{-}p)}$. The third term, is referred to by Aronson et al (1994) as*Reranking effect (R)*, and it measures the extent of reranking in the move from the pre-payment income distribution to the post-payment income distribution by comparing the post-payment income Gini coefficient with the post-payment concentration coefficient, if there is no reranking, R is zero (Wagstaff and Van Doorsaler, 2000).

The decomposition in equation 2.6 helps explain the difference between horizontal inequity and reranking using the AJL framework. The terms *H* and *R*are always non-negative, so differential treatment will as a matter of principle always reduces the vertical effect. Empirically, Aronson et al., (1994), show that H increasesand R decreases when the income bandwidth used to define 'equals' is increased, but this has no effect on the result of the summation of differential treatment *(H+R)*when considered jointly. As expressed by Wagstaff and Van Doorsaler, (2000) although conceptually different, in practice *H* and *R* appear intricately connected. Expressing *V* as a percentage of *RE* enables a comparison of the relative magnitude of vertical effects in comparison with horizontal inequity and reranking.

The AJL methodology is empirically applicable to a populacecomprising of units of exact income equals (hereafter EIEs).Here theaverage post-payment earning of each unit increases with theirrespective pre-prepayment income level. This payment arrangement does not create changes in the group's position.It also consists of clusters of individuals having precisely the same pre-payment income but in reality survey data do not contain, sufficient EIEs this observed limitation hampers the empirical application of the AJL methodology, thus the need to rely on the principle of "close-income equals" (hereafter CIEs) as against EIEs (Bilger, 2008). The CIEs are constructed by dividing the sample into units of close income equals based on convincedclassifications of incomebandwidths. The reranking effect is dependent on selection of the CIEs while horizontal effect is gotten as a residual (Wagstaff and van Doorslaer, 1997;Abu- Zaineh, 2009).

Van de Ven et al, (2001) (hereafter, VCL) opines that this couldresulting in obtaining findingsthat are distorted. Preferencesoccur because of the randomchoice of CIEs, and also due to the risk of ***within-groups re-ranking***; the magnitude to which the healthcare contributions producefluctuations in the position of persons within the specific groups of CIEs and ***total-groups reranking***; the magnitude that health payment options create changes in position of the entireclusters of CIEs. The choice of the income bandwidth is crucial for measuring horizontal inequality and when wrongly specified horizontal inequity can no longer be defined in a "Classical sense". Furthermore, the choice of arbitrary income bandwidths severely hampers the quantification of all decomposition effects especially the measurement of the horizontal and vertical effects. The AJL model is based on a ethically rigid social welfare function- Gini social welfare function, which does not capture the level of society's distaste for inequity.The AJL model although previously employed in studies on the redistributive effect of taxes has been utilized in healthcare financing studies these include (Ichoku, 2005; Bilger, 2008; Ataguba, 2009; Sandal and Theurl, 2015).

Van de ven Creedy and Lambert Decomposition Model of the Income Redistributive Effects

The VCL framework was developed to correct for the theoretical inaccuracies present in the AJL decomposition approach arising from the arbitrary specification of income bandwidths. Following Bilger, (2008) the AJL is specified as:

$$\underbrace{(G_X - G_N)}_{= RE_{AJL}} = \underbrace{G_X - G_{B,N}}_{=V_{AJL}} - \underbrace{\sum_k \alpha_{k,N} G_{k,N}}_{= H_{AJL}} - \underbrace{(G_N - C_N)}_{= R_{AJL}} \qquad 2.7$$

Where G_X and G_N are the pre and post payment Gini indexes, $G_{B,N}$is the Gini coefficient that is obtained when each individuals or households prepayment income is adjusted by the mean contribution paid by their respective group prepayment equal. Invariable, all group of prepayment equals face the same average payment, $G_{k,N}$ group k post-payment Gini index, $\alpha_{k,N}$the product of k_{th} group populationshare squared and post-payment income shares, and C_N, the concentration index of payment where groups of equals are ranked according to their prepayment income and households according to their post-payment income within groups. From equation 2.7, R_{AJL} can be shown to be equal to R_{AP} when the population contains group of exact prepayment income equals (EIE_S).[2]

Equation 2.7 is further re-specified under VCL methodology in the absence of groups of EIEs but where group of close prepayment equals (CIEs) are used as:

$$\underbrace{(G_X - G_N)}_{=RE_{VCL}} = \underbrace{G_{B,X} - G_{B,N}}_{=V_{VCL}} - \underbrace{\sum_k \alpha_{k,N} G_{k,N} - \alpha_{k,X} G_{k,X}}_{=H_{VCL}} - \underbrace{(G_N - C_N)}_{=R_{VCL}} \quad 2.8$$

Wherein equation 2.8, $G_{B,X}$ is the Gini coefficient corresponds to the average share of prepayment income enjoyed by all households within each group of prepayment equal$G_{k,X}$, the weighted sum of group k specific pre -payment (within group) Gini coefficients, $\alpha_{k,X}$the product of group k population and prepayment income share.

VCL shows that increasing the bandwidth in the case of progressive financing generates two opposing effect which Ven de Ven et al (2001) refers to as the***"averaging"*** and ***"appropriating"*** effects. One reduces the inaccuracy in the quantification of decomposition while the other increases it. Increasing the bandwidth choice implies that the Lorenz curves of prepayment and post-payment incomes will consist of fewer groups moreover due to the assumption of progressivity the prepayment Lorenz curve is more convex than the post- payment Lorenz curve. Thus, with the increase of the income bandwidth the prepayment Gini index decreases faster than the post- payment Gini index and the estimates of V_{VCL} and H_{VCL}fall. The ensuing decline in V_{VCL} is recognised as a subtraction from the H_{VCL}, while at the same time a part of R_{VCL} is accredited to H_{VCL}, because growingshares of V_{VCL} and R_{VCL}add to the H_{VCL} when the bandwidth is enlarged, VCLrefers to this as the decliningprecision in measuring the ***appropriation effect***(Bilger, 2008).

Conversely, increasing the bandwidth helps to improve the estimates of the payment mechanism by reducing the variability of the function when joining group mean post-payment income to prepayment income.This levelling causes V_{VCL} to increase because there is a shift of regressivity caused by the excessive unpredictability of the group

[2]Where $R_{AP} = (G_N - C_N)$ is the Atkinson- Plotnick measure of reranking. For any population where H > 0 the full inequity of the payment mechanism which includes R_{AP} is generally understated. For detailed presentation see Atkinson (1979) and Plotnick (1981).

average post- financing function from V_{VCL} to H_{VCL} and R_{VCL}.*VCL* refers to this improvement in the estimation of the decomposition the ***averaging effect***. *VCL* advocates that the choice of the optimal bandwidth should be one that minimises the decomposition error. This optimal bandwidth is that which corresponds to the maximum value of V or the bandwidth that maximises the estimate obtained from *V*, $V_{VCL\,max}$(Van de Ven*et al.,* 2001).

Van de Ven *et al.,* (2001) advanced that, linkingboth effects, involve choosing a bandwidth that reduces the error associated with the estimate of the effective tax schedule or health care payment. Inadequate averaging occursat exceptionally low levels of bandwidth (w), and the error associated with the decomposition method increases. As w increased, the benefits associated with increased decomposition accuracy arising from the averaging effect are at the first likely to be greater than the losses triggered by the appropriation effect. In practice as w increases, the deficits connected with the effects of appropriation are greater than the benefits gotten from the averaging effect, which suggests an optimal w that lessens the decomposition error. As a more precise estimate of the effective tax schedule or health care payment is obtained,the averaging effect associated with increasing w tends to increase *H* and *R*, and subsequently V. Moreover, the appropriation effect has an ambiguous effect on H and tends to decrease V and R. *VCL* suggest that the estimate for *H* (horizontal inequity) be obtained s a residual after calculating RE_{VCL} and $R_{AP.}$

$$H_{VCL} = V_{VCL\,max} - R_{AP} - RE_{VCL} \qquad 2.9$$

The major limitations of the VCL are that the choices of the bandwidth criterion do not work where the financing mechanism is regressive. Furthermore, irrespective of the choice of bandwidth, since decomposition within the *VCL* framework entails grouping, measurement of the decomposition effect is hampered. Additionally, the quantification of horizontal inequity in a classical sense is impossible, thereby altering the definition.

Urban and Lambert (UL) Decomposition Model of the IncomeRedistributive Effects.

For evaluating the redistributive effects of fiscal measures, it becomes necessary to consider how sensitive the estimation of the VE and HI are to the selection of income width for the CIEs, and the effect of within group re-ranking and entire group re-ranking (Urban and Lambert, 2005). These are important for assessing the unequal impact of various payment options. Urban and Lambert (2005) provide an extension to Aronson et al., (1994) model. This is generally referred to as the UL approach in the tax literature.

The UL method has been adjudged effective particularly in cases where the payment mechanism can reverse or alter the ranks of entire income groups and is also effective when near- equal groups are lacking for decomposing income-inequality. The conceptual and theoretical superiority of the *UL* approach over the traditional *AJL* approach is that incomparison to the traditional AJL approach, the UL methodology was structured to incorporate the concept of CIE.Thus, reorganising the quantification of VE, HI and RR. The UL frameworkboast two corresponding advantages: it provides a basis for identifying all reranking effects.Through the levelling of the impact of a fiscal measure within the respective CIEs unit, it serves to profer anappropriatemeasureof horizontal and vertical inequities. The HE is quantified within each CIEs unit based on individual assessment of definite and counterfactuallevelledincomes which remain after payments for health have been made.On the other hand, The VE is measured by assigning to each person the averageincome paid by the particular unit of CIEs(Abu-Zaineh, 2009).

There is no agreement in the empirical literature on an optimal technique for selecting the income bandwidth of CIEs (Duclos *et al,* 2003).In the UL approach, the *VE*, *HI*, and *RR*are computed as sample estimates. The valuation of the significance of inequity effects is conducted usingvarying ranges of income bandwidth because this will ensurethe propermeasurement of CIEs groups for the sake of policy formulation. Decomposing the redistributive effect or the overallvariation in income inequality due to contributions for health into *VE*, *HI* and *RR* involves specifying a group of concentration curves created by dissimilarordering of income entitiesof near-income equivalents*w* (*w*assuming values form 1 to *W*) and is specified onalready allotted income bands (Abu – Zaineh, 2009). The novelty of this approach is that it breaks down *RR* into within group reranking (R_{WG}), entire group reranking (R_{EG}) and between group reranking (R_{BG})[3].Like previous decomposition models the UL framework is still based on the grouping of households into close income equal bands. This form of grouping adversely affects the measurement of horizontal inequity and consequently the value of the entire decomposition estimates.

The Duclos Jalbert and Araar (DJA) Model of Decomposition of the Income Redistributive Effects

The DJA model is an improvement over other decomposition models which involve the decomposition of the Gini index. Duclos *et al.,* (2003) developed a model that is founded on a different analytical framework- the Atkinson- like inequality index and what they refer to as "ethical social welfare function". One of the advantages of DJA approach is that it defines and estimates horizontal inequity and reranking effectsseparately;this is achieved through the specification of the aversion to risk or uncertainty in the post- payment income distribution given the level of prepayment income (ε) and aversion to relative deprivation or inequality (ν). Another merit of the DJA framework is that it does not require any form of grouping and this ensures that the definitions of the decomposition effects are not altered during the course of their measurement this is attributable to the nonparametric estimation of the expected net income function (Ataguba, 2012). However, Bilger (2008) warns that special care should be taken when performing this non-parametric estimation because an inaccurate estimation could adversely affect thevalues of the vertical and horizontal effects. Moreover, since non-parametric estimations are basically about finding a trade-off between bias and variability, the estimated expected net income function is asymptotically biased accordingly, and therefore so are the vertical and horizontal effects. The asymptotic bias of V_{DJA} and H_{DJA} depends on the choice of the nonparametric method.Even though asymptotically biased, it's been argued that non-parametric estimation of expected net income can significantly improve the decomposition effects (Cavagnero and Bilger, 2010). To analyse the cost of inequality to society DJA uses the concept of equally distributed equivalent income (EDE). The decomposition model proposed by Duclos et al., (2003) is specified below;

The social welfare function used by DJA is specified as follows:

[3]For detailed conceptualization of the UL approach and the application within the context of close income equals see Abu- Zaineh (2009)

$$W_X(\varepsilon, \nu) = \int_0^1 U_\varepsilon\big(X(p)\big)\omega(p, \nu)\, dp \qquad 2.10$$

$$U_\varepsilon(y) = \begin{cases} \frac{y^{1-\varepsilon}}{1-\varepsilon} \text{when} \varepsilon \neq 1 \\ 1n(y) \text{ when} \varepsilon = 1 \end{cases} \qquad 2.11$$

$$\omega(p, \nu) = (1 - p)^{\nu - 1}, \qquad \nu \geq 1, \qquad 2.12$$

Where *X(p)* is the income quantile function, *ω(p, ν)* ethical weight function, $U_\varepsilon$utility of income function. Parameters $\varepsilon$and ν permits setting social aversion to horizontal inequity and reranking respectively. Parameter ν is always greater than or equal to one, the value one corresponding to indifference to reranking *(R=0),* while ε is non-negative and the value zero corresponds to indifference to horizontal inequity *(H=0)*. The inequality index is computed by subtracting from one the ratio of the equally distributed equivalent income to average income.

$$I_X = 1 - \frac{U_\varepsilon^{-1}(\varepsilon, \nu)}{\mu_X} \qquad 2.13$$

Finally, the DJA decomposition is presented as:

$$\underbrace{(I_X - I_N)}_{\equiv RE} = \underbrace{(I_X - I_N^E)}_{\equiv V} - \underbrace{(I_N^P - I_N^E)}_{\equiv H} - \underbrace{(I_N - I_N^P)}_{\equiv R} \qquad 2.14$$

The DJA redistributive effect is computed as the difference between the gross and net inequality indices. The DJA decomposition requires two counterfactual inequality indices. The first counterfactual inequality indexI_N^E corresponds to a horizontally equitable financing schedule where every household is granted its expected net/ post-payment income. The secondI_N^P is obtained by granting every household their expected utility, this prevents reranking because gross income ordering is maintained, but it may cause horizontal inequity (Cavagnero and Bilger, 2010). Therefore, this decomposition makes it possible to quantify separately the horizontal and reranking effects without the associated errors that result from constructing income bandwidth of CIEs or EIEs.

When comparing the AJL, UL, VCL and DJA frameworks for measuring decomposition, proponents argue that the DJA methodology stands out because in fact, while this methodology makes the unrestricted choice of non-parametric estimation possible without the accompany restriction of the optimal bandwidth choice (thus reducing the error associated with estimating the decomposition effects). On the other hand, the AJL, UL and VCLgrouping of the average post- financing function is perceived as being a very crude non-parametric estimation of *DJA* expected net/post-payment income function. Particularly because similar average post-payment income in each group is assignedto each group of prepayment equals which eventually produces heavily biased *V*and *H*; the wider the groups, the larger the bias (Ichoku, 2005; Ataguba, 2012). Moreover, no outside information from the group is used when computing mean income, which results in large inconsistency; the more contracted the groups, the greater the variability. *VCL* criterion permits the selection of optimal bandwidth but the significant sub-optimality of the nonparametric estimation still remains. *DJA* can significantly reduce the asymptotic bias by employing an "efficient" nonparametric estimation of the expected net/ post-payment income function using kernel density estimation (Bilger, 2008).

Secondly the advantage of the *DJA* over the *VCL* is that the *VCL* bandwidth choice is only applicable when the source of financing is progressive, but the *DJA* method finds its applicability because it can be applied to any source of financing whether (progressive or regressive) because the choice of the nonparametric method is based on established statistical underpinnings.

Thirdly, the *DJA* methodology is effective in measuring horizontal inequity in a "classical sense". This implies it can successful detach the components of horizontal inequality into horizontal inequity and reranking effects.

The major drawback of the DJA decomposition is that when comparing H and R values of the standard errors for all financing sources, it seems that H is always less accurately measured than *R*. This is a direct aftermath of DJA non-parametric estimation of expected net income/ post-payment income, which although "efficiently" corrects the bias, but at the cost of greaterinconsistency.

2.4 Review of Methodological Literature

This section focused on the methodologies that have been utilized in the investigation of progressivity and the overall redistributive effect of health care financing.

2.4.1 Measuring Progressivity in Health Care Financing

There are several measures of progressivity in health care financing. These include the tabulation method, summary indices namely (Concentration Indices, Kakwani progressivity index (KPI), the Suits index) and the disaggregated analysis.

Tabulation Method

The tabulation is as a crude measure of progressivity (Ataguba, 2012). The method involves grouping of households into quantiles (deciles, quintiles, and percentile). The share of each quantile income spent in health care through various payment mechanism is calculated. Progressivity is determined based on how the ratios differ across income quantiles (Shakarishvili, 2006). This method does not provide an inclusive measure of how the health care finance to income share differ over the entire distribution of income. It is a limited measure of progressivity which does not allow for progressivity comparison across different financing mechanism. To address these limitations other measure of progressivity have been developed.Different authors in studies conducted for four former Soviet Unioncountries, Brazil and Nigeria have applied the tabulation method (Shakarishvili, 2006; Uga and Santos, 2007, Olaniyan *et al.*, 2013)

Summary Measures of Progressivity in Health Care Financing

The concentration indices (CI) summarise the information on the relationship between the relevant health variable in relation to the position of the capacity to pay measure. It is a measure of socio economic inequality present in a health payment variable (Abu Zaineh, 2008). The value of the CI lies in the range of [-1, 1]. A positive (negative) value of the indices suggest that the variable of interest is domicileamong the worse-off (better-off), when related to the field of health financing, a negative (positive) estimate of CI implies that the worse-off (better-off) spend a greater proportion of their income on health care than the better-off (worse-off). The CIalthough specifies the extent of income inequality associated with payments for health care they are deficient in addressing the issue of whoexpends most as a share of income and whether contributions for health care increase(decrease) as a share of income as income increase (Abu- Zaineh, 2009). This method has been applied to the study of progressivity in four central African Capital (Cissie *et al.,* 2007).

The WHO measure of progressivity called the fairness of financial contribution index (FFC) assumes, that contributions towards health care should be proportional to capacity to pay, implying that everyone regardless of their capacity to pay should pay the same proportion from their income for health care (Murray et al., 2000). Wagstaff (2002) argues that the fairness of financial contribution index developed by the World Health Organization (FFC) as a measure of progressivity (Murray et al, 2000) is not an equity measure, but a measure of financial protection that focuses only on health payments made by individuals and households. It does not concern itself with how equitable a financing system is in terms of its distribution of access to and utilization of health care services.

Secondly, Wagstaff, (2010) observes that the WHO (FFC) index considers the concept of vertical inequity and horizontal inequity as symmetrical. This assumption he views as illogical, because from literature while vertical inequity from the proportional link with the ability to pay (i.e. people with different ability to pay, making dissimilar health care contributions) can either reduce the level of inequality in the income distribution depending on whether contributions are progressive or regressive. Conversely, horizontal inequity increases the degree of inequality in the income distribution. The third critic of the FFC index arises because, except in cases where everyone spends the same proportion of their capacity to pay on health care, the index cannot capture the degree of vertical equity, horizontal equity and the mean proportion of income spent on health. Thus, difficulties arise in making cross-country comparisons of the proportion of income spent on health.

The Kakwani index of progressivity (KPI) has been adjudged a better index for measuring progressivity when compared to the World Health Organisation construct commonly referred to as the Fairness of Financial Contribution Index (FFC) (Wagstaff, 2002; O'Donnell et al, 2008).Wagstaff (2010), study on measuring equity in health care financing, utilized the Vietnam living standard measurement survey LSMS (1992-93, 1997-98).The proxy of prepayment income was household consumption gross of household payments for health and the health payment variable was out- of-pocket contribution. It was observed, that unlike the Kakwani index of progressivity (KPI), the WHO FFC index simply indicated a move towards greater "fairness" during the period of study and was incapable of assessing the magnitude of income –inequality arising from health payments due to the similar treatment of progressivity and regressivity. In a similar study conducted in Tehran- Iran on equity in household health care payments, (Rezapour, *et al.,* 2015) further noted that the FFC index results only revealed inequity in the income distribution in favour of the rich (pro- rich income distribution). The index could not determine the extent of inequality associated with health payments in the income distribution noting that the result of the Kakwani index indicated a regressive health system in Iran.

The progressivity indices which was proposed by Kakwani (1977). The Kakwani index of progressivity (KPI) corrects for the deficiencies of the concentration indices, because they link payments for health care to the ATP measure (prepayment income). It is a summary measure of non-proportionality of health funding sources in relation to prepayment income.The KPI indicates the degree to which the distribution of health care contributions deviates from proportionality. Where proportionality is quantifiedalongside the distribution of gross incomeAbu- Zaineh, (2009). Proportionality (non-proportionality) of contributions towards health onthe pre-financing income, suggests that the payments exert equalising (dis - equalising) effects on pre-financing income. This index can be further expressed as the difference between the concentration coefficient of payments for health care and theGini coefficient of prepayment income. The value ranges from [-2 to 1]. A positive value indicates a progressive health financing system. Where, households in the higher income quantile contribute a greater proportion of prepayment towards healthcare payments than those in the lower income group (Lorenz curve lies above the concentration curve). A negative value is indicative of a regressive financial system (payment concentration curve lie above Lorenz curve of prepayment income) and zero depicts proportionality (the payment concentration curve lies on the Lorenz curve).The KPI has been applied in various studies to measure progressivity (Wagstaff and Van Doorsaler, 1992; Wagstaff and Van Doorsaler, 1999; Olaniyan et al, 2013; Lawanson and Opeloyeru; 2016; Quintal and Lopes, 2016; Omotosho and Ichoku; 2016).

Analogous to the Kakwani index of progressivity (KPI) is the suit index. The suit (1977) measure of progressivity is based on “relative concentration curves”. This index of progressivity compares the relative concentration curve of prepayment income $H_{pre}(y)$with the relative concentration curve of health payment $H_{pay}(y)$.The suit index is twice the area between both curve $H_{pay}(y)$ and$H_{pre}(y)$. A value of$\pi_s > 0$indicates that health care payments are progressive thus the curve H_{pay} *(y)* lies below H_{pre} *(y)* and regressive whenthe curveH_{pay} *(y)* lies aboveH_{pre} *(y)*. The values of suits index ranges from [- 1 to 1], -1 when the payment incidence is borne by the poor and 1 when the entire payment burden falls on the better – off in the population.

The suit index of progressivity though previously developed before the Kakwani index has been criticised on the grounds that it apportions more weights to departure from proportionality that arise at higher income levels than deviations from proportionality that occur at lower income groups (Ataguba, 2012). The Kakwani index has gained wide acceptability in health economics and public finance research because of the unique property of "additively separable". Given this feature the overall progressivity of health care financing system can be obtained when the Kakwani indices of individual health payments and their individual contributions to the entire financing system are known. This entails obtaining the weighted average of the indices for the various sources of finance where the weights are the shares of each source in total revenue (Lawanson and Opeloyeru, 2016).

Disaggregated Analysis

It been argued that an absolute dependence on progressivity indices (Kakwani and suit indices) might mask the equity implications of health care funding across diverse population groups (Abu-Zaineh, 2009). It has been further argued, that the degree to which various sources of health care payments are related to ability to pay (ATP) and thus the distributional burden of health contributions would not be properly articulated. Thus using the progressivity indices would lead to a concealing effect that is veiled. For instance, if the estimated progressivity was due to large share of income spent on health care by the non -poor than the poor or if the estimated weak (or insignificant), regressivity identified at the aggregate level was due to the low expenditure by low income groups (Wagstaff, 2002, Olaniyan *et al.,* 2013). Consequently, these authors advocate for an in-depthanalysis, whichinvolves moving from the aggregate measures of progressivity to the disaggregated one.

The disaggregated technique while encompassing estimates of burden of health payment at severalranks in the distribution makes it possible to specify the significancelevel of the distributional estimates at each of these levels and offers the benchmark for making inequality assessmentsin a dominance structure[4]. This encompassesassessing the progressivity of health payments atdefinite range in the income quantile (Abu- Zaineh, 2009).There are instances where the Lorenz curve and the concentration curve might intersect, when this happens the value of the progressivity index gives an ambiguous conclusion. Consequently, statistical dominance test is applied to determine the progressivity of the payment system over the prepayment income distribution.

Several studies have applied the disaggregated analysis to equity studies relating to health care financing with the aim of performing dominance test of the Lorenz and concentration curves.This has been carried out using different estimation techniques such as the Distribution Free Technique, the Bootstrap Method and the Multiple Comparison EstimationTechnique (MCET). These estimation techniques are used to test for vertical in- (equity) at specific ranges in the income distribution and to determine if dominance identified is statistically significant(Cissie*et al.,*2007; Abu Zaineh, 2009; Akazili*et al.,* 2012; Munge and Briggs, 2014; Almasiankia *et al.,* 2015; Yu *et al.,* 2008).

For this study, a combination of disaggregated and aggregated measures was applied to evaluate the progressivity of the out-of-pocket payments for health and the health insurance contributions. Disaggregated analysis, allowed for differentiated assessments of progressivity across different income groups to be performed graphically using the MCET. Entailed comparing the Lorenz curve of ATP and the concentration curves for the out -of-pocket health care payments and the health insurance contribution. Aggregated analysis was based on the Kakwani index for the OOP and the health insurance contributions.

2.4.2 Measuring Progressivity, Horizontal Inequity and Reranking in Health CareFinancing

In the literature, two major approaches to decomposing the redistributive effects of health care payments into vertical, horizontal and reranking effects, and measuring the overall redistributive effect of health care finance exist. These are the decomposition of the Gini index and the Atkinson-like inequality index. The measurement of the

[4]The dominance approach involves using relevant inference technique for assessing dominance relations at different ranks of two related distributions.

redistributive effect in the AJL, UL models are based on the sub group decomposition of Gini coefficient of income inequality. In the DJA model the decomposition of the redistributive effect is performed using the Non-parametric regression (Ataguba, 2012).

The Sub-group decomposition of the Gini coefficient is usually carried out using the Convenient Covariance Estimation Technique (CCET). The CCET is used to generate the between and within group concentration and Gini coefficients which are required for computing the vertical, horizontal and reranking effect as well as the overall redistributive effect of health care financing (O' Donnell, 2008). The Gini coefficient is obtained from the Gini social Welfare Function. The Gini index is apt for the measurement of inequity or trends in inequity that exist overtime. The Gini index measures the average deviation of the population from their expected mean. This deviation from p in the equation is not weighted and this is a major drawback of the Gini index. The implication is that the Gini index is insensitive to policy makers concern to inequity in the income distribution because same weights are attached to inequity that occurs across the entire income distribution (Ichoku; 2010). Thus, the Gini index is an ethically neutral or rigid measure of inequality. The Gini index takes the value of between 0 and 1. For a case of perfect equity(inequity) caused by health care financing it will assume the value of zero (one).

In applying the Convenient Covariance Estimation Technique (CCET), the entire population is grouped into income bands of pre-payment or pre-tax equals. The researcher carries out the specification of the income bands. The arbitrariness in the specification of income band for grouping prepayment equals adversely affects the measurement of progressivity, horizontal inequity and reranking (Van de ven *et al.,* 2001). Authors like Bilger, (2008); Ataguba; (2012); Sanwald and Theurl, (2015) have applied this approach in their studies. Wagstaff and Van Doorsaler (1997) in a decomposition study on health care finance conducted for the Netherlands observed that computing the constituents of the redistributive effects of health care financing using the Convenient Covariance Estimation Technique (CCET) was a complicated process. The process involved computing several Gini coefficients based on the available number of prepayment equal groups. Adding that the most difficult component of the redistributive effect to compute was the Horizontal inequity.

In a study for Nigeria on the income redistribution of health care payments, Ichoku (2005), computed the estimates of the vertical, Horizontal and reranking effects of the out-of-pocket health care payments using the CCET approach. After computing the estimates of the Gini coefficients for vertical redistribution and horizontal inequity, the reranking effect had to be obtained as a residual and this could have affected the results of the decompositions. O' Donnell *et al.,*(2008) study of the redistributive effect of public finance of health care in the Netherlands also applied the Convenient Covariance Estimation Technique (CCET) in decomposing the Gini coefficients and obtaining the concentration index of post-payment income. In the study the estimates for horizontal inequity are computed as residuals. This computational process was similar to that performed by Bilger (2008), in his analysis of progressivity, horizontal inequity and reranking caused by health care financing for Switzerland. He utilized the Swiss Household Income and Expenditure Survey to obtain data on General taxes, Social insurances, Private insurance, Direct Payment and NPI. The components of the AJL decomposition effects were computed but horizontal inequity is computed as a residual. This is done to avoid the problem of computing many post payment Gini coefficients based on the number of prepayment income groups.

In the study conducted for Canada, Zhong (2009) used data obtained from 5 different time points, 1986, 1992, 1996, 2000 and 2004 from the Statistics Canada Survey of Household Spending (SHS) and the Family Expenditure Survey (FAMEX) on the extension to decomposition of the redistributive effect of health care finance. Unit of analysis was the household and two Payment sources: Taxes and OOP payments were equalized using the AJL equivalent scale. The equivalent scale parameters were set to 0.5.The optimal band -width for close income equals adopted in the study follows the approach by (Van de ven et al., 2001).The estimates derived from V were maximizedfor the entire income distribution. The study the adopted the AJL decomposition method using close income prepayment equals but it was extended by separating the effects of differences in the average health payment rate or tax rate (g) from the effects of differences in tax structure. The horizontal effect was also decomposed into two components: a measure of the degree of differential tax treatment and an average tax rate g. also the contribution of g was separated from the contribution of the tax structure for the reranking effect, this term measured the contribution of tax payment to the RE resulting from reranking.

Sanwald and Theurl, (2015) in a distributional analysis conducted for the Austrian health care system utilized the Austrian Household Budget Survey 2009/2010 in their study. The study adopted the AJL decomposition model. The empirical estimates of the decomposition were obtained using the Convenient Covariance Estimation technique following the specification of (O'Donnell *et al.,* 2008). Two categories of ATP were used in the study one based on household net income and the other which is the disposable household income obtained after subtracting expenditure for the basic necessities of life (less OOP) alongside four categories of out-of-pocket payments namely prescription fees, over the counter pharmaceuticals, therapeutic aids and Physician services.

The method utilized in obtain the estimates of the DJA model is the Non-Parametric Kernel Density Estimation Technique. The kernel regression through the non-parametric estimation of the expected net income utility eliminates the problem that comes with grouping of households into groups of prepayment equalsbecause it is difficult in reality to find survey data containing sufficient exact income equals (Duclos *et al.,* 2003). This estimation technique makes it possible to measure the decomposition effects without altering their definitions. The non-parametric estimation of the net income function contributes significantly to improving the decomposition effects by providing natural parameter estimates for income bands required in decomposing vertical equity, horizontal inequity and reranking effects. This method transfers the normative decision of determining income equals from the researcher to a statistical exercise (Ichoku *et al.,* 2005).

The components of the redistributive effect in the DJA model are estimated by initially computing different aggregate welfare functions and subsequently the corresponding Atkinson-like inequality indices. The vertical, horizontal and reranking effect are obtained by a sub group decomposition of the Atkinson inequality index using the Kernel regression. "this involves passing to an artificial income distribution in which every body in $k = 1, 2,\ldots,K$ get the equally distributed equivalent income for that group rather than the mean in order to get the between group inequality. When this is done a multiplicative decomposition emerges where the weights are income shares*"*(Lambert, 2001). The Atkinson Index I_F takes the value of 0 and 1. $I_F = 0$ if there is absence of inequality in the income distribution because income is equally distributed. It is uncertain if I_F would assume the value of one if inequality is maximum The Atkinson measure of inequity is adjudged as an improvement over the Gini index because it is based on an ethical flexible social welfare function that incorporates parameters which measure the extent of the policy maker's aversion to inequity (Ataguba, 2012).

Bilger (2008), in estimating the decomposition effects of the Atkinson inequality index for the Swiss health care financing system utilized the non-parametric estimation technique of the Epanechnikov kernel. This was done following the work of Fan (1992). Epanechnikov kernel was applied because it possesses the property of automatically correcting for boundary bias and are asymptotically optimal amongst all linear smoothers. In a study conducted for South Africa on health care financing and income inequality (Ataguba and Mclntyre, 2012) followed the DJA methodology in analysis variables obtained from the Income and Expenditure Survey (IES) (2005/2006) these included direct taxes, out-of-pocket payment, personal health insurance and indirect taxes. The kernel regression was applied in computing estimates of the redistributive effects. The major challenge faced in the estimation process was the choice of parameters for the aversion to rank inequality υ and the aversion to risk or uncertainty in the post-payment income ε. (Duclos *et al.,* 2003) recognises that empirical values given to these parameters depend on what they call a "leaky bucket" or the extent of society acceptance of cost incurred when income is redistributed from the rich to the poor. The values used in the study followed the values used in other studies by (Bilger, 2008; Cavagnero and Bilger, 2010). Bootstrap methods were employed in obtaining estimates for the standard errors for the value decomposition effects.

In a related study for Argentina,Cavagnero and Bilger, (2010)utilized survey data on household consumption expenditure. Direct and indirect taxes, social health insurance (SHI), private health insurance premium (PHI) and out-of-pocket health care payments were obtained from three household surveys Encuesta de Impacto Social de la Crisis Argentina (EISCA), the Encuesta Nacional del Gasto de los Hogares (ENGH) and the Encuesta de Desarrollo Social (EDS). The decomposition estimates were obtained by initially deriving several welfare functions and their corresponding inequality indices. This exercise was performed using the Epanechnikov Kernel in addition to a "plug-in band with selection" see (Bilger, 2008). Rather than obtain the standard errors directly, the Bootstrap method was applied in deriving them.

In a paper on the distributional analysis of out-of-pocket health care financing in Nigeria, (Ichoku *et al.,* 2010) adopted the DJA methodology. The empirical estimates of the DJA decomposition were derived using the Nonparametric Gaussian Kernel regression. This estimation technique does not require theoretical assumption about the income distribution of the study population. Values of υ and ϵ were chosen following Duclos *et al.,* (2003).

2.4.3 Adjusting Household Survey Using Equivalent Scale

In the measurement of ability to pay, most surveys use the household as a unit of analysis because collecting consumption expenditure/ income data on an individual basis is both time-consuming and expensive. Cases exist where it is impossible to assign consumption to specific individuals especially where it involves collective goods shared by the household like housing. O' Donnell *et al.,*(2008) observed that most times interest for studies on progressivity, horizontal inequity and reranking is in the area of individual consumption or welfare. Therefore, household estimates of aggregate consumption are adjusted to reflect household size and composition using a deflator, or an equivalence scale. This can be done using various methods including the per capita household consumption expenditure approach. The per capita household consumption despite being a convenient measure of living standardsthat accounts for household size, has been criticised on the ground that it assigns to all member of the households the same level of welfare irrespective of their individual differences (Ataguba, 2012). This approach also ignores household economies of scale that occur because some goods and services consumed within the household have public good characteristics; that is, they generate benefits for other household members besides the major consumers. Furthermore, age or gender specific differences in consumption needs (with particular reference to the consumption needs of children relative to adults) may occur (Ataguba, 2012).

In order to tackle the issues raised above O'Donnell, *et al.,* (2008) notes that "equivalence scales can be constructed as some function of the household size and demographic composition provided estimates are available for household economies of scale and the cost of children". Adult equivalents (AE) in the household can be defined as:$AE = (A + \propto K)^{\theta}$. where A is the number of adults in the household, α is the cost of children, and θ captures the extent of economies of scale K is the number of children, (Cirto and Michael, 1995). The challenge is to determine the appropriate values for α and θ. For developing nations, the values for α should be the region of 0.3 to 0.5 and for θ between 0.75 and 1 because economies of scale are fairly limited, and food constitute a large and important share of total consumption Deaton and Zaidi (2002).

Studies on progressivity and the overall redistributive effect of health care payments Yu *et al.,*(2008); Zhong (2009); Mills *et al.,*(2012); Akazili *et al.,* (2012); Munge and Briggs, (2014);Cavagnero and Bilger; (2010) have utilized equivalent scale. In a study on progressivity of health care financing in Kenya, Munge and Briggs (2014),equivalised for household size were made by applying equivalent scale to household consumption expenditure following Deaton and Zaidi (2002). Wagstaff and Van Doorsaler (1997), in a decomposition study for the Netherlands adjusted household income using equivalent scale where the cost of adult and the cost of children following Aronson et al., (1994) are both fixed at 0.5. the equivalent scale is calculated as the square root of the sum of the half the number of children and the number of adults.

Yu *et al.,* (2008), study conducted for Malaysia, derived the estimates for adult equivalent in their progressivity analysis by modifying the aggregate household consumption expenditure to capture household composition and size following the approach proposed by (Deaton and Zaidi (2002).This method of adjusting total household income or consumption expenditure for household size and structure was adopted in Argentina. Per adult equivalent income was obtained by adjusted total household income Cavagnero and Bilger; (2010). Studies exist that did not employ the equivalent scale in adjusting for total household consumption expenditure or total household income (Ichoku et al., 2010; Ichoku et al., 2011; Almasiankia et al., 2015).

2.5Review of EmpiricalLiterature

Empirical findings about the progressivity of health care payment optionsin Sub-Saharan Africa abound. Studies on the interaction between progressivity, horizontal inequity and reranking in developing counties especially for African countries remains comparatively sparse.

2.5.1 Empirical Review of Vertical Equity or Progressivity in Health CareFinancing

Progressivity studies have been conducted for high income, middle income and low-income countries to assess the disproportionality in measure of living standard occasioned by health care payments. These studies differ based on the following; Firstly, estimation technique employed in the study. Secondly, the nature of data employed in the analysis of vertical equity; Micro data (National household survey data) and Macro data (National Health accounts (NHA)). Thirdly, differences in the measure of "Ability to Pay": developing countries employed consumption expenditure as their ability to pay measure while most developed countries utilize income. Finally, other studies conducted their analysis beyond the scope of progressivity to include such themes as; measuring the catastrophic and the impoverishing effect of health financing scheme, while others addressed issues relating to utilization of various healthcare services and benefit incidence analysis.

In a study conducted in Malaysia using the Malaysian household expenditure survey data Yu *et al.,* (2008) assessed inequalityin the health financing system with the progressivity of each financing source and the entire financing system determined via the use of concentration index and Kakwani index. Sensitivity analyses were conducted using three measures to test the sensitivity of theKPI towards different choice of ATP measures and the application of varying equivalent scales. First, average household payments and consumption expenditure. Second, ATP measure was income and third, non-food consumption expenditure. The results were compared with the base; the equivalent payments and consumption expenditure.

The study established that the health care financing system for Malaysia which is primarily a tax financed system was mildly progressive (KPI /0.186). This arose because of the Malaysia two tier health systems, comprising a user charged private sector and a heavily subsidized public sector. All sources of health care contributions apart from indirect were progressive. Indirect taxes which was regressive. Direct taxes were the most progressive finance source. The sensitivity analysis using different equivalent scale within the uncertainty interval of $\pm$ 0.01 did not alter the result of the estimated Kakwani index.The three different ability to pay scenario did not have any impact on the result of the Kakwani index. The progressivity result of the five financing sources was also not altered. The only exception was the out- of- pocket payment, when income employed as an ATPmeasure. The KPI results were mildly regressive instead of mildly progressive compared to when the base(per adult equivalent household consumption) was utilised as the ability to pay measure.

In the analysis of equity in Brazilian healthcare system, Uga and Santos (2007), applied both micro (National Family Budget Survey) containing both income and expenditure of Brazilian families and macro data (SUS) to obtain the sources of tax revenue that finance the national health system. The result of the study unravelled high level of income inequality as shown by the Gini estimate of 0.5703. In general, it was observed that funding of the entire health system was slightly regressive. This was because direct taxes and private insurance premium were progressive. Indirect taxes, contribution to social security financing and out-of-pocket payments wereheavily regressive. Spending on medicine was very regressive and absorbedthe largest share of out-of-pocket expenditure for all income deciles, butincreased as population income decreased.

Abu- Zaineh, (2009) in a study conducted for two regions of the Occupied Palestinian Territory using the data obtained from Palestinian representative household survey on health spending and utilization (2004), employed the aggregate summary measures of inequality (Kakwani index and Reynolds Smolensky index) and the disaggregate analysis. Consequently, the bootstrap test was utilised to determine the significance level of the KPI results. The findings revealed that overall, healthcare financing was significantly regressive and out- of- pocket health care payment absorbed a large chuck of household prepayment income. This finding had a significant negative effect on the attendant inequality of incomeforboth provinces. The regressivity of the out- of-pocket contributions at precise quantiles of the distribution was statistically confirmed by the disaggregate analysis, indicative of the relatively huge burden of direct health care expenditures on least well-off group of the population. While the aggregation method did not establish the progressivity of the prepayment scheme, the disaggregated approach revealed that social health insurance was progressive and significant for those on higher income quantiles.

A similar study conducted in Kenya, on the progressivity of health care financing using data from the Kenya National Household Accounts (KNHA) 2007,Munge and Briggs (2014), applied as the proxy for prepayment income or ATP: food expenditure plus non-food expenditure gross of taxes and contributions to the National health insurance fund (NHIF) as Measure for consumption and income. Furthermore, adjustments were made for household composition using equivalence scales. Health financing source included; social health insurance, private health insurance, direct taxes, indirect taxes and out-of-pocket payments for health. Concentration indices were employed to estimate the inequality in the income distribution arising from health payments and Kakwani index of progressivity was employed in the study to test for progressivity. For the disaggregated analysis, the Bootstrap method (BTS) was further applied to test the sensitivity of Kakwani index to differences in equivalent scale and the use of income as an alternative source of ATP apart from consumption expenditure previously used. The findings of the study revealed an overall regressive health care funding system in Kenya, withdirect health payments being the most regressive source of health funding. While other payments such as direct taxes, indirect taxes, private health insurance and social health insurance were proportional. In particular, direct taxes, indirect taxes, private health insurance were sensitive to employing income as a substitute measure of household's welfare.

Other studies on equity in health care financing have extended the scope of progressivity studies to include themes such as measuring catastrophe and the impoverishing effect of health financing, while others have conducted research on equity in assess with particular reference to utilization and benefit incidence analysis. Mills *et al.,* (2012) work on equity in financing and the use of health care in three African countries: Ghana, South Africa and Tanzania. The study, extended the scope of equity research by testing for not only progressivity but catastrophe in health systems associated with health payments and conducted a benefit incidence analysis {BIA} on the distribution of health services in the three countries. The Kakwani index was used to estimate progressivity but no sensitivity test was conducted. Moreover, the test of catastrophic health payment involved calculating catastrophic spending on health care as the percentage of household consumption expenditure devoted to out-of-pocket payments on health services. Spending was adjudged catastrophic if it exceededthe World Health Organization (WHO) threshold of 40% or more of non-food household expenditure. Monetary benefits utilization rate for each category of health services, in both private and public health sectors, was calculated and multiplied by the unit cost of the service.

The results showed that generally health care financing, was progressive in the three countries and out- of pocket payments was regressive in all three countries but especially in Ghana and Tanzania where out - of- pocket payments for health constituted a very large portion of total health care expenditure. Generally, taxes were progressive: Direct taxes: were progressive in all three countries and indirect taxes (VAT, fuel levies, excise duties and import duties: were regressive in South Africa but progressive in Ghana and Tanzania. VAT was marginally progressive in Ghana and fuel subsidies were regressive. Contributions to the National Health insurance for the informal sector in Ghana and the community health insurance scheme in Tanzania were regressive. While the National Health insurance scheme for the formal sector involving mandatory contributions and private voluntary insurance health payments by the formal sector higher- income employees in South Africa were all progressive. The proportion of the population incurring catastrophic expenditure due to health care was 2.43 per cent, 1.52 per cent and 0.09 per cent for Ghana, Tanzania and South Africa respectively. The scenario was worse in Ghana due to long history of high user fees at public health facilities with people lacking National health insurance cover being the most severely affected. The overall distribution of service benefits in all three countries favoured the wealthy income group with service being pro- rich in South Africa and only slightly so in Tanzania with the burden of illness being greater amongst lower-income groups.

Akazili *et al.,* (2012),conducted a related study for Ghana on the progressivity of health care financing and benefit incidence of health service utilization. The study employed the Ghana living standard survey (GLSS) household survey data and the SHIELD surveys, which provided data on health service utilization. The Measure of ability to pay was the household reported data on consumption and expenditure on food, housing and other non-food items.This was converted to per adult equivalent household consumption also the health payment variables included those employed earlier in previous studies such as: direct taxes, indirect taxes, out-of-pocket contributionsfor health, private and government health insurance. The concentration index {CI} was utilized in the determination of the incidence burden and Kakwani index was employed to estimate progressivity.

The benefit incidence was calculated by multiplying the utilization rate of each type of service for each socioeconomic by the unit price of that service. Findings generally showed that health care payment mechanisms in Ghana were generally progressive. General taxes were progressive and only fuel levy was regressive. Also, VAT which is a contributory levy to indirect taxes and the national health insurance fund which were generally regressive in high income countries were progressive. It could be that in the case of Ghana, VAT was removed from goods and services patronized by low income earners. The progressivity of the overall taxes was informed majorly by the progressivity of direct tax as seen in the case of Asian countries. Payments for health care out-of-pocket were regressive because direct payment to private health care providers and user fees charges. The national health insurance for both formal and informal sector was progressive. This was notably dominated by the progressivity of the formal sector contributions; the contributions of the informal sector were regressive because a flat rate of contribution was chargedtheresults were similar to those obtained by Mills et al (2012). The distribution of total benefits from using health care in Ghana was pro- rich at all levels of care. The richest quintile gained almost double the benefit gained by the poorest.

In another study conducted for Africa, (Cissie *et al.,*2007), analysed progressivity and horizontal equity in health care funding and distribution for the capitals of four central African countries. Data applied in the research was based on (1998-1999) Household Surveys of the four countries capitals. Proxy for the ability to pay was obtained from data on consumption expenditure (food and non-food) per adult equivalentincome. Unlike other studies such as (Mills et al, 2012and Akazili et al, 2012) the healthcare payment variable for this study was just the out-of-pocket expenditure. The need variable was reported morbidity using a three-point scale of from not sever to very sever. Majorly the Concentration Curves/ indices and Kakwani index were used in the study.Testing statistical significance, the Distribution-Free Techniques wasutilized to determine dominance between the curvesand perform statistical estimations to measure progressivity or horizontal equity for the entire distribution.

In each of the four capitals, the KPI estimate for the OOP was regressive. The OOP was more regressive in Conakry and Bamako than in Dakar. Health care utilization was also found to be skewed in favour of the wealthy who receivedmore medical resources than thepoor. Whereas results were clear-cut about the presence of vertical inequity in all four African capitals, they appear ambiguous on the subject of horizontal equity. In three of the four capitals, some level of horizontal inequity wasconfirmed for individualssufferingsevere disease. This finding on the regressivity of healthcare financing could be attributed to the nature of the predominant financing mechanism in these capitals, which was out- of- pocket payment for health.

In a study conducted in Nigeria, Ichoku and Fonta (2006) in a partial study on the distributional impact of healthcare financing using cross sectional data from Enugu state in Nigeria, observed that the out- of - pocket healthcare paymentswere likely to lead to high incidence of catastrophic healthcare financing, impoverishment.Furthermore, the incidence of catastrophic financing was likely to be higher if the policymaker was averse to inequality in catastrophic financing.

Empirical studies on the distribution impact of various health care financing sources show that as a rule when direct taxes are progressive and their percentage in total taxes are larger in comparison to indirect taxes overall taxes become progressive. In the studies revieweddirect taxes were progressive. This implies that the better – off spent a larger percentage of their earnings on their health care payments in form of direct taxes(Wagstaff and Van Doorsaler, 1992; O'Donnell, 2008; Yu et al, 2008).A variety of taxes are used to finance health care, and rarely are taxes ever earmarked to finance healthcare but there are exceptions such as in the case of Ghana 2.5 per cent of value added tax (VAT) is allocated to health care funding (Akazili et al, 2012).

Indirect taxes which comprise of VAT, fuel levies, excise duties and import duties are a regressive source of health payment in developed countries especially European countries because the tax payment share in income is a decreasing function of income, but they are progressive in developing countries. Wagstaff and Van Doorsaler, (1992) in a Cross country survey for 10 OEDC countries, affirmed that indirect taxes were generally found to be regressive in all countries except Portugal and Italy where they were found to be progressive. This was due to higher tax rate imposed in these countries as against a flat tax rate on luxury goods consumed by the high income groups. For low income countries indirect taxes were non- regressive.

In a study conducted in Ghana, South Africa and Tanzania Mills *et al.,*(2012) observed that indirect taxes were regressive in South Africa but progressive in Ghana and Tanzania. The result of the regressivity of indirect taxes, for South Africa was in tandem with that of OECD countries and some middle and high-income countries in Asia. The progressivity result for Ghana and Tanzania was in consonance with those of low and middle-income countries in Asia. Indirect taxes were progressive in Ghana because VAT was removed from goods and services patronized by low-income earners. As the economy grew the lower income socio economic groups were able to buy a wide variety of goods and services which were hitherto exempted from VAT and this cancelled out the regressive pattern of fuel and kerosene levy.

Social health insurance contributions differ from one country to another country in terms of the enrolment criteria, premium rates, and scope of coverage and the incidence could either be progressive or regressive. Wagstaff and Van Doorsaler (1992) noted that Social health insurance contributions results were regressive for the three countries France, Netherlands and Spain where it is the predominant mode of healthcare financing because contributions tend to be proportional to income up to a ceiling. In Italy,social health insurance was mildly progressive due to the following reasons: firstly, while contributions may be regressive on earnings, they are progressive on income. Secondly, professional units face different payment rate, with individuals who face lower average contributions tending to have relatively smaller declared incomes.

The progressivity of the Portuguese social health insurance arose from the fact that contribution to the scheme was optional but earning related, and the scheme covers specific workers who are in the higher income group. Malaysia and Netherlands have various social health insurance schemes catering for various classes of persons. In the case of Netherlands, there a two types of social health insurance contribution the sickness fund and the AWZB.The Sickness funds were regressive because majority of people who opted out of the scheme and were instead privately insured earned huge wages but the AWBZ was mildly progressive (Wagstaff and Van Doorsaler, 1997). Two kinds of social insurance programs exist in Malaysia namely the Employee Provident Fund (EPF) and the Social Security Organization (SOCSO). The progressive pattern of the social insurance contribution could be attributed to the offsetting effects of the mildly progressive EPF contributions on the regressive SOCSO contributions. The progressive pattern of the social insurance contribution could be linked to the offsetting effects of the mildly progressive EPF contributions on the regressive SOCSO contributions. The regressive pattern of the SOCSO contribution arose due to the imposition of an upper earning limit for the SOCSO contributions and the exclusion of the wealthy from the scheme. Therefore, Yu et al., (2008) captured progressivity overall as the summation of EPF and SOCSO for household's payments.

Private health insurance payments are not a common source of health care financing in developing countries, but they happen to be the major source of health care payment in developed countries such as the United States of America. They are a voluntary form of contribution purchased primarily by the affluent that chose policy and pay their premium in accordance with their capacity to pay with the sole purpose of protecting themselves against catastrophic health payments. In Malaysia, the private health insurance contribution was the second most progressive source of health care payment after direct taxes (Yu *et al.,* 2008). They are progressive in the Netherland (Wagstaff and Van Doorsaler, 1997). For Kenya, Munge and Briggs, (2014) pointed out that Private health insurance payments were progressive but further investigation revealed that only a small fraction of the Kenyan work force precisely those working in the formal sector were enrolees of the private health insurance scheme. Stressing that the private health insurance payments might not adequately capture the actual distributional burden of payments for the financing of health care. In systems where private insurance is purchased by the wealthy to supplement health coverage, the payments tended to be progressive but in systems where private insurance was the major source of health-care funding, the health system tends to be regressive (Wagstaff *et al.,* 1999).

Out- of- pocket payment for health are a regressive or mildly progressive pattern of financing for both developed and developing countries. Countries that rely heavily on out- of- pocket spending with such spending constituting more than 50 per cent of total health care expenditure were most likely to have overall a regressive system of healthcare financing. Studies conducted for African countries revealed that out- of-pocket health payments were regressive irrespective of the region where the studies are conducted within the continent. Cissie, *et al.,* (2007), noted that in four Central African capitals, Conakry, Abidjan, Dakar and Bamako, the Kakwani index of progressivity reveal that this payment mechanism was regressive for all four capitals. This finding was corroborated for Tanzania, Ghana and South Africa (Akazili, 2012; Mills, 2012; Meit and Borgi, 2010). In the case of Ghana, the regressivity of the health payments was attributed to direct payment to private health care providers and user fees charges.

In Nigeria,contradictory results exist from previous studies on the vertical equity analysis.Olaniyan et al (2013)study on equity in health care expenditure utilized the Nigerian Living Standard Survey NLSS (2003-2004). The KPI estimate was (-0.39) signifying that out- of - pocket healthcare contributions were regressive and in tandem with the results obtained from other related studies in Africa (Mills *et al,* 2012 and Akazilli, 2012). The result obtained by Olaniyan et al (2013) conformed to a prior expectation especially in countries, where direct mode of payment for health is the major source of healthcare funding. Olaniyan *et al.,* (2013) established from the aggregation result that the poor spent nine times more of their income on OOP expenditure aggravating inequality in the country.

Lawanson and Opeloyeru (2016) using the Nigerian living standard survey (NLSS, 2003- 2004) data set, observed a wide income disparity among the socio-economic groups in Nigeria, while the bulk of health care expenses was undertaking by the least poor quintile.This accounted for about two-third of total healthcare expenses. The results of Gini coefficient (0.4)obtained indicatedthe presence of income inequality for Nigeria. The Kakwani index for the entire quintiles was positive (0.18), indicating that out-of-pocket healthcare payment was progressive, and that the proportion of household resources absorbed by healthcare payment rose with increase in household income.

In a related study conducted in Nigeria by Omotosho and Ichoku, (2016) which employed data from the Harmonized Nigerian Living Standard Survey 2009/2010to determine the progressivity in health care payment for Nigeria and its six geopolitical zones. It was discovered that out-of-pocket payment was a progressive healthcare financing mechanism across the income quintile and geopolitical zones.

The available progressivity studies in Nigeria (Olaniyan et al, 2013; Lawanson and Opeloyeru, 2016; Omotosho and Ichoku, 2016) reviewed in this section employed the Kakwani index to test for vertical equity in order to determine the magnitude of disproportionality in the income distribution orchestrated by health payments. None of these studies performed a disaggregated analysis totest the dominance relation between curves, which is the criterion for making inequality comparisons between concentration curves and Lorenz curves. The disaggregated analysis involves applying statistical inferences to measure progressivity not only in the overall distribution, but also at the level of different income ranges(O' Donnell*et al.,* 2008). This study filled this gap by employing the Kakwani index and the Multiple Comparison Estimation Technique (MCET) to the General Household Survey data for 2010/11; 2012/13 and 2015/16 to test for the progressivity of the Out-of-pocket and the Health Insurance Contribution ($OOP_{insurance}$) in Nigeria.

2.5.2 Empirical Review of Vertical, Horizontal and Reranking Effects in HealthCare Financing

The issue of redistribution in health care financing is a recent development. The earliest works had been carried out majorly in OECD countries (Wagstaff and Van Doorslaer, 1997; Wagstaff et al, 1999; Bilger, 2008). The redistributive studies for developing countries especially Africa are rather sparse. In the studies conducted, for both developed and developing countries on the redistributive effect of health care payment on the income distribution the following major issues have been identified from the existing literature. Firstly, different models have been applied in the literature. Secondly, various health financing sources have been utilized in these studies.

Different methodologies have been employed in the literature by various authors and these have produced varying results. These methodologies include; the AJL, UL, VCL and DJA methods. Some studies have used just one method and others have combined different methods. Abu-Zaineh, (2009) applied the UL methodology in the study conducted for the occupied Palestinian territory. Wagstaff and Van Doorsaler, (1997) applied the AJL technique for the study conducted for Netherlands. In a study on progressivity, horizontal inequity and reranking carried out for the Switzerland health system Bilger (2008) applied the AJL, VCL and the DJA methodologies to a combination of micro and macro data. The Micro data; Swiss household income and expenditure survey [SHIES] provided information on income and consumption, while the macro data applied were the (HSC and Swiss national health accounts [SNA].

The SHIES, like other household surveys, did notprovidedata on health care funding options, therefore, to obtain data or proxy variables for all funding sources, macro data from HSC and the Swiss National Accounts (SNA) were combined with micro data from SHIES. This process involves standardizing the proxy variables gotten from SHIES in order to adjust this with the more reliable total financing data obtained with macro data. The macro financing sources were adjusted in order to make them compatible with micro data. Income taxes, corporate taxes and indirect taxes were allocated to the household based on information obtained from the Swiss national health accounts- SNA. For the micro variables the household, is the unit of analysis. Data on gross income, direct health payments and social insurance contributions were obtained directly from the (SHIES). Findings from the research show that both the V_{AJL} and V_{VCL} increase with the choice of income bandwidth due to averaging and appropriating effects. Re-ranking from both the AJL and VCL methods diminishes with the band width choice because altering groups by households became more problematic as groups widen, also horizontal inequity increased as groups widen, this was similar to the vertical effect and the AJL effects were much more affected than the VCL effect by bandwidth choice.Findings from the study revealed that total health system financing was strongly regressive and had a pro-rich negative redistributive effect. It caused income inequality to increase by 0.02. Vertical effect constituted 85.6% of the pro-rich redistribution, while horizontal inequity 7.6% and reranking 6.8% respectively. All inequity issues occurred in the Swiss healthcare financing arrangement, but the vertical inequity dominated.

The second issues arising from the redistributive studies focused on the impact of various health system financing arrangements on the income distribution. Findings from empirical literature indicated that out-of-pocket spending on health generally induced a pro-rich redistribution both in developed and developing countries.In Switzerland, direct financing (OOPS) produced the second greatest redistributive effect. It made income inequality increase by 0.00549. Even though “pro-rich” with vertical inequity dominating (77.8%), direct financing also generated horizontal inequity (12.4%) and reranking (9.8%). Reranking resulted from horizontal inequity. Indeed, sick and healthy pre-financing equals faced different out-of-pocket payments, which resulted in horizontal inequality, aspoorer healthy ones overtook richer sick individuals, leading to reranking (Bilger, 2008). Contrary results exist for Argentina where out-of-pocket spending (OOPS) exhibited a pro- poor redistributive effect (RE > 0). This could have occurred due to the introduction of a government social security programme that protected poor households from increased health spending. This resulted in the move from a pro- rich distribution in 1997 to a pro- poor distribution in 2002. It was also likely that the poor forsook pursuing care. The positive vertical effect clearly dominated the horizontal and reranking effects, therefore the pro-poor redistribution RE > 0 induced by the out- of-pocket spending occurred majorly due to the unequal but unfavourable treatment of unequals. The value of V> 0 indicated that out- of- pocket spending was a progressive source of health care payment.

For redistribution issues associated with private health insurance (PHI), the results vary from one country to another and depend on the type of cover. PHI was regressive in France, Ireland, Switzerland and the United States of America where it constitutes the major source of health care financing (Van Doorsaler *et al,* 1999). This occurred because approximately 32 million Americans are uninsured and only the high income group can afford PHI due to high premium rate. Furthermore, a large spectrum of the insured population can only access individual risk-rated policies which are costlier than bulky group policies and provide inadequate cover. In addition, people with this insurance risk growth in premium or risk forfeiting cover once their health deteriorates (Evans and Etienne, 2010). One pertinent reason adjudged for the pro-rich redistributive effect of PHI in some countries was that payment for health were not linked to individual's capacity to pay (Van Doorsaler *et al,* 1999). There were also countries such as Germany and Argentina with a pro- poor RE which was observed when PHI was progressive. This occurred majorly because of the positive contribution of vertical effect to the components of differential treatment (Horizontal and reranking effects). In Germany, the PHI cover was purchased majorly by the higher income groups and this gave rise to a pro-poor redistribution (RE > 0) and a positive vertical effect (Van Doorsaler, et al 1999). The result obtained for the occupied Palestinian territory for the PHI, revealed an insignificant vertical effect for the two territories of the West bank and Gaza Strip. This could be attributed to the fact that across different income levels very small proportions of households have private insurance (Abu-Zaineh, 2009).

The studies conducted for social health insurance (SHI) indicated that findings for redistribution depended on the following factors; level of enrolment, contributory rate and the nature of the scheme. Overall findings showed that (SHI) was generally a regressive payment scheme having a pro-rich redistributive effect (RE < 0). Wagstaff and Van Doorsaler (1997) study for the Netherlands applied the AJL decomposition framework involving the convenient covariance method. Findings from the study revealed that the Dutch health care financing system has a pro rich redistributive effect and this would have been 14 per cent less in the absence of differential treatment, the major share coming from reranking approximately 11 per cent. Much of this was attributable to system's regressive nature, which occurred due to the duality of the social health insurance financing mechanism. Sickness funds were regressive because majority of people who opted out of the scheme and were privately insured and wealthy. The value of RE [-0.01288] implied that the regressive nature of sickness fund was attributed to the regressivity of V which dominated both H and R. On the other hand,AWBZ was mildly progressive with a RE of (0.0012) it would have been 91.8 per cent more pro-poor in the absence of differential treatment. Overall findings for social health insurance revealed a negative pro rich distributive effect because of the combined effect of a mildly progressive AWBZ scheme and a regressive sickness fund. In both cases, the vertical decomposition effect dominated the differential treatment.

Similarly, for Switzerland, the results of the DJA decomposition revealed that the dominant equity issue was vertical inequity. This resulted from the social health insurance (SHI)contribution which was the primary financing source for health payment in the country. Besides, it constituted the payment contribution with the greatest redistributive effect and produced a negative redistributive effect of (−0.009). The redistribution consisted majorly of a negative vertical effect. This arose because premium was not fixed based on income and the premium payment constituted a large share of budgetary expenditure for poor households than the rich oneresulting in apro-rich redistribution. Reranking occurred all through the income distribution and this was caused by a small but concealed horizontal effect. The economic implication of this was that competition between social health insurers and price heterogeneityacross regions induced horizontal inequity, which also produces reranking.

Most studies on the redistributive effect of direct taxes were conducted for OECD countries with exception of the studies conducted for Argentina and South Africa (Cavagnero and Bilger, 2010, Ataguba and Mclntyre, 2012). Ataguba and Mclntyre, (2012) in their study carried out for South Africa on health care financing and income inequality utilized variables from income and expenditure survey (IES) (2005/06) which included; direct taxes (personal and corporate income tax), personal health insurance, indirect taxes and out-of-pocket health payments. The study also employed the DJA methodology in the analysis. The results indicated that financing health care through direct taxes and private health insurance premiums were progressive and resulted in a pro- poor redistributive effect (RE > 0) and led to a reduction in income inequality. Conversely, Indirect taxes and out-of-pocket payments worsened overall inequality in the distribution of income. Overall health care funding in South Africa reduced the income gap between the haves and the have not. The positive total redistributive effect of health care financing (RE > 0) was due to general taxes and specifically direct taxes. Indirect taxes induce a negative redistribution effect (RE < 0) in favour of the rich which increase income inequality in the post financing income distribution of those with prepayment income. This negative distribution was largely attributed to the vertical effect. Indirect taxes are generally regressive (V< 0). In cases where the positive redistributive effect of direct taxes (RE > 0) dominated the negative redistributive effect of indirect taxes, results for general taxes would inevitably produce a pro- poor positive redistributive effect (Ataguba and Mclntyre, 2012; Bilger, 2008).

The redistribution of total health care financing depends on the relative share of each payment mechanism and the relative estimates of their vertical, horizontal and reranking effects. In a study conducted for Argentina, which involved comparing the equity analysis before and during the economic crises, Cavagnero and Bilger (2010) applied the DJA alongside the non- parametric bootstrap methodology and the corrected concentration index. Data was gotten from three different surveys these include: (EISCA)which was conducted in November 2002 and contained information on both household expenditure and the utilization of health services, (ENGH) comprised of data on household expenditure conducted 1997 and (EDS), with information on health service utilization for the same period. The sources of financing employed in the analysis were: indirect taxes, direct taxes, social health insurance, private health insurance and the out- of-pocket payment. Gross income was calculated as the sum of household expenditure including all contributions towards health care while net income was computed as gross income net of household's total expenditure. All household expenditure was equivalised. Overall the redistributive effect was positive both before and after the economic crises. The values of RE obtained were greater after the crises with a vastly significant change. This attributed primarily to direct payments which became more progressive during the economic crises. The vertical effectfor the two years was progressive. Estimates of HIand RR were significant. The average percentage of income spent on health (g) declined slightly. The estimates of VE for Direct taxes were positive for both periods. Hand Rwere not significantly different from zero.

Abu-Zaineh (2009) in his study conducted for the occupied Palestinian territory applied the representative household survey data on health expenditure and utilization (2004)**.** The study utilized three health payment variables these were out-of- pocket health payments, private health insurance and government health insurance**.**The proxy for Prepayment Income or ATP wasoverall household expenditure including health care expenditure and adjusted through an equivalent measure. While Post payment income was similar to prepayment income net of all health care payments. The UL methodology was employed to decompose income inequality in the absence of equal-income groups into V, H and R effects. BTS econometric method was applied to test the statistical significance of each decomposable measure of inequality. The result revealed increased level of income inequality via health payments. The prepay Gini estimates (Gx) was 0.5 and 0.4, in the West Bank and Gaza Strip respectively. The income inequality was worsened due to direct payments for health. The overall redistributionfor the total health payments implied a pro-rich financing system. The results reveal that health care payment induced income inequality. This was due to the combined effect of a pro- rich redistribution for out-of- pocket payment for health and the pro-poor redistributive effects of government health insurance and the premiums of private insurance schemes. The magnitude of their redistributive effects (RE)of the private health insurance were quite marginal.

There have also been some extensions to the analysis of redistribution. In the study conducted for Canada, Zhong (2009) used cross-sectional data of five years 1986, 1992, 1996, 2000 and 2004 obtained from the Statistics Canada Survey of Household Spending (SHS) and the Family Expenditure Survey (FAMEX). Unit of analysis was the household and two Payment sources: Taxes and OOP payments were equalized using the AJL equivalent scale. The equivalent scale parameters were set to 0.5. The optimal bandwidth adopted was one that maximized the estimates derived from VE. The AJL method was adopted but it was extended by splitting the impact of alterations in the average health payment rate from the effects of changes in tax structure. The horizontal effect was also split into two components: a measure of the degree of differential tax treatment and an average tax rate g. Furthermore, the contribution of g was separated from the contribution of the tax structure. The reranking effect measured the impact of tax payment to the RE resulting from reranking.

Result of the redistributive effect for five periods revealed the presence of increased inequality in the prepayment and post payment income distribution. Besides no significant changes in the overall RE was observed. The average rate (g) and progressivity of personal income tax grew from the period of 1986 to 1992 and remained at a constant level until 2004. A significant growth in the average rate (g) and regressivity was observed for the OOP. In general, out-of-pocket health expenditure worsened while tax improved the redistribution. For out- of-pocket payment this could be attributed majorly to the increased per capita health expenditure.Consequently, the negative contribution of the OOP to the VE increased incessantly. This undesirable effect was offset by the positive impact of tax to vertical effect. The finding on the overall vertical effect was ambiguous. Differential treatment has a reduced impact on the RE than the VE. The reranking effect was negligible in comparison with the horizontal effects at all points but all the same worsened over the 5-year period.

In a related study for India Mondal (2014), employed four successive rounds of data obtained from the National household survey data conducted by the National Sample Survey organization (NSSO) at both the state and national levels. The World Health

Organisation(WHO) FFC index and AJL methodology were engaged to determine the redistributive effect of health payment on the income redistribution. Furthermore, to determine the major determinants of equity in health care financing, a regressions model was developed.The dependent variable was RE and the independent variables were federal and state health expenditure, average state GDP, growth rate of mean state GDP, poverty rate of sates, Gini estimates, health coverage, and capacity of fund utilization for health by states. Estimates of the determinants of equity in healthcare funding were obtained using a pooled cross-section time series data, fixed effect estimates, and the generalized linear model (GLM).

Findings established a reduced pro-rich redistribution due to progressive health care payment over the years but this experienced a decline,the redistributive effect of health care payment for the periods; 1993, 2004, 2009, and 2011 were 0.003, 0.005, 0.005, and 0.001 respectively. Over the initial period, the RE improved but declined by 64 per cent in 2011. The decline in pro-poor redistribution could be partially credited to an 84 per cent decrease in the overall portion of pre-financing income absorbed by out-of-pocket payments (g) from 1.7 per cent in 2009 to 0.38 per cent in 2012. The result of the FFC revealed that the healthcare payment arrangement was not equitable. This could be attributed to the introduction of user fees and the high medical cost of drugs and diagnostic tests resulting in the poor households paying more for medical services than the wealthy. The Kakwani index (assuming horizontal inequity) increased between the periods 1993–1994 and 2004–2005 but declined by 92 percent between 2004 and 2009. The VE improved from 0.0004 in 1993 to 0.006 in 2004 then declined to 0.0010 in 2012. The higher value of V could be traced to the greater value of g or the lower estimates of the Kakwani index. The Kakwani index improved in 2004. The study findings showed that the vertical effect of out- of –pocket spending on income redistribution had increased between 1994 and 2004 by 15 per cent, and in 2012 decreased by 80 per cent. Differential treatment also declined over time. Also, between the periods of 2004 and 2012, the RE decreased by 63 per cent. The value of V was lowest in 2012. The implication of the result was that government-funded health care services, which were introduced from 2005 and beyond, had a positively significant effect on low-income group and produce greater equity and reduced income inequality in out-of-pocket spending.

The study conducted by Ichoku and Fonta (2006) using primary data for Enugu state and the AJL decomposition framework observed that health care financing in Nigeria exhibited a negative pro- rich redistribution. This was attributed to the out-of- pocket health care paymentwhich producedsignificant vertical inequity, horizontal inequity and reranking in the income distribution. These findings were different from those obtained in a study conducted for Nigeria by Ichoku et al., (2010). This study utilized the DJA methodology in estimating the variable of interest namely out-of-pocket health payment while the proxy for ability to pay was the household gross consumption expenditure (total expenditure of household plus health care expenditure. The post payment income was the gross expenditure net of health care cost. Results from the study confirmed thatthe OOP induced significant pro-poor redistributive effect due to the presence of a positive and significant vertical effect existing alongside high levels of horizontal inequity and reranking effects.

Ichoku, et al., (2011), in another study conducted for Nigeria applied a different methodology (the Lerman – Yitzhaki decomposition framework) to the study on the income redistributive effects of health care financing and utilized a nationally representative survey data (NLSS 2003-2004).The findings revealed that health care financing in Nigeria, which was mainly financed out-of- pocket, induced a positive redistributive effect in favour of the poor. This was due largely to the progressivity of out-of- pocket payment for health but produced a loss of social status in the income distribution due to high value of the reranking effect. These findings were similar to those obtained by Ichoku *et al.,* (2010). The highest level of progressivity and reranking were obtained in the South- East region and their lowest values in the North West. The findingsabove were contrary to those from other studies such as (Wagstaff and Van Doorsaler, 1997; Bilger, 2008; Abu-Zaineh, 2009; Ichoku and Fonta, 2006) which specify out- of-pocket spending on health as a regressive form of health care payment. The implication of the findingsfor Nigeria are that the rich spend a higher proportion of their total expenditure on health care than the poor.However, these results must be examined cautiously because the positive and significant redistributive vertical effect alongside high levels of reranking and horizontal inequity could be masking very severe problems. The poor households might not be consuming health-producing goods because they cannot afford paying for them.Invariably they have unfulfilled health care needs, which such decomposition analysis is not able to capture because the focus of such analysis is on the effect of health payment on the post payment income distribution.

In a related study but conducted for the South Eastern Part of Nigeria,Onyema et al., (2019) utilized the Lerman Yitzhaki methodology inanalysing progressivity and reranking in out-of-pocket payment for health. The findings revealed that the out-of-pocket payment was a regressive financing source that produced a pro-rich redistributive effect and increased income inequality.Ataguba et al., (2019) study for Nigeria on the redistributive effects of health Financing applied the Shapley Value Approach to data obtained from the Harmonized Nigeria National Living Standard Survey HNLSS 2008/2009. The measure of welfare utilized in the study was household consumption while the health variable was out-of-pocket expenditures involving direct payments for medical services which were adjusted using an equivalent scale. The results indicated that financing health out-of-pocket increased income inequality in Nigeria. The total redistributive effect (*RE*) for out-of-pocket payments was estimated at − 0.0002 was significant ($P<0.05$).

The studies for Nigeria on the income redistributive effect of health care financingIchoku and Fonta, (2006); Ichoku et al, (2010), Ichoku et al., (2011), Onyema et al., (2019) and Ataguba et al., (2019) employed the out- of- pocket payments as the only health care financing variable. This study extended the literature by utilizing two health payment variables namely; the payments for healthcare out- of- pocket and health insurance contributions. Given the increasing emphasis that nations of the world should move towards universal health care coverage even as expressed in goals 3 of the sustainable development goals as a means of providing access to safe and affordable medical care (SDGs report, 2016). There is the growing need to examine the effect of the social health insurance contribution on the income distribution. This study obtained empirical evidence of vertical, horizontal, reranking effect and the overall redistributive effect of both health care payments.

GAPS IN THE LITERATURE

Intrinsically the equity theory of taxation is the foundation of studies on equity in health care financing. The theory only focuses on the issue of vertical equity and horizontal equity. It does not address the concept of reranking associated with a fiscal policy.Thus, leading to the violation of the concept of "complete fairness" that extends the equity analysis to the "improper treatment of unequals".To fill this theoretical gap, the assumption that payments for health care should be based on individual's ability to pay which focuses on the vertical equity (progressivity analysis) and horizontal equityprinciples was extended. This involved adopting refinements of the ability to pay principle borrowed from models of income redistribution; Kakwani (1984); Aronson *et al.,* (1994) and Duclos *et al.,* (2003) decomposition models. This was done to capture the vertical, horizontal and reranking redistributive effects of health care financing.

Previous studies on the vertical equity analysis conducted for Nigeria Olaniyan *et al,* (2013), Lawanson and Opeloyeru (2016)have only utilized the Kakwani index of progressivity in assessing progressivity in health care financing. This summary measure of progressivity has been attributed to conceal vertical inequity that may be present at various income levels. Thus the need to perform a disaggregated analysis of the distribution burden of health care payment at various income percentile. It will be observed that none of these studies performed a dominance test of the progressivity or otherwise of health care payments.This study,filled this methodological gap by conducting adisaggregated analysis using the Multiple Comparison Estimation Technique (MCET) to determine the following; the estimate of the incidence burden of the health care contributions across various income quantile in the income distribution and the dominance relations that might exist between the Lorenz and concentration curves for the measure of progressivity.

Thirdly, studies on the interrelationship between progressivity, horizontal inequity and reranking are sparse in Nigeria. Ichoku, (2005) and Ichoku *et al.,* (2010) studies were conducted for Enugu state. Onyema et al., (2019) study was conducted for the South East zone. These studies were not representative of the inequity issues prevailing in the country. The available nationally Ichoku *et al.,* (2011), examined the vertical and reranking components of redistribution in health care financing but the horizontal inequity in health care finance was not estimated. This does not provide an inclusive measure of the inequity issues that might be prevalent in the nation's health care financing system. This gap was filled by providing empirical evidence on the degree of horizontal inequity present in the Nigerian health.The quantification of the vertical, horizontal and reranking redistributive effects of health care contributions is the appropriate measure of the overall redistribution induced by health care funding sources.

Fourthly, available studies on effect of health care financing on income redistribution in Nigeria (Ichoku 2005; Ichoku *et al.,*2010; Ichoku *et al.,*2011; Onyema et al., 2019; Ataguba et al., 2019) have so far utilizedonly the out-of-pocket payments as the health care funding variable. This study extended the work done for Nigeria by incorporating the health insurance contribution ($OOP_{insurance}$) as the second health payment variable in assessing theimpact of these health care financing sources on income distribution.

CHAPTER THREE

THEORETICAL FRAMEWORK AND METHODOLOGY

3.0 Introduction

The chapter is made up of the theoretical framework, empirical model specification, the estimation technique, data description and data sources.

3.1 Theoretical Framework

The theoretical framework for this study wasdeveloped from progressivity and income redistribution models whichwerederivedfrom theequity theory of taxation. The model for analysing progressivity of health care financing follows the Kakwani (1977) model of tax progressivity. Two decomposition models were utilized in this studyto measure the vertical equity, horizontal inequity, reranking and overall redistributive effect of health care financing. The first model follows Kakwani (1984) and Aronson *et al.,* (1994) models which are based on the decomposition of the Gini index. The model by Kakwani (1984) was modified by introducing a variable adapted from Aronson *et al.,* (1994). The variable captured the role of horizontal inequity in determining the overall redistributive of health care financing on the income distribution. The second model adopted Duclos *et al.,* (2003) model which is based on the decomposition of the Atkinson inequality index.

Following Kakwani (1977) it is assumedthat progressivity (regressivity) is measured by linking taxes to an ability to pay measure (Labour income or Consumption expenditure). Health care payment is progressive (regressive) when payment for health care is an increasing (decreasing) share of the ability to pay. It is also assumed that reranking does not occur from making health care payments. If $T(_X)$ is the health care payment paid by an individual with income$X$ and g the average payment rate. The relationship between the Lorenz curve of income $L_X$and the concentration curves for health care payments $L_T$and post-payment income L_{X-T} is specified below:

$$L_X \equiv g\, L_T + (1-g)L_{X-T} \qquad 3.1$$

Equation 3.1; shows that the Lorenz curve L_X is a weighted average of health care payment L_T and post-payment concentration curves$L_{X\text{-}T}$. It implies that reranking does not occur in the income distribution due to health care payments.

The progressivity measure in the funding of health care should capture the deviation of a giving health care financing mechanism from proportionality (pre-payment distribution of income). This will depend on twice area between the Lorenz curve for income *L(x)* and the concentration curve for health care payments $L_{T.}$

$$P_T^K = 2\int_0^1 [L_X(p) - L_T(p)]\, dp \qquad 3.2$$

Given that the Gini index of income or consumption expenditure can be expressed in relation to the Lorenz curve as one minus twice the area under the Lorenz curve;

$$G_X = 1 - 2\int_0^1 L_X(p)\, dp \qquad 3.3$$

Similarly, the Concentration coefficient of health care payments can be stated in relation to the Concentration curve as one minus the area under the concentration curve.

$$C_T = 1 - 2\int_0^1 L_T(p)\, dp \qquad 3.4$$

progressivity in health care financing P_T^K can be expressed as the difference between the concentration coefficient of health care payments $C_T$and the Gini coefficient for prepayment consumption expenditure G_X.

$$P_T^K = C_T - G_X \qquad 3.5$$

Positive values of P_T^K implies that the health care financing mechanism is progressive, and the burden of health care financing is borne by the rich households. Negative values of P_T^K implies that the health care payment system is regressive, and the poor households bear the burden of health care financing.

Borrowing from Kakwani (1984) the model of progressivity is extended by assuming the following;

i. A progressive tax or health care payment has both a disproportional effect and an equalizing (redistributive) effect on the income distribution. A progressive health care financing shifts the payment burden from the rich to the poor and makes the pre-financing income distribution less equal than the post-financingdistribution. Causing a reduction in the income gap between the rich and the poor.

ii. The population can be partitioned into *M* groups, such that in each group m, all K_m(prepayment income) units have equal pre-payment income $x_m$and post-payment income $x\text{-}t_{m,k}$, after making payments for health care $t_{m,k}$.

iii. Prepayment equals make similar health care payment $\tilde{T}^x$resulting in horizontal equity in the post-payment income distribution.$\tilde{T}^x$ is a vector of health care payments free from horizontal inequity

iv. Health care payment may result in a change in the income rank of income units on the income distribution. This reranking effect reduces the progressive health care payment. Making it less vertically equitable.

Recalling equation 3.1; $L_X \equiv g\, L_T + (1-g)L_{X-T}$. The assumption of no reranking is relaxed by assuming that health care payments in the post-payment period alter the position of income units on the income distribution. It is also assumed that the Gini coefficients are suitable measures of inequality in an income distribution (Lambert, 2001). Therefore, the Lorenz curves of prepayment income L_X and concentration curves of health care payments and post payment income L_T and L_{X-T} in equation 4.1, are replaced with Gini coefficients of prepayment income G_X, concentration coefficient of health care payments C_T and concentration coefficient of post financing income C_{X-T}. To ensure that the right hand side captures the inequality effect of health care payment, we introduce to both sides of the equation, the Gini coefficient of post-payment income (income net of health care payments) $G_{X\text{-}T}$.

The reductions induced by health care payments can be decomposed, to correspond to the following transformations:

$$G_X - G_{X-T} = \frac{g}{1-g}(C_T - G_X) - (G_{X-T} - C_{X-T}) \qquad 3.6$$

OR

$$\underbrace{RE}_{\equiv RE^K} = G_X - G_{X-T} \equiv \underbrace{\frac{g}{1-g}P_T^K}_{V^K} - \underbrace{(G_{X-T} - C_{X-T})}_{R^K} \qquad 3.7$$

Equation 3.7 is the decomposition modelwhich is analogous to Kakwani (1984). Where V^K measures the vertical redistributive effect, it is a product of the average rate of health care payment $\frac{g}{1-g}$(the share income taken up by health care payment) and the measure of progression in health care financing P_T^K. $R^K$is the reranking effect which is the difference between the Gini coefficient of post-payment income $G_{X-T}$for households with prepayment income $X$and the concentration coefficient of post-financing income C_{X-T}. A major drawback of the model is that it does not include a measure for horizontal inequity.

A measure of horizontal inequity was added to equation 3.7. This was performed by relaxing the assumption of horizontal equity earlier specified by Kakwani (1984) andassuming that households with similar prepayment income make different health care payments irrespective of their non-income characteristics resulting in horizontal inequity. In low income countries such as Nigeria, a large share of health care expenditure is financed through direct out-of-pocket payment. The prepayment health care financing mechanism of the health insurance covers majorly the formal sector workers and some of those employed in the organised private sector which make up about 3 per cent of the nation's population (Uzochukwu *et al.,* 2015). Thus, prepayment income equals would have to make different health care payments resulting in horizontal inequity. Horizontal inequity makes the post-payment income distribution less equal than the prepayment income distribution. This leaves households with less income to provide for their subsistence need such as food, clothing and shelter. Some households might even be forced to forgo seeking health care due to a reduction in their post payment income. The decomposition model in equation 3.7, was extended by including a variable that captures horizontal inequity in health care financing sources adopted from Aronson *et al,* (1994), which is the weighted summation of the within group post-financing Gini index. It measures inequity present in the post-payment income distribution caused by dispersions in health care payment amongst prepayment income equals.

$$H^{AJL} = \sum_m \theta_m \; G_{(x-t).m} \qquad 3.8$$

Where: weights $\{\theta_m\}$, is the product of the m*th* group's population share and post-payment income share of households with income *X.* The dissimilar health care payments made by prepayment income equals may result in households moving up and down the income distribution after they have made the health care payments. Due to the presence of differential health payment made by households with comparable income,the decomposition of the redistributive effect of health care financing RE in equation 4.4 is transformed and specified as;

$$RE = G_X - G_{X-T} \equiv \underbrace{\left[\frac{g}{1-g}\right] P_T^K}_{V} - \underbrace{\sum_m \theta_m \ G_{(x-t),m}}_{HI} - \underbrace{[G_{X-T} - \ C_{X-T}]}_{RR} \quad 3.9$$

Where; RE measures the redistributive effect of health financing on the distribution of income; V measures vertical income redistributive effect it is a product of the average payment rate $\frac{g}{1-g}$ and the Kakwani measure of progressivity P_T^K ; HI measures the horizontal income redistributive effect; RR measures the reranking effect which is the difference between the Gini index of post-financing incomeG_{X-T}andthe concentration index of post-financing income C_{X-T}. The economic implication of the algebraic specification in equation 3.9 is that when the RE is positive (RE > 0) this implies that the health care financing system makes the post-payment income distribution more equal that the prepayment income distribution. This implies that the health care financing system transfers income from the rich to the poor on the income distribution there by reducing the level of inequality in the income distribution. If the redistributive effect is negative (RE < 0) this implies that the health care financing mechanism transfers income is from the poor households to the rich households this increase the level of income inequality in the distribution of income. Horizontal inequity and reranking both make the distribution of post payment income more unequal and offset the vertical redistributive effect resulting in a decrease of the entire redistributive effect.

The second decomposition model which was based on the approach by Duclos *et al.,* (2003),follows a different analytical foundation, the decomposition of the Atkinson inequality indices. It incorporates flexible ethical parameters (ε, ν) that measure the level of society's aversion to inequality.The model assumes a Yaari (1998) social welfare function, it is additive and linear in X(p), $w(p)$ which is the weights function is determined by the ranking of the individual on the gross income distribution.

$$W_X = \int_0^1 X\ (p))\ w\ (p) dp \qquad 3.10$$

The single parameter of $w\ (p)$ can be written following the specification of Donaldson and Weymark (1983) as:

$$w\,(p,\nu) = \partial k(p,\nu)/\partial p = \nu\,(1-p)^{(\nu-1)}, \qquad \nu \geq 1 \qquad 3.11$$

Where; parameter ν is a measure of aversion to rank inequality. The faster is the fall in $w\,(p,\nu)$the rank dependent ethical weight for higher percentiles, the larger the value of ν.

To assess inequality,$X\,(p)$ in (3.10) is substituted by an isoelastic utility function of incomesuch that social welfare function generates relative inequality indices.

$$U_{\varepsilon}(y) = \begin{cases} \frac{y^{1-\varepsilon}}{1-\varepsilon} \text{when} \varepsilon \neq 1 \\ 1\text{n}(y) \text{ when} \varepsilon = 1 \end{cases} \quad 3.12$$

The parameter ε captures how individuals will be averse to uncertainty in their net income level, with the parameter ε being the measure of relative risk aversion. The overall social welfare function then aggregates these utilities across the population by using the rank-dependent ethical weights, $w\,(p,\nu)$(Duclos et al, 2003).

$$W_X(\varepsilon,\nu) = \int_0^1 U_{\varepsilon}(X\,(p))\,w\,(p,\nu)dp \qquad 3.13$$

Where equation 3.13 is the distribution of gross income. The distribution of net income is expressed similarly by replacing $X\,(p)$ with $N(p)$. If each person at rank p of gross income distribution were to pay equal amounts of health care payments resulting in the expected net income $\overline{N}(p)$, such that horizontal inequity is absent then the DJA social welfare function for this equitable distribution can be depicted as:

$$W_N^E(\varepsilon,\nu) = \int_0^1 U_{\varepsilon}(\overline{N}(p))\,w\,(p,\nu)dp \qquad 3.14$$

If instead of their expected net income $\overline{N}(p)$individuals at rank p are given their expected net income utility $\overline{U_{\varepsilon}(N(p))}$, the resulting social welfare function would equal:

$$W_N^P(\varepsilon,\nu) = \int_0^1 \overline{U_{\varepsilon}(N(p))}w\,(p,\nu)dp \qquad 3.15$$

If *X(p)* is replaced with ξ_x (ε, ν) in equation 3.13 to obtain a social welfare function based on the Equally distributed equivalent income EDE. The EDE is the income which if equally distributed will generate the same welfare to society as the original distribution of income.$N(P), \overline{N}(p),$ $and\ \overline{U_{\varepsilon}(N(p))}$ will be similarly replaced in equations 3.13, 3.14 and 3.15 respectively with $\xi_N(\varepsilon,\nu)$, $\xi_N^E(\varepsilon,\nu)$, and $\xi_N^P(\varepsilon,\nu)$.

$$W_X(\varepsilon,\nu) = \int_0^1 \mathrm{U}_\varepsilon\big(\xi_X(\varepsilon,\nu)\big)w(p,\nu)dp = \mathrm{U}_\varepsilon\big(\xi_X(\varepsilon,\nu)\big) \qquad 3.16$$

The model estimation of inequity is based on the Atkinson (1970) formulation of the (EDE). If both sides of the equation 3.16 are multiplied by the inverse utility function of equation 3.12, the equation becomes: $\xi_X(\varepsilon,\nu) = U_\varepsilon^{-1}W_X(\varepsilon,\nu)$. Similarly; $\xi_N(\varepsilon,\nu) = U_\varepsilon^{-1}W_N(\varepsilon,\nu)$; $\xi_N^E(\varepsilon,\nu) = U_\varepsilon^{-1}W_N^E(\varepsilon,\nu)$ and $\xi_N^P(\varepsilon,\nu) = U_\varepsilon^{-1}W_N^P(\varepsilon,\nu)$. Following Atkinson (1970), the general notation for inequality is obtained as the difference between ξ_X and μ_X as a proportion of μ_X:

$$I_X = \frac{\mu_X}{\mu_X} - \frac{\xi_X(\varepsilon,\nu)}{\mu_X} \qquad 3.17$$

I_X is the Atkinson measure of inequality in the gross income distribution. It is the share of total income that could be spent in removing inequality with no resulting loss in social welfare if the rest were equally distributed (Ataguba, 2012). It is one minus the ratio of EDE to the average of the actual distribution. If the risk or uncertainty in the post payment distribution of income ε rises (falls) the ratio $\frac{\xi_X(\varepsilon,\nu)}{\mu_X}$ will also fall (rise). The Atkinson measure of inequality rises (falls) this implies that more (less) EDE is required to remove inequality from the society. The indices I_N, I_N^E, I_N^P are similarly derived.

The decomposition of ΔI which is written as:

$$RE \equiv I_X - I_N = \underbrace{(I_X - I_N^E)}_{\equiv V} - \underbrace{(I_N^P - I_N^E)}_{\equiv H \geq 0} - \underbrace{(I_N - I_N^P)}_{\equiv R \geq 0} \qquad 3.18$$

The redistributive effect of health care funding is the difference between the Atkinson measure of prepayment income I_X and the Atkinson measure of net income I_N. I_N^E the Atkinson measure for expected net income. It is derived from a horizontally equitable social welfare function. I_N^P It is the Atkinson measure for expected net income utility.it is a local measure of horizontal inequity. RE measures the overall redistributive effect; V measures the vertical income redistributive effect H measures the horizontal income redistributive effect; R measures the reranking effect.

3.2 Methodology

3.2.1 Measuring Progressivity in Health Care Financing Sources

In order to measure progressivity of health care payments and address the issues raised in objectives 1 of the study, equation 3.5 was estimated following (O' Donnell *et al.,* 2008) as;

$$2\omega_r^2\left[\frac{t_jOOP, OOPins}{\bar{t}} - \frac{x_j}{\bar{x}}\right] = \gamma + \rho r_i + u_i \qquad 3.19$$

Where; the ordinary least square (OLS) estimate ρ is the Kakwani progressivity index. $\{t_iOOP, NHIC\}$health care funding variable forhousehold j. OOP (Out-of-pocket health care payments.OOP_{ins} (Health Insurance Contributions),$\bar{t}$ an estimate of the average health care payment. x_j, household j total consumption expenditure.$\bar{x}$, an estimate of household j average consumption expenditure. r_i is the household's fractional position on the consumption expenditure distribution. ω_r^2 is the sample variance of the fractional position. γ is the intercept and u_i is the error term.

The values of ρ range from -2 to 1. When a financing system is progressive, $\rho > 0$ but ≤ 1. This implies that the non-poor households pay more for health care than the poor households. When the health care payment mechanism is regressive $\rho < 0$ this indicates that the poor households spend a greater share of their income on health care payments when compared to the non-poor households.

A disaggregated analysiswas conducted on the progressivity estimates at different quantile of the distribution of income using the multiple comparison estimation technique.It involvedchoosing the quantile points at which ordinates of the concentration curve and Lorenz curvewereassessed(O' Donnell et al, 2008).

3.2.2 Measureof the Income Redistributive Effects of Health Care Financing Sources

To address the second objective of the study, two models were specified to decompose the redistributive effects of health care payments into the vertical redistributive effect, Horizontal effect (horizontal inequity) and the Reranking effects. Model 1,wasderived from the decomposition of the Gini index and model 2 from the decomposition of the Atkinson inequality index.

Mode1: Gini Measure of the Vertical Redistributive Effect of Health Care Financing

To estimate the vertical redistributive of out-of-pocket health care payments and the health insurance contributions the vertical equity component of equation 3.9is specified below;

$$V = \frac{g}{(1-g)} P^{K}_{T\,\widetilde{OOP,OOPins}} \qquad 3.20$$

V measures vertical redistribution caused by each health care payments (out-of-pocket health payment and health insurance co-payments), g is the ratio of per capita out- of-pocket health care payments and health insurance contributions to total consumption expenditure. $P^{K}_{T\,\widetilde{OOP,OOPins}}$ is the Kakwani index of the respective health care payments.

To decompose the vertical redistributive effect households were grouped into income bands of prepayment equals using the STATA software. To compute the Kakwani index $P^{K}_{T\,\widetilde{OOP,OOPins}} = C_{\bar{T}} - G_X$, the data was collapsed to obtain group means for the computation of the between group concentration index for out- of- pocket health care payments and the health insurance co-payments$C_{\bar{T}}$. Thereafter, the between-group concentration index for each health payment was estimated at each prepayment income level using the covariance approach. The Gini coefficient of prepayment income(equivalent consumption expenditure gross of each health care payment)G_X,was computed using the convenient covariance estimation technique. The Kakwani index was computed as the difference between the between-group concentration index for health care payments $C_{\bar{T}}$and the Gini coefficient for prepayment income G_X. Finally, $V$was computed as the product of $\frac{g}{(1-g)}$ and $P^{K}_{T\,\widetilde{OOP,OOPins}}$ for the entire distribution.

A positive (negative) vertical income redistributive effect implies that health care payments are progressive (regressive) on prepayment income. The progressive (regressive) health care payments redistribute income in favour of the poor (rich), causing a reduction (increase) in income inequality in the post payment income distribution. Households after paying for health care have more income to purchase other necessities of life.

Mode1: Gini Measure of Horizontal Inequity in Health Care Financing

To measure the horizontal redistributive effect of the out-of- pocket health care payment and the Health Insurance Contributions, equation 3.8was recalled from the theoretical model.

$$HI = \sum_{m} \theta_m \; G_{(x-t\;OOP,OOPins).m} \qquad 3.21$$

HImeasured horizontal inequity caused by each health care finance.Horizontal inequity within each group of income equals was estimated by the level of inequality in the post-payment income *(x-t)*. $x - t$; is the equivalent consumption expenditure net of out-of-pocket health care payments and national health insurance payments for each group of prepayment equals. The within group inequality in the post payment income due to health care payment was measured by the summation of weighted within group Gini coefficients. The within group Gini coefficient of post payment income for the eachprepayment income group is $G_{(x-t\;OOP,NHIC).m}$ .The horizontal inequity weight θ_m was obtained as a product of the share of the population for each income group and the post payment income (equivalent consumption expenditure net of out-of-pocket and health insurance contributions) accruing to the prepayment income group. The horizontal measure of inequality in the post-payment period was computed as a weighted sum of the within group Gini coefficient of post payment income for each health care payment variable using the covariance method after applying the appropriate weights. This computation will be conducted using the Adept software. Apirori expectation for both model 1 and 2 were similar. It is expected that the presence of horizontal inequity makes the post payment income distribution more unequal that it would have been if horizontal inequity was absent. It reduces the vertical income redistributive effect.

Mode1: Gini Measure of the Reranking Effect in Health Care Financing

To measure the reranking effect of the out-of- pocket health care payment and the health insurance contributions, the reranking component of equation 3.9was recalled and specified below,

$$RR = G_{X-T\;OOP,OOPins} - C_{X-T\;OOP,OOPins} \qquad 3.22$$

RR measured the extent of reranking, $G_{X-T\,oo\quad,OOPins}$ is the Gini Coefficient of post–payment income (equivalent consumption expenditure net of all health care payments) Gini coefficient, $C_{X-T\,OOP,OOPins}$the post-payment income concentration index. T (out-of-pocket health payment and health insurance co-payments), X (equivalent consumption expenditure). The within group post payment Gini coefficients were computed for each health care payment and prepayment income group using the covariance method. The post-payment concentration index of each health care payment was computed using the covariance estimation technique first by ranking the income groups of prepayment income in ascending order and then within each unit of pre-financing equal ranking by their post-financing income. Reranking income redistributive effect for each health care payment is computed as the difference between the post –payment income Gini coefficient and the post-payment income concentration index. Apriori for both models 1 and 2 are similar. It is expected that the reranking effect would reduce the vertical income redistributive effect, making it more unequal than it would have been in its absence.

Model 1: Gini Measure of the Total Redistributive Effect of Health Care Financing

The Gini decomposition of the overall redistributive effect is specified algebraically below as;

$$RE = G_X - G_{X-T\,OOP,OOPins} \qquad 3.23$$

The total redistributive effect (RE) was obtained by subtracting G_X the Gini coefficient of prepayment income (equivalent consumption expenditure gross of each health care financing mechanism out-of-pocket payment for health and the health insurance contributions) from the $G_{X-T\,OOP,OOPins}$Gini coefficient of post payment income (equivalent consumption expenditure net of all health care payments) across the entire income groups. The Gini index was computed using the convenient covariance approach. The Adept software was applied in the analysis. A positive value of the redistributive effect implies that the vertical income redistributive effect is progressive. Horizontal inequity and reranking effects were not large enough to offset the pro-poor redistributive effect. Consequently, health payments exert an equalizing effect on the post-payment income distribution and income was redistributed from the rich to the poor. A negative redistributive effect implied that the health care financing scheme had a pro- rich redistributive effect and increased the level of inequality in the post-payment income distribution. This could be due to a vertically inequitable health care financing system, whichwas worsened by the presence of horizontal inequity and reranking.

Model 2: Atkinson Measure of the Vertical Redistributive Effect of Health Care Financing

To estimate the vertical redistributive component of the out-of- pocket health care payment and the health insurance contributions, the vertical income redistributive component in equation 3.18 was recalled and specified following Duclos *et al.,* (2003)

$$V = \left(I_X - I^E_{X-T\ OOP,OOPins}\right) \qquad 3.24$$

V measure of vertical redistribution, I_X Atkinson index of prepayment income (equivalent consumption expenditure gross of payments for health care out-of-pocket and health insurance co-payments). $I^E_{X-T\ OOP,OOPIns}$ Atkinson index for expected post-payment income. To obtain I_X, a welfare estimator was derived from the social welfare function of gross income by first ranking the observations according to increasing gross income and then splitting the integral into as many parts depending on the number of observations (Bilger, 2008). $I^E_{X-T\ OOP,OOPins}$was computed under the assumption that every prepayment equal makes similar health care payment assumption of horizontal equity. The gross incomes $x_i$was replaced by predicted net incomes $\hat{n}_i$at $x_i$where observations are ranked according to gross income. These inequality estimates were computed using the Gaussian Kernel function in the STATA software. Finally, vertical income redistributive effect was computed as the difference between the Atkinson coefficient of pre-financing income (equivalent consumption expenditure gross of all health care payments) and the Atkinson index of expected post-payment income Atkinson index (equivalent consumption expenditure net of all health care payment) for each health care payment. The apirori expectation of the vertical redistributive effect in model 2 is similar to that of the model 1.

Model 2: Atkinson Measure of Horizontal Inequity in Health Care Financing

To estimate the horizontal redistributive effect of the out-of- pocket health care payment and the health insurance contributions, the horizontal income redistributive component in equation 3.18was recalled from the theoretical model.

$$HI = \left(I^P_{X-T\ OOP,OOPins} - I^E_{X-T\ OOP,OOPins}\right) \qquad 3.25$$

HI is the measure of horizontal inequity caused by health care payments, $I^{P}_{X-T\ OOP,NHIC}$ the Atkinson index for expected net income utility, $I^{E}_{X-T\ OOP,OOPins}$the Atkinson index for expected post-payment income. Using the Gaussian kernel regression $I^{P}_{X-T\ OOP,OOPins}$was obtained by ranking the observations according to their gross income (equivalent consumption expenditure gross of all health care payments) and then replacing gross incomes by net incomes (equivalent consumption expenditure net of all health care payments). Finally, horizontal inequity was computed as the difference between Atkinson index expected net income utility and Atkinson index for expected post-payment income. This was computed using the STATA software.

Model 2: Atkinson Measure ofthe Reranking Effect in Health Care Financing

To estimate the reranking effect of the out-of- pocket health care payment and the health insurance contributions, the reranking component in equation 3.18 was recalled from the theoretical model and specified following (Duclos *et al.,* 2003).

$$RR = \left(I_{X-T\ OOP,OOPins} - I^{P}_{X-T\ OOP,OOPins}\right) \qquad 3.26$$

RR measure of reranking caused by health payment.$I_{X-T\ OOP,OOPins}$. The Atkinson index for post-payment income (equivalent consumption expenditure net of each health care payments). $I^{P}_{X-T\ OOP,OOPins}$ The Atkinson index for expected net income utility. To obtain $I_{X-T\ OOP,OOPIns}$a welfare estimator was derived from the social welfare function of net income by first ranking the observations according to increasing net income and then splitting the integral into as many parts depending on the number of observations using the Gaussian kernel regression. The reranking redistributive effect was obtained by subtracting the Atkinson index for expected net income utility from theAtkinson index for post-payment income.

Model 2: Atkinson measure of the totalincome redistributive effects of health care financing

Based in the theoretical framework, equation 3.18 was recalled and specified following Duclos *et al.,* (2003) as;

$$RE = I_X - I_{X-T\ OOP,OOPins} \qquad 3.27$$

Where; RE is measure of total redistributive effect, I_X Atkinson index of pre-payment income, $I_{X-T\,OOP,OOPins}$ Atkinson index of post-payment income. The overall redistributive effect was computed as the difference between the Atkinson index of gross income I_X (equivalent consumption expenditure gross of out- of- pocket health care payment and the health insurance contribution) and the Atkinson index of net income $I_{X-T\,OOP,OOPins}$ (equivalent consumption expenditure net of all health care payments) using the STATA software. The Apriori expectation of the model 2 is analogous to that of model 1.

3.3 Estimation Technique

3.3.1 Estimation Technique for Progressivity of Health Care Payments

The Kakwani index of progressivity was applied to measure the progressivity of health care payments in objective one. An estimate of Kakwani index of progressivity (KPI)wasobtained from the Convenient Regression estimation technique. This is based on the relationship between the ordinary least square (OLS) regression and the covariance. This estimation technique involvedthe convenient regression of the transformation of the health care financing variable (out-of-pocket) on the fractional rank of the Ability to pay measure (income). The Kakwani index of progressivity (KPI) was computed using the CR. Since the $KPI = C_T - G_X$.The CWR was performed using STATA software. When a financing system is progressive, the Kakwani Index is positive (with a maximum value of 1) and negative (with a maximum value of –2) when a financing system is regressive. Proportionality is reflected in a Kakwani Index of 0.

Disaggregated analysiswas conducted to ascertain the dominance criterion in cases where the Lorenz curve and the concentration curve cross once or more than once.The test of dominancewas conducted using the Multiple Comparison Estimation Technique (MCET) following Dardanoni and Forcina (1999).The MECTwas applied in this study because there were cases where the Lorenz curve of income and the concentration curve of heath payments intercept or coincide, thus it was impossible to establish the dominance of either curves.The resultant effect was that the results produced were rather ambiguous. In the eventuality that this scenario arose during the progressivity analysis, the MCETwould be applied to determine if dominance exist, and if the existing dominance of either curves is statistically significant.

The decision here is reject the null of nondominance if there are at least one significant difference between the curves in one direction and no significant difference in the other (i.e. Lorenz curve against concentration curve). It involves selecting the number of quantile points at which ordinates are to be compared. It concludes that curve A dominates curve B, "if there is at least one quantile point at which curve A lies significantly above curve B and there is no quantile point at which curve B lies above curve A (O' Donnell et al, 2008).

3.3.2 Estimation technique for the Income Redistributive Effects of Health CareFinancing

The estimation technique of the redistributive effects in the first model one was the covariance approach, and this was used in this study to estimate the relative and overall redistributive effects of health care financing. The estimation technique for the secondmodel involved the use of a non-parametric estimation technique called the kernel regression.

The Convenient Covariance Estimation Technique

The redistributive effects in model 1 were computed using theconvenient covariance approach to estimate the Gini coefficient for prepayment income.

Let X be the prepayment income variable and βt is the sample weight variable. Create a weighted fractional rank (r) and estimate the Gini coefficient for prepayment income using the covariance estimation technique. To obtain the Gini coefficient for post-payment income, a global containing all health care payments variables needed for the decomposition analysis was created. A variable representing post-payment income for each health care contribution was generated and the Gini coefficient for that variable was then estimated. The redistributive effect for each payment was computed as the difference between the pre-payment and post-payment Gini indices (O'Donnell, 2008).

To decompose the redistributive effect into vertical, horizontal and reranking effects, households were grouped into prepayment equals; this exercise was performed by creating a variable that categorized households according to prepayment income intervals of fixed bandwidth. This involved breaking the sample into groups of prepayment equals each spanning an interval of income of fixed width. To compute the reranking effect, the concentration index of post payment income and the Gini coefficient for post- payment income were generated. The computation was done by first ranking all the groups by prepayment income and then ranking further households within the groups by post-payment income, the appropriate weighted fractional rank was computed when households are ranked in this manner. The covariance method was then used to estimate the concentration index and the reranking term was subsequently computed.

To compute the Kakwani index, the data was collapsed to (weighted) group average and the between-groups concentration index for payments was estimated at that level. Firstly, a constant (grpsize) was created whichspecified the group sizes when data were collapsed and preserve before collapsing the data so that they can be restored later to the household level.This process is called the sub-group decomposition of the Gini coefficients. The between-groups concentration index was estimated and the Kakwani index computed as the difference between this and the Gini coefficient for prepayment income. Afterwards the household-level data wasrestored, and the vertical redistribution effect computed. Thiswas expressed as a percentage of the overall redistribution effect (O' Donnell*et al.,* 2008).Horizontal inequitywas computed as residuals. This was to eliminate computing as many Gini coefficients corresponding to the number of groups of pre-payment close-equals. Finally, the overall redistributive effect was computed as the difference between the Gini index of prepayment income and concentration index of the health care payments.

Non-Parametric Kernel Regression

The redistributive effects were computed using the non-parametric estimation technique called theKernel regression. Model 2 was estimated by initially computing different aggregate welfare functions and subsequently the corresponding Atkinson inequality indexes.

In this study, a weighted type of total welfare estimator proposed by Duclos *et al.,* (2003) was applied to obtain gross income estimate. The welfare estimator was derived from the social welfare function of gross income in equation 3.13 by first ranking the observations according to increasing gross income and then splitting the integral into as many parts depending on the number of observations(Bilger, 2008).Following Bilger (2008) we have;

$$\widehat{W}_X(\varepsilon,\nu) = \sum_{i=1}^{n} \int_{s_X^{i-1}}^{s_X^{i}} \mathrm{U}_\varepsilon(x_i) w(p,\nu) dp$$

Where $S_X^i$is the sum of the i first weights equivalent to the data ranked according to gross income *X.* since in the earlier equation, the utility function does not depend on rank *p* therefore it will be deleted from each integral. Finally, once the primitive of the ethical weight function is determined, the welfare estimator for gross income can be expressed as follows:

$$\widehat{W}_X(\varepsilon,\nu) = \sum_{i=1}^{n} \left\{ \mathrm{U}_\varepsilon(x_i)\left[\left(1 - S_X^{i-1}\right)^\nu - \left(1 - S_X^{i}\right)^\nu\right]\right\}$$

The estimator for total welfare produced by net income $W_N$was computed similarly. The estimator for $W_N^P$was obtained by ranking the observations according to gross income and by replacing gross incomes by net incomes in Equation (3.15). Lastly, a non-parametric estimation of the function linking gross income to net income was needed in order to computeW_N^E. The gross incomes $x_i$was replaced by predicted net incomes $\hat{n}_i$at $x_i$where observations were ranked according to gross income (Bilger, 2008). The non-parametric method applied in the estimation was the Gaussian Kernel function because of the efficient properties of the Gaussian distribution. One of such properties is that it does not need apriori expectations about the distribution of income of the sample population. However, much more important than the choice of the kernel function is the selection of the window width which determines the smoothness of the distribution (Ichoku *et al.,* 2010; Yatchew, 1998, Silverman 1986).

By applying this statistical approach, the normative decision of determining income equals is transferred from the decision maker to a statistical exercise. "The choice of the window width was determined by the optimal trade-off between bias and minimization of the squared mean error. The only assumptions required were statistical assumptions such as the smoothness and continuity of the joint distribution of gross and net incomes" (Ichoku, *et al.,* 2010). Empirical values for these parameters of ε and ν were based on a "leaky bucket" or what is termedthe experiment of efficiency loss which estimates the magnitude of society's tolerance to costs incurred when redistributing income from a wealthy to a poor individual (Duclos *et al.,* 2003).

Duclos et al, (2003) advocates based on this experiment the values of ε should range between 0.25 and 1.0 while that of ν should be between 1 and 4, but stresses that 'reasonable' values for ν and ε should be1.5 and 0.4 respectively. These reasonable values have been used in recent studies on the redistributive effect of health care payments in health care financing (Ataguba and Mclntyre; 2012; Bilger, 2008; Cavagnero and Bilger, 2010) and these valueswere applied in this study.

3.4 Source of Data, Variables Description and Descriptive Statistics

3.4.1 Data and Source of Data

The data for this study were generated from three sets of the General Household Survey, (GHS) for the year 2010- 2011; 2012-2013 and 2015-2016. The GHSwas conducted by the Nigerian National Bureau of Statistics in collaboration with the Federal Ministry of Agriculture and Rural development and The World Bank Living Standards Measurement Study (LSMS) team as part of the Integrated Surveys on Agriculture (ISA) program. The GHS-Panel is a nationally representative survey of 5,000 households, which are also representative of the six geopolitical zone in Nigeria the South-South (SS), South East (SE), South West (SW), North East (NE), North West (NW) and North Central (NC). These zones were grouped into urban and rural areas. The GHS-Panel sample is a sub sample of the 2010 GHS sample. The three waves of the GHS that are presently available are GHS Wave 1 2010/ 2011; GHS Wave 2 2012/ 2013; and GHS Wave 3 2015/ 2016 these data were obtained from the World Bank data site; http://microdata.worldbank.org/index,php.

Atwo-staged stratified sampling design. In the First Stage: A total of 500 EAs were selected. The EAs were selected using the probability proportional to size (PPS) of the total EAs in the 36 states and Federal Capital Territory (FCT), Abuja. The second stage involved the selection of households. Households were randomly chosen using the orderly selection of ten (10) households per EA. This involved obtaining the total number of households listed in anEA, and then calculating a Sampling Interval (S.I) by dividing the total households listed by ten. In all, 500 EAs were polled and 5,000 households were interviewed. The survey instrument used was the GHS-Panel Household Questionnaire. The Household Questionnaire offers information on demographics; education; health (including child immunization); labour and time use; food and non-food expenditure; household nonfarm income-generating activities; food security and shocks; safety nets; housing conditions; assets; information and communication technology; and other sources of household income. From the three set of data the following information was extracted.

Section 1: Is the household roster- contained information on household characteristics.

Section 3: Focuses on labour it contains information on those who are enrolled in the National Health Insurance Scheme (NHIS). S3aq38; Does [Name] contribute to the National Health Insurance Scheme (NHIS)?

Section 4: Contains information on the health and the following health care financing variables were extracted?

S4aq14 – How much did name pay for the drugs or medicines over the counter or kiosks?

S4aq16 – How much did name pay in total for staying in a hospital or health facility?

S4aq19 – How much did name pay altogether for those medicines and medical supplies in the last 12 months.

S4aq21 – Apart from what was paid by others how much did name pay out of name's own pocket for medical services not including any medicines or medical supplies or over the counter drugs.

The ability to pay measure (total consumption expenditure) was a combination of food and non-food consumption expenditure. Food expenditure was gotten from section 10 of the GHS data and the following information were extracted;

S10aq2 – How much did you or other household members pay in total in the last 7 days for meals? If free estimate what it would have cost if you had to pay.

S10bq4 – How much did your household spend on the following food items during the past seven days?

Section 11 provides information on non-food consumption expenditure and the data listed below were extracted from it.

S11q2 – How much did household purchase in total of various non-food items over the past 7 days.

S11q4 – How much did household purchase in total of various non-food items over the past 30 days.

S11q6 – How much did household purchase in total of various non-food items over the past 6 months.

S11q8 – How much did household purchase in total of various non-food items over the past 12 months.

S11q11 – For other non-food items purchased over the past 1 year.

Theability to pay measure was the pre-payment income variable (*X)*which is usually employed as the bench mark against which progressivity and redistributionwas estimated as total household consumption expenditures (food and non-food expenditure), gross of all health care costs and modified through the use of an equivalent scale[5], to generate per equivalent household consumption expenditure. Household post-payment income(*X-T)*wasestimated as pre-paymentincome excluding health care contributions. For this study, two health payments were considered these are out-of-pocket health payments and health insurance contributions, because there was no household data on private insurance and earmarked taxes for health in Nigeria.

The out-of-pocket (OOP) variable was computed as a combination of the following; doctor's consultation fee, transportation cost to the health facility, other hospital charges, admission fees and medication cost. The $OOP_{insurance}$ variable, was obtained as the cost of medicines and drugs purchased by those enrolled in the scheme excluding the cost of transportation. To obtain the health insurance contributions, it was assumed that the entire incidence burden is borne by the employee. This was in conformity with the Nigerian case where the co-payments involve a flat rate contribution of 10% made out-of-pocket by beneficiaries as treatment cost for medical care received. The conventional rule is to assume that the beneficiary's contributions represent the burden borne by the household, this is in line with other studies conducted both for developed and developing countries such as (Ataguba, 2012; O' Donnell*et al.,* 2008; Bilger; 2008; Wagstaff and Van Doorsaler, 1999).

3.4.2 Variable Description

The empirical model for objective one was operationalized in equation 3.19.Estimate progressivity of the health care financing mechanism.

The Ordinary Least Square OLS estimate of ρ is the Kakwani progressivity index. $t_{i\,OOP,OOPins}$, the various health care payment variable of the household j (Out-of-pocket health care payment and health insurance contributions),$\bar{t}$ an estimate of the average health care payment. x_j, the household j equivalent consumption

[5] Adjustments were made to account for age structure and the size of the household using the equivalence scale proposed by (O'Donnell*et al.,* 2008).

expenditure.$\bar{x}$, an estimate of the household average consumption expenditure. r is the household's fractional position on the consumption expenditure distribution. ω_r^2 is the sample variance of the fractional position.

Apiori expectation for the first empirical model is that if ρ equalstwice the area between the curves$L_X$andC_T.It is expected that for all *0 ≤ t(x) < x and 0 ≤ t'(x) < 1 for all x,* ρ is positive (negative) if the payment elasticity is greater (less) than unity for all x and assumes value zero when the payment elasticity is unity for all incomes. Thus, the positive value of $P^K_{T\ OOP,NHIC}$ implies a progressive health financing system, and the negative value implies a regressive health payment system. Further, it can be seen that ρ increases (decreases) with the increase (decrease) in payment elasticity at all income levels.

Graphically, if the payment Concentration curve lies above the Lorenz curve of consumption expenditure, one can conclude that the lower income brackets contribute a greater proportion of total healthcare financing than the proportion of income they receive, and that the system is therefore regressive. If the concentration curve lies below the Lorenz curve, it indicates a progressive health financing system. If the concentration curve lies on the Lorenz curve, it indicates direct proportionality. It is also possible for the financing curve to cross the Lorenz curve. This suggests that the financing system is mixed i.e. is regressive for some income groups and progressive for others. If the financing curve crosses the Lorenz curve, negative and positive values cancel each other out, and the overall index is ambiguous (O'Donnell*et al.,* 2008).

The empirical models for objective two.Quantify therelative income redistributive effectsof health care financing using the Gini and Atkinson decomposition frameworks.

The Gini decomposition is operationalized in equations 3.20, 3.21, 3.22and3.23. In equation 3.20; V is the Gini based measure of vertical redistribution or vertical equity caused by out-of-pocket health care payments and the health insurance contributions. It is composed of two distinct effects the average health care payment rate $\frac{g}{(1-g)}$ which was measured by the share of per adult equivalent consumption expenditure taken up by out-of-pocket payments and the Health Insurance Contributions and the Kakwani index of progressivity $P^K_{\tilde{T}\ OOP,OOPins}$. Using the Gini coefficients, $V^{AJL}$was measured as the difference between the Gini coefficient for prepayment incomeG_X and the between group Gini coefficient for counterfactual post payment income vector;

$X - T$,$G^B_{X-T\ \widetilde{OOP,OOPins}}$. $G_X$was computed as the per equivalent adult consumption expenditure gross of all health care expenditure for all prepayment equals. $G^B_{X-T\ \widetilde{OOP,OOPins}}$was computed by replacing all income of post payment equals their group mean incomes.

In equation 3.21 HI is the Gini measure of horizontal inequity which wasmeasured by the weighted sum of group m specific post-payment (within group) Gini coefficients $\sum_m \theta_m\ G_{(x-t\ OOPOOPins),m}$. θ_m is the horizontal inequity weight it was computed as a product of the fraction of the population in the m^{th} prepayment equal group and their share of post-payment income within the same prepayment group. $G_{(x-t\ OOP,OOPins),m}$is the within group Gini coefficient that measured inequality in the post-payment period.

In equation 3.22 RR is the Gini measure of reranking was measured as the difference between the post-payment income Gini coefficient $G_{X-T\ OOP,OOPinsu}$which wascomputed as per equivalent adult consumption expenditure net of all health care expenditure for all prepayment equal groups and the post-payment income concentration index$C_{X-T\ OOP,OOPinsuran}$. Itwas obtained by first ranking household's income into groups of prepayment equals and then within each group of prepayment equals by their post-payment income in ascending order.

Apriori expectation for the decomposition model of the vertical, horizontal and reranking effectsare stated as follows; if payments are progressive implying that $V > 0$ it can be concluded that the health care financing system causes the post-payment income distribution to be more equal than the prepayment income distribution. Thus, implying that health care payments exert an equalizing effect on the post-payment income distribution. Households have greater ability to purchase other necessities of life in the post-payment income period. Furthermore, an increase in g; the rise in the share of income used to finance health care would invariable decrease the level of vertical equity. Thus, a health care financing system may be vertically equitable pro-rich redistributive due to the positive value of the Kakwani index, but a high value of g could render the health care payment vertically inequitable and pro-rich redistributive causing$V < 0$. $V > 0$ means that the health care financing is progressive or "pro-poor", while $V < 0$ implies that it is regressive or "pro-rich". Horizontal inequity and reranking. Generally,reduce the vertical redistributive effect and correspondingly increasing the level of inequality in the post payment income distribution and reducing the redistributive effect.

The overall redistribution model based on the Gini decomposition wasoperationalized in equations 3.23. WhereRE is the Gini measure of total redistributive effect it was measured as a combination of the three dimensions of equity. It was computed by subtracting the Gini index of post G_{X-T}payment income (equivalent consumption expenditure net of OOP and OOPins) from the Gini index of prepayment income G_X (equivalent consumption expenditure gross of OOP and OOP$_{ins}$).

The decomposition of the vertical redistribution horizontal inequityand reranking effects based on models 2 areoperationalized in equations 3.24, 3.25, 3.26, 3.27respectively. In equation 3.24; V is the Atkinson measure of vertical redistribution or vertical equity caused by health care payments. It was measured as the difference between $I_X$and$I^E_{X-T\ OOP,OOPins}$. $I_X$the Atkinson index for prepayment income gross of out-of-pocket payment and health insurance contribution. It was measured as one minus the ratio of the equally distributed equivalent income (EDE) - which is a counterfactual income computed using the kernel regression to the mean of the actual distribution. It is also the percentage of total income that could be spent in removing inequality with no resulting loss in social welfare. $I^E_{X-T\ OOPOOPins}$ the Atkinson index for expected net income (post-payment income). It was computed by assuming a horizontally equitable financing system, where every household at rank p (of prepayment equal) is granted its expected net income $\bar{N}(p)$. ($\bar{N}$is similar to the mean post payment income of the group).

In equation 3.25HI is the Atkinson measure of horizontal inequity. Wasmeasured as the difference between two Atkinson measures of inequality $I^P_{X-T\ OOP,OOPins}$ and$I^E_{X-T\ OOP,OOPins}$. $I^P_{X-T\ OOP,OOPins}$ the Atkinson index that measures of local horizontal inequity (within rank q of post-payment equals). Where every household at rank p is granted its expected net income utility $\overline{U_\varepsilon(N(p))}$. This may cause horizontal inequity within the distribution but prevents reranking because the gross income ordering is maintained.$I^{E}_{X-T\,OOP,NHIC}$was operationalized as specified earlier. In equation 3.26,RR is the DJA measure of reranking. It wasmeasured as the differencebetween two Atkinson measures of inequality$I_{X-T\,OOP,OOPins}$and$I^{P}_{X-T\,OOP,OOPins}$. $I_{X-T\,OOP,OOPins}$ the Atkinson index for post-payment income measured as prepayment income, net of out-of-pocket health care payments and health insurance contributions made out-of-pocket. $I^{P}_{X-T\,OOP,NHIC}$ was operationalized as specified earlier.

The overall redistributive model based on the Atkinson inequality index is specified in equation 3.27. RE is the DJA measure of total redistributive effect. It was computed by subtracting the Atkinson measure of net income $I_{X-T\,OOP,OOPins}$ (per adult equivalent income net of OOP and OOP$insurance$) from the Atkinson measure of gross income I_X (equivalent consumption expenditure gross of OOP and OOP$insurance$).

Apriori expectation for the decomposition model of the vertical effect, horizontal effect and reranking effects were similar to that of the Gini decomposition model. If payments were progressive implying a reduction in income inequality when all prepayment equals are treated equally in the post-payment period such that$V > 0$. It can be concluded that the health care financing system causes the post-payment income distribution to be more equal than the prepayment income distribution. Implying that health care payments exert an equalizing effect on the post-payment income distribution. Furthermore, V> 0 means that the health care financing is progressive or "pro-poor", while V< 0 implies that it is regressive or "pro-rich". Similarly, HI and RR imply the presence of differential treatment. They are non-negative measures of redistribution. In the case where V> 0 the presence of HI reduces the redistributive effect of health care payments making it less redistributive than it would have been ifit was absent. V< 0 the presence of differential treatment helps to further worsen the already pro-rich redistributive effect, consequently increasing the inequality in the income distribution.RR, is a non-negative measures of income reranking and as in the case of horizontal inequity it reduces the vertical redistributive effect. Consequently, increasing the level of inequality in the post-payment income distribution and reducing the total redistributive effect.

Apriori expectation for the both the Gini and the Atkinson based models are similar. The magnitude of total redistributive effect RE in both models will depend on the value of the vertical, horizontal and reranking effects.Theoretically, it is expected that $RE > 0$ implies that the health care financing scheme has a pro-poor redistributive effect and reduces the level of income inequality in the income distribution this occurs because of a positive vertical redistributive effect that offsets the horizontal and reranking effects. On the other hand, $RE < 0$ means that the health care financing scheme has a pro- rich redistributive effect and increases the level of inequality in the post payment income distribution.

Table 3.1 Description of variables and measurement for the empirical models

Variable	Description	Measurement
	Progressivity Equation	
x_j	Prepayment income	Measured as per equivalent consumption expenditure (food and non-food consumption expenditure) including health care payments (cost of drugs and medication over the counter or kiosks, hospitization expenses, medical supply cost, and cost of other medical services)
$\bar{x}$	An estimate of the household average consumption expenditure.	
$t_j OOP, OOPins$	health care payment variables of the house hold j (Out-of-pocket health care payments and Health Insurance Contributions)	out-of-pocket (cost of drugs and medication over the counter or kiosks, hospitization expenses, medical supply cost, and cost of other medical services).Health Insurance Contributionwas computed as medical expenses incurred by those who indicated that they contribute to the scheme (Sq3a38)
$\bar{t}$	an estimate of the average health care payment.	

$\boldsymbol{\rho}$	The Kakwani measure of progressivity.	Measured as the difference between the concentration coefficient for health care payment and the Gini coefficient of health care payment
$\boldsymbol{r_i}$	the households fractional position on the consumption expenditure distribution	Obtained by grouping households into quantiles using STATA
$\boldsymbol{\omega_r^2}$	the sample variance of the fractional position.	Obtained using the Covariance Estimation Technique

Model 1:Gini decomposition of the income redistributive effects of health care financing.

$\boldsymbol{X}$	Prepayment income adult equivalent consumption expenditure	Measured as per equivalent consumption expenditure (food and non-food consumption expenditure) including health care payments (cost of drugs and medication over the counter or kiosks, hospitization expenses, medical supply cost, and cost of other medical services)
$\boldsymbol{X-T}$	The post-payment adult equivalent consumption expenditure	Measured as per equivalent consumption expenditure (food and non-food consumption expenditure) including health care payments (cost of drugs and medication over the counter or kiosks, hospitization expenses, medical supply cost, and cost of other medical services)the health care payment variables the out-of-pocket health care payment represented as

		T_{Mi} and the Health Insurance ContributionT_{Mj} respectively.
$\boldsymbol{RE}$	AJL measure of the overall redistributive effect of health care financing	It will be computed by subtracting the measure of horizontal inequity H^{AJL} andthe measure of reranking $R^{AJL}$from themeasures vertical redistributionV^{AJL}.
$\boldsymbol{V}$	V^{AJL} is the AJL measure of vertical redistribution or vertical equity caused by health care payments.	Using the Gini coefficients, V^{AJL}will also be measured as the difference between the Gini coefficient for prepayment incomeG_X and the between group Gini coefficient for counterfactual post payment income vector N,$G_{X-\tilde{T}}^{B}$.
$\boldsymbol{G_X}$	The Gini coefficient for prepayment income equals.	is captured as per equivalent adult consumption expenditure gross of all health care expenditure for all prepayment
$\boldsymbol{G_{X-T\ OO\widetilde{P,OO}P\imath ns}^{B}}$	is the between group Gini coefficient for counterfactual post payment income vector N.	It is computed by replacing all income of post payment equals their group mean incomes,
$\boldsymbol{HI}$	horizontal inequity is measured by the weighted sum of group m specific post-payment (within group) Gini coefficients$G_{(x-t),m}$	is measured by the weighted sum of group m specific post-payment (within group) Gini coefficients$G_{(x-t),m}$
$\boldsymbol{\theta_m}$	the horizontal inequity weight.	it will be computed as a product of the fraction of the population in the m^{th} prepayment equal group and

		their share of post-payment income within the same prepayment group
$G_{(x-t\ OOP,OOPins),m}$	the within group gini coefficient	$G_{(x-t),m}$ that measures inequality in the post-payment period
RR	The AJL reranking measure	The difference between the post-payment income Gini coefficient G_{X-T} and the concentration curve for post payment income C_{X-T}
$G_{X-T\ OOP,OOPins}$	the post –payment income Gini coefficient	Gini coefficient is captured as per equivalent adult consumption expenditure net of all health care expenditure for all prepayment equal groups .
$C_{X-T\ OOP,OOPins}$	Is the post-payment income concentration index	obtained by first ranking household's income into groups of prepayment equals and then within each group of prepayment equals by their post-payment income in ascending order.

Model 2: Atkinson decomposition of the income redistributive effects of health care financing		
RE^{DJA}	DJA measure of the overall redistributive effect of health care financing	It will be computed by subtracting the measure of horizontal inequity H^{DJA} andthe measure of reranking$R^{DJA}$from themeasures vertical redistributionV^{DJA}.
I_X	It is the Atkinson index for prepayment income gross of out-of-pocket health care payments and Health Insurance Contributions.	will be measured as one minus the ratio of the equally distributed equivalent income (EDE) - which is a counterfactual income computed using the kernel regression to the mean of the actual distribution. It is also the percentage of total income that could be spent in removing inequality with no resulting loss in social welfare
$I_{X-T\ OOP,OOPins}$	The Atkinson index for post-payment income	Measured as prepayment income net of out-of-pocket health care payments and Health Insurance Contributions.
$I^{P}_{X-T\ OOP,OOPins}$	The Atkinson index of expected net income utility that measures of local horizontal equity (within rank q of post-payment equals).	Measured by granting every household at rank p is its expected net income utility $\overline{U_{\varepsilon}(N(p))}$. This may cause horizontal inequity within the distribution but prevents reranking because the gross income ordering is maintained.
I^{E}_{N}	The Atkinson index of expected net income derived by assuming a horizontally equitable financing system,	Obtained by granting every household at rank p its expected net income $\bar{N}(p)$. ($\bar{N}$is similar to the mean post payment income of the group).

CHAPTER FOUR

RESULTSAND FINDINGS

4.0 Introduction

This chapter provides an empirical analysis of the data used in the study. Results obtained from the analysis are presented and discussed. The data for the study was obtained from three sets of the General Household Survey Panel (GHS) 2010/2011, 2012/ 2013 and 2015/ 2016. The households' health payments and total consumption expenditure by quintiles are presented below including estimate of progressivity and the income redistributive effects of health care financing sources in Nigeria.

4.1 Descriptive Statistics

For this study data on the following variables were obtained from the 3 sets of the GHS panel of 2010/2011, 2012/2013 and 2015/2015; household total consumption expenditure gross of health expenditure as the ability to pay measure, out-of-pocket health care payments (OOP) and the health insurance contributions ($OOP_{insurance}$). These variables were collected to cover a period of 12 months and adjusted using the appropriate equivalent scale to account for household size and age composition (O'Donnell, et al; 2008).

In 2010/2011 GHS data set there were 5000 households and the average household size was 4.9 persons in urban areas and 5.9 persons in rural. In the study2,836 householdswere utilised and only 191 households made health insurance contributions see table 4.1.At the national level, the mean equivalent prepayment expenditure (household consumption expenditure gross of all health care payments)was₦ 160,517.9. The mean out-of-pocket payment and health insurance contributions are ₦11,988.4 and ₦48,332.8 respectively.The mean equivalent post-payment expenditure (household consumption expenditure net of all health care payments) was N149, 613.4. In the urban, the mean equivalent household consumption expenditure was₦ 205,621.4. The mean out-of-pocket payment and health insurance contributions were ₦ 12,569.5 and ₦ 2,434.0. For the rural area, the mean equivalent household prepayment expenditure was ₦134,347.2. The mean out-of-pocket payment and health insurance contributions were₦9,938.5and₦2,140.7.

Table 4.1: Descriptive Statistics 2010/2011

	Overall				
	N	Mean	Std.Dev	Min	Max
eqoop (Out-of-pocket)	2,836	10,904.5	58,936.1	100.4	5,215,000.0
eqprepay_exp (Total consumption gross of all health care payments)	2,836	160,517.9	297,918.1	866.0	7,912,630.0
eqpostpayment_exp (Total consumption net of all health care payments)	2,836	149,613.4	286,327.5	685.8571	7,910,840.0
eqOOPinsurance (Health Insurance Contribution)	191	11,988.4	8,915.67	1000	115,200.0
eqhhsize (Household size)	2,836	1.0	.2	1.0	3.0
wt_wave1 (Household weights)	2,836	6,105.4	3,739.5	612.2	33,469.5
Urban					
eqoop (Out-of-pocket)	920	12,569.5	74,534.1	53.0	5,215,000
eqprepay_exp (Total consumption gross of all health care payments)	920	205,621.4	316,494.2	1,252.2	7,912,630.0
eqpostpayment_exp (Total consumption net of all health care payments)	920	193,052.0	301,392.9	1,019.6	7,910,840.0
eqOOPinsurance (Health Insurance Contribution)	135	2,434.0	10,336.2	0	404,000.0
eqhhsize (Household size)	920	1.0	.15	1	3

	N	Mean	Std.Dev	Min	Max
Rural					
eqoop (Out-of-pocket)	1,934	9,938.5	47,573.7	45.4	393,900.0
eqprepay_exp (Total consumption gross of all health care payments)	1,934	134,347.2	283,326.6	866.0	69,806.0
eqpostpayment_exp (Total consumption net of all health care payments)	1,934	124,408.7	274,083.6	685.9	696,260.0
eqOOPinsurance (Health Insurance Contribution)	56	2,140.7	7,974.7	0	4,900.0
eqhhsize (Household size)	1,934	1.0	.17	1	3

Geopolitical Zones

	N	Mean	Std.Dev	Min	Max
North Central					
eqoop (Out-of-pocket)	414	15, 246.96	106,928.9	84.85	5,215,000.0
eqprepay_exp (Total consumption)	414	127,804.0	191,086.7	2227.12	7,729,400.0
eqpostpayment_exp (Total consumption net of all health care payments)	414	112,557.0	128,368.3	1,332.697	2,514,400.0
eqOOPinsurance (Health Insurance Contribution)	29	2135.04	9676.93	0	404,000.0
eqhhsize (Household size)	414	1.04	.1520721	1	2.83

North East					
eqoop (Out-of-pocket)	425	7,821.35	22,563.31	45.36	451,050.0
eqprepay_exp (Total consumption gross of all health care payments)	425	120,853.7	228,850.3	2,153.517	2,391,840.0
eqpostpayment_exp (Total consumption net of all health care payments)	425	113,032.3	226,870.8	2,066.914	2,390,840.0
eqOOPinsurance (Health Insurance Contribution)	63	1,099.29	4,504.62	0	200,000.00
eqhhsize (Household size)	425	1.0	.14	1	2.65
North West					
eqoop (Out-of-pocket)	510	4,995.37	13,588.41	110	361,000.0
eqprepay_exp (Total consumption gross of all health care payments)	510	104,128.4	234,816.9	2,130.0	3,528,180.0
eqpostpayment_exp (Total consumption net of all health care payments)	510	9,9132.1	234,040.9	1,980	3,527,680
eqOOPinsurance (Health Insurance Contribution)	3	1,264.6	2,719.733	0	68,000
eqhhsize (Household size)	510	1.0	.1	1	2.8

South East					
eqoop (Out-of-pocket)	588	13,572.9	50,032.7	86.6	1,414,053
eqprepay_exp (Total consumption gross of all health care payments)	588	160,160.8	208,873.6	4,645.7	2,176,693
eqpostpayment_exp (Total consumption net of all health care payments)	588	146,587.9	196,542.0	1,761.3	2,019,600
eqOOPinsurance (Health Insurance Contribution)	30	2,831.8	9623.2	0	172,000
eqhhsize (Household size)	588	1.1	.2	1	3
South South					
eqoop (Out-of-pocket)	454	14, 010.3	72,469.82	53.0	3,939,000
eqprepay_exp (Total consumption gross of all health care payments)	454	228,705.1	448,003.5	866.0	6,980,600
eqpostpayment_exp (Total consumption net of all health care payments)	454	214694.8	434990.6	750.5554	6962600
eqOOPinsurance (Health Insurance Contribution)	45	3,634.0	13,507.4	0	490,000.0
eqhhsize (Household size)	454	1.1	.19	1	3
South West					
eqoop (Out-of-pocket)	443	6,161.5	25,660.58	86.6	785,300.0
eqprepay_exp (Total consumption gross of all health care payments)	443	187,681.3	347,323.0	1252.2	7,912,630

eqpostpayment_exp (Total consumption net of all health care payments)	443	181519.8	34,5642.9	685.9	7,910,840
eqOOPinsurance (Health Insurance Contribution)	21	1,380.5	4,446.8	0	175,000
eqhhsize (Household size)	443	1.0	.2	1	2.8

Source:*Computed from GHS-Panel, 2010/2011*

For wave GHS 2012/2013 data set, 4716 households are contained in the survey and the average household size was 6.1 individuals the in rural and 5.2 individuals in the urban areas. Table 4.2 revealed that 3,999 households were utilized for the study of which 345 made health insurance contribution. At the national level the mean equivalent prepayment expenditure (household consumption expenditure gross of all health care payments) was ₦ 61,387.6. The mean equivalent out-of-pocket payment was ₦10, 013.3, and the health insurance contribution on the average was an estimated N 9380.3. The mean equivalent post-payment expenditure (household consumption expenditure net of all health care payments) was ₦ 51,374.3. In the urban area, the mean equivalent prepayment household consumption expenditure was ₦ 77,114.4. The mean out-of-pocket payment and health insurance contribution were ₦10,398.9 and ₦2,585.4. The equivalent post-payment household consumption expenditure was ₦66,715.4. For the rural area, the mean equivalent household prepayment expenditure was ₦51,954.1. The mean out-of-pocket payment and Health Insurance Contributions were ₦9,781.9 and ₦2,185.7. The equivalent post-payment household consumption expenditure was₦ 42,172.2.

Table 4.2: Descriptive Statistics for 2012/2013

	N	Mean	Std.Dev	Min	Max
Overall					
eqoop (Out-of-pocket)	3,999	10,013.3	28,849.0	100.0	1,509,400.0
eqprepay_exp (Total consumption gross of all health care payments)	3,999	61,387.6	104,339.4	223.6	7,482,800.0
eqpostpayment_exp (Total consumption net of all health care payments)	3,999	51,374.3	97,164.7	0	7,452,800
eqOOPinsurance (Health Insurance Contribution)	345	9,380.3	8,631.5	1000.0	300,000.0
eqhhsize (Household size)	3,999	1.1	1.0	.4	4.5
wt_wave2 (Household weights)	3,999	7,055.2	4,818.9	680.2	41,836.9
Urban					
eqoop (Out-of-pocket)	1,278	10,398.99	31,019.86	26.7	1,200,550.0
eqprepay_exp (Total consumption gross of all health care payments)	1,278	77,114.4	126,519.8	223.6	7,482,800.0
eqpostpayment_exp (Total consumption net of all health care payments)	1,278	66,715.4	119,098.4	0	7,452,800.0
eqOOPinsurance (Health Insurance Contribution)	181	2,585.4	9,240.7	0	500,000.0
eqhhsize (Household size)	1,278	1.1	.4	1	4.5
Rural					
eqoop (Out-of-pocket)	2,721	9,781.9	27,462.7	25	1,509,400.0
eqprepay_exp (Total consumption gross of all health care payments)	2,721	51,954.1	87,053.7	223.6	6,189,500
eqpostpayment_exp (Total consumption net of all health care payments)	2,721	42,172.2	79,813.7	0	6,078,000.0
eqOOPinsurance (Health Insurance Contribution)	164	2,185.7	8,241.0	0	600,000.0
eqhhsize (Household size)	2,721	1.1	.4	1	4.5

Geopolitical Zones	N	Mean	Std.Dev	Min	Max
North Central					
eqoop (Out-of-pocket)	664	8,789.8	26,149.0	28.9	1,509,400
eqprepay_exp (Total consumption gross of all health care payments)	664	53,380.6	114,177.5	242.5	7,482,800.0
eqpostpayment_exp (Total consumption net of all health care payments)	644	44,590.8	109,634.9	0	7,452,800.0
eqOOPinsurance (Health Insurance Contribution)	42	1,736.1	4,554.1	0	200,000.0
eqhhsize (Household size)	664	1.1	.4	1	4.5
North East					
eqoop (Out-of-pocket)	599	7,164.1	25,875.1	26.7	903,900.0
eqprepay_exp (Total consumption gross of all health care payments)	599	39,491.1	56,624.5	250.0	1,571,350.0
eqpostpayment_exp (Total consumption net of all health care payments)	599	49375.59	32,326.1	0	1,552,000.0
eqOOPinsurance (Health Insurance Contribution)	94	3,727.1	1,239.6	0	160,000.0
eqhhsize (Household size)	599	1.1	.4	1	4.5
North West					

eqoop (Out-of-pocket)	688	8,103.8	18,727.6	53.5	801,600.0
eqprepay_exp (Total consumption gross of all health care payments)	688	37,337.5	51,290.1	258.2	801,600.0
eqpostpayment_exp (Total consumption net of all health care payments)	688	29,233.7	46,630.3	0	720,000.00
eqOOPinsurance (Health Insurance Contribution)	10	1,143.8	2,846.4	0	100,000.0
eqhhsize (Household size)	688	1.1	.3	1	4.5
South East					
eqoop (Out-of-pocket)	710	11,131.1	31,383.7	45.9	720,000.0
eqprepay_exp (Total consumption gross of all health care payments)	710	68,308.6	103,244.5	223.6	1,526,810.0
eqpostpayment_exp (Total consumption net of all health care payments)	710	57,177.5	94,426.8	0	1,525,960.0
eqOOPinsurance (Health Insurance Contribution)	53	2,974.2	10,669.6	0	514,000.0
eqhhsize (Household size)	710	1.1	.5	1	4.5
South South					
eqoop (Out-of-pocket)	673	13,246.3	37,834.2	25	1,107,900.0
eqprepay_exp (Total consumption gross of all health care payments)	673	84,134.9	132,258.3	242.5	6,189,500.0
eqpostpayment_exp (Total consumption net of all health care payments)	673	70888.7	121,718.2	0	6,078,000
eqOOPinsurance (Health Insurance Contribution)	113	3,193.8	12,638.8	0	600,000.0

eqhhsize (Household size)	673	1.1	.5	1	4.5
South West					
eqoop (Out-of-pocket)	685	9,608.4	23,968.9	28.9	1,200,550.0
eqprepay_exp (Total consumption gross of all health care payments)	685	68,389.8	109,503.6	223.6	6,015,000.0
eqpostpayment_exp (Total consumption net of all health care payments)	685	58,781.5	104,788.7	0	6,000,000.0
eqOOPinsurance (Health Insurance Contribution)	31	2,798.3	8,336.0	0	400,000.0
eqhhsize (Household size)	685	1.1	.5	1	4.5

Source computed from GHS panel 2012/2013

Similarly, in the 2015/2016 GHS data set 4,939 households are contained in the survey 5.9 and 4.9 persons in both the rural and urban areas respectively. Table 4.3 showed that 4,051 households were employed in the analysis and 416 were enrolled in the national health insurance scheme. On the average the household equivalent prepayment expenditure (consumption expenditure gross of all health care payments) was ₦ 50,855. The equivalent out-of-pocket payment and the equivalent health insurance contribution were ₦ 10,262.4 and ₦ 9,865.1 respectively. The average household equivalent post-payment expenditure (consumption expenditure gross of all health care payments) was₦ 40,592.7. In the urban area, the mean equivalent prepayment household consumption expenditure was ₦ 59,830.1. The mean out-of-pocket payment and health insurance contribution were ₦ 10,975.6 and ₦ 2,690.2. The equivalent post-payment household consumption expenditure was ₦ 48,854.5. For the rural area, the mean equivalent household prepayment expenditure was ₦45,497.8. The mean out-of-pocket payment and health insurance contribution were ₦ 9,836.7 and ₦ 2,170.0. The equivalent post-payment household consumption expenditure was ₦35,661.0.

Table 4.3: Descriptive Statistics for 2015/2016

	N	Mean	Std. Dev	Min	Max
Overall					
eqoop (Out-of-pocket)	4,051	10,262.4	31086.1	100.7	2,406,100.0
eqprepay_exp (Total consumption)	4,051	50,855.1	73583.4	258.2	3,709,800.0
eqpostpayment_exp (Total consumption net of all health care payments)	4,051	40,592.7	64872.3	0	3,416,000.0
eqOOPinsurance (Health Insurance Contribution)	416	9,865.1	8335.6	1000.0	366,000.0
eqhhsize (Household size)	4,051	1.1	.3	1.0	4.9
wt_wave3 (Household weights)	4,051	6,670.3	4,398.7	612.2	37,188.3
Urban					
eqoop (Out-of-pocket)	1,305	10,975.6	28,289.7	41.6	969,000.0
eqprepay_exp (Total consumption gross of all health care payments)	1,305	59,830.1	77,163.24	315.8	2,799,780.0
eqpostpayment_exp (Total consumption net of all health care payments)	1,305	48,854.54	71,036.43	0	2,796,000
eqOOPinsurance (Health Insurance Contribution)	320	2,690.2	7,476.2	0	302,000.0
eqhhsize (Household size)	1,305	1.1	.3	1	4.5
Rural					
eqoop (Out-of-pocket)	2,746	9836.7	32,634.32	27.7	2,406,100.0

	N	Mean	Std. Dev	Min	Max
eqprepay_exp (Total consumption gross of all health care payments)	2,746	45,497.8	70,822.3	258.2	3,709,800.0
eqpostpayment_exp (Total consumption net of all health care payments)	2,746	35,661.0	60,360.8	0	3,416,000.0
eqOOPinsurance (Health Insurance Contribution)	94	2,170.0	8803.143	0	1,012,000.0
eqhhsize (Household size)	2,746	1.1	.2	1	4.9

Geopolitical Zones

	N	Mean	Std. Dev	Min	Max
North Central					
eqoop (Out-of-pocket)	671	8,210.4	20,376.5	50	721,150.0
eqprepay_exp (Total consumption gross of all health care payments)	671	40,467.9	55,097.1	387.3	1,879,500.0
eqpostpayment_exp (Total consumption net of all health care payments)	671	32,257.6	50,414.1	0	1,860,000.0
eqOOPinsurance (Health Insurance Contribution)	62	1876.5	4289.8	0	100,000.0
eqhhsize (Household size)	671	1.1	.2	1	4.5
North East					
eqoop (Out-of-pocket)	556	7058.2	34237.6	44.7	2,406,100
eqprepay_exp (Total consumption gross of all health care payments)	556	35,476.9	57,984.4	320.7	2,468,500.0

eqpostpayment_exp (Total consumption net of all health care payments)	556	28,418.7	46,712.5	0	910,000.0
eqOOPinsurance (Health Insurance Contribution)	58	1509.7	3749.0	0	100,000.0
eqhhsize (Household size)	556	1.1	.2	1	3.9
North West					
eqoop (Out-of-pocket)	740	7,596.5	23,809.4	27.7	822,100.0
eqprepay_exp (Total consumption gross of all health care payments)	740	34,009.2	49,200.6	268.3	822,100.0
eqpostpayment_exp (Total consumption net of all health care payments)	740	26,412.7	43,106.8	0	522,400.0
eqOOPinsurance (Health Insurance Contribution)	23	1402.9	3,658.2	0	160,000.0
eqhhsize (Household size)	740	1.1	.2	1	4.5
South East					
eqoop (Out-of-pocket)	722	11,356.1	32,449.1	53.5	816,800.0
eqprepay_exp (Total consumption gross of all health care payments)	722	50,130.1	71,885.4	301.5	3,709,800.0
eqpostpayment_exp (Total consumption net of all health care payments)	722	38,774.8	58,762.6	0	3,197,600
eqOOPinsurance (Health Insurance Contribution)	123	2,118.2	4,726.9	0	139,000.0

eqhhsize (Household size)	722	1.1	.3	1	4.5
South South					
eqoop (Out-of-pocket)	686	14,605.4	40,974.5	41.6	2,092,200.0
eqprepay_exp (Total consumption gross of all health care payments)	686	78,758.7	103,482.4	258.2	3,425,000.0
eqpostpayment_exp (Total consumption net of all health care payments)	686	64,153.3	94,702.1	0	3,416,000.0
eqOOPinsurance (Health Insurance Contribution)	57	3617.9	13,500.6	0	1,012,000.0
eqhhsize (Household size)	686	1.1	.3	1	4.9
South West					
eqoop (Out-of-pocket)	676	9,943.3	25,370.6	50	800,900.0
eqprepay_exp (Total consumption gross of all health care payments)	676	52,548.2	63,831.4	315.8	1,469,000.0
eqpostpayment_exp (Total consumption net of all health care payments)	676	42,604.9	58,311.37	0	1,460,000.0
eqOOPinsurance (Health Insurance Contribution)	93	3,009.8	11,029.4	0	302,000
eqhhsize (Household size)	676	1.1	.2	1	4.4

Source:*Computed from GHS-Panel, 2015/2016*

4.2 Household Health Financing and Total Consumption Expenditure Shares

This section presents the estimates of total consumption expenditure and health care payments by quintiles. The households were ranked in ascending order of prepayment income (gross equivalent consumption expenditure). Information related to the average health financing as a proportion of consumption expenditure for the period of 2010/ 2011; 2012/ 2013 and 2015/ 2016 are shown below.

4.2.1 Quintile Share of Per Capita Health Care Finance (2010/2011)

The first column in table 4.4, showed that on the average the lower, lowest and middle income quintile consumed₦24,705.0, ₦55,521.2, and ₦94,694.7 in Nigeria respectively. The highest quintile on the average consumed N486,511.8, this estimate was 19 times more than the consumption expenditure of the lowest income quintile. The lower and lowest income quintiles contributed₦2,213.1 and ₦4,448.4 toward direct health care payments. These figures on the average amounted to 9.0 per cent and 8.0 per cent of their share of gross consumption expenditure spent on out-of-pocket payments. The higher and highest quintiles contributed N9,629.8 and N26,941.5 as their share of out-of-pocket payments. These figures represented 6.0 per cent and 5.5 per cent of their share of prepayment income spent on out-of-pocket health financing. In the urban area the share of consumption expenditure spent on health care payment 8.6 per cent was more for the lowest income quintile compared to the highest income quintile share 6.1 percent. The share of out- of-pocket payment in per capita consumption expenditure in the rural area spent by the lowest income quintile 9.1 percent was more than that consumed by their counterparts in the urban area 8.6 percent.

The results revealed that the mean health insurance contribution for those enrolled in the National Health Insurance Scheme(NHIS) for the lowest, lower and middle quintileswere N6,193.4; N5,440.8 and N20,971.6 respectively. The gross per capita consumption expenditure as a share of the health insurance contribution for the lowest quintile was 13.1 percent. It reduced to 5.3 percent for the second quintile. The estimate for the highest quintile was 2.7 percent. In the urban area, the share of health insurance contribution in the lowest income quintile 15.1 percent, was thrice the estimate of those in lowest income quintile in the rural area 2.8 percent.

Table 4.4: Quintile Share of per capita Health Care Finance (2010/2011)

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP Payments
Quintiles of per capita Consumption, gross			
Lowest Quintile	27,309.1 (9,869.9)	2,446.3 (3,379.2)	9.0
Lower Quintile	56,150 (10,251.8)	4,365.7(6,873.6)	7.8
Middle Quintile	92,735 (15,370.3)	6,400.6 (10,387.4)	6.9
Higher Quintile	155,011(29,620.5)	10,118.8 (19,884.7)	6.5
Highest Quintile	471,507 (559,107.4)	31,199.1 (127,532.2)	6.6
Total	160,517.9 (297,918.1)	10,904.60 (10,904.6)	6.8

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	42,433.7(14,792.5)	5,297.6(9,879.1)	12.5
Lower Quintile	86,150.2(139,44.8)	4,682.1(9,790.6)	5.4
Middle Quintile	157,010.4(24,860.1)	11,912.3 (19,306.4)	7.6
Higher Quintile	288,764.0(35,616.0)	12,761.4 (21,397.3)	4.4
Highest Quintile	575,204.5(213,433.6)	25,479.7 (31,696.1)	4.4
Total	228,847.3(215,086.9)	11,988.4 (21,239.4)	5.2

Urban

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP Payment
Quintiles of per capita Consumption, gross			
Lowest Quintile	28,767.1(9,679.8)	2,464.1(3,299.01)	8.6
Lower Quintile	57,186.7(10,194.4)	3,679.3 (5,947.4)	6.4
Middle Quintile	93,393.6(15,194.5)	5,093.5(9,344.7)	5.5
Higher Quintile	156,314.6(29597.8)	8,517.2 (17,185.7)	5.4
Highest Quintile	472,925.1(48,7295.3)	29,818.2 (13,5501.4)	6.3
Total	205,621.4(205,621.4)	12,569.5 (74,534.12)	6.1

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	41,520.1(14,158.8)	6,264.3 (10,807.5)	15.1
Lower Quintile	86,003.6(13,664.3)	4,913.9 (10,042.8)	5.7
Middle Quintile	162,171.7(28,156.9)	17,241.9 (23, 282.9)	10.6
Higher Quintile	282,016.4(42,021.1)	16,827.3 (20,789.7)	6.0
Highest Quintile	548,347.5(116,881.9)	33,064.9 (33,634.9)	6.0

Total	206,725.2(200,785.2)	14,589.1 (23,212.8)	7.1

Rural

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP Payment
Quintiles of per capita Consumption, gross			
Lowest Quintile	26,921.1 (9,885.0)	2,441.5 (3,400.7)	9.1
Lower Quintile	55,754.6 (10,247.6)	4,627.9 (7,179.6)	8.3
Middle Quintile	92,321.8 (15,467.9)	7,219.5 (10,912.5)	7.8
Higher Quintile	154,024.5(29605.5)	11,330.0 (21,628.9)	7.4
Highest Quintile	469,884.3 (63,1494.4)	32,780.0 (11,7761.2)	7.0
Total	134,347.20 (134,347.2)	9,938.5 (47,573.7)	7.4

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	46,218.9 (17,893.1)	1,292.9 (1,007.7	2.8
Lower Quintile	88,567.9 (24,986.1)	857.1 (787.8)	1.0
Middle Quintile	149,268.6 (17,002.4)	3,917.9 (5,113.6)	2.6
Higher Quintile	291,856.7 (32,797.6)	10,897.9 (21,848.7)	3.7
Highest Quintile	652,791.1 (376,558.0)	3,566.7 (2,683.3)	0.5
Total	276,251.9 (237,941.8)	6,415.4 (14,937.2)	2.3

Source *Author's compilation GHS 2010/2011*

Note: Standard deviation estimates are in parenthesis

4.2.2 Quintile Share of Per Capita Health Care Finance (2012/2013)

The findings from Table 4.5indicatedthat the lowest, lower and the middle quintiles on the average consumed ₦3,450.5, ₦14,360.9 and ₦32,586.4 respectively. The two higher and highest quintiles consumed N64,900 and N195,765.2 respectively. These estimates point to a decline in the gross per capita consumption for Nigeria especially when the figures were compared with those obtained from 2010/ 2011 period. The mean out-of-pocket payment by the lowest, lower and the middle quintiles income deciles were₦1,338.0, ₦4,016.4 and ₦6,556.0 respectively. These figures constituted 38.8 per cent, 28 per cent and 20.1 per cent of the health care payments by the three deciles. On the average, the out-of-pocket payment by the highest quintile was ₦24,704.6. This estimate constituted about 12.6 percent of health care payment for the period. The results revealed that the poor make a greater proportion of out-of-pocket contribution although they have the least share of prepayment income.In the urban area the lowest income quintile spent 40.5 percent their total consumption expenditure on out-of-pocket payments for health care while the higher and highest income quintiles spent 13.9 and 11.5 percent respectively. On the average the share of consumption expenditure spent on out-of-pocket was greater in the rural area across all income quintiles than in the urban areas.

The low and middle income quintiles contributed ₦2,065.0, ₦6,240.6, ₦10, 986.9 and these figures amounted to 35.4 per cent, 22.2 per cent and 18.2 per cent of their share of consumption expenditure contributed towards health insurance payments by the respective quintiles. The health insurance contribution as a proportion of the gross per capita consumption expenditure of the two high income quintiles were 11.3 and 12.6 per cent respectively. The results suggest that the low income quintiles contribute more towards the health insurance than the highest quintiles.The results from the sectorial analysis suggest that on the average the share of health insurance contribution in per capita consumption expenditure for the lowest income quintile was more in the rural area 49.4 percent than in the urban area 17.6 percent. In the rural area the estimate for the lowest income quintile 49.4 percent was four times greater than the estimate of the highest income quintile 9.8 percent.

Table 4.5: Quintile Share of per capita Health Care Finance (2012/2013)

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP Payments
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,509.5 (3,073.9)	2,265.2 (2318.8)	41.1
Lower Quintile	17,628.7 (5,033.4)	4,998.0 (5558.5)	28.4
Middle Quintile	35,180.1 (8,293.2)	7,153.4 (9381.2)	20.3
Higher Quintile	64,952.0 (15,165.7)	10,394.6 (15329.5)	16.0
Highest Quintile	183,699.9 (182,774.8)	25,259.1 (58963.4)	13.8
Total	61,387.6 (104,339.4)	10,013.3 (28849.0)	16.3

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	6,909.2 (4,754.2)	2,040.3 (2,944.0)	29.5
Lower Quintile	25,407.1 (6,125.2)	4,272.8 (6,081.8)	16.8
Middle Quintile	52,166.8 (7,573.4)	5,465.2 (7203.3)	10.5
Higher Quintile	85,330.2 (14,845.2)	7,251.5(8,846.6)	8.5
Highest Quintile	246,765.9 (249,273.3)	28,143.6 (60,115.1)	11.4
Total	82,840.7 (139,806.3)	9,380.3 (28,820.8)	11.3

Urban

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,536.9 (3,103.6)	2244.7 (2,242.6)	40.5
Lower Quintile	17,683.4 (5,024.9)	4542.6 (5,113.9)	25.7
Middle Quintile	35,417.1 (8,534.0)	6801.2 (9,102.1)	19.2
Higher Quintile	65,437.2 (15,500.2)	9093.6 (13,452.6)	13.9
Highest Quintile	191,780.9 (19, 6691.9)	22105.1 (55,590.8)	11.5
Total	77,114.4 (126,519.8)	10398.99 (31,019.9)	13.5

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	7,105.8 (5,027.2)	1,253.9 (2,691.6)	17.6
Lower Quintile	24,624.8 (6,111.8)	3,808.7 (6,461.6)	15.5

Middle Quintile	51,668.4 (7,748.5)	4,929.7 (6,644.2)	9.5
Higher Quintile	80,898.5 (14,751.8)	4,802.2 (5,396.1)	5.9
Highest Quintile	220,477.4 (138,496.8)	29,395.7 (6,6893.2)	13.3
Total	72,769.7 (97,852.8)	8,573.5 (31,316.4)	11.8

Rural

	Per Capita Consumption, gross (₦)	**Out-of-pocket (₦)**	**Per capita consumption as % of OOP Payment**
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,498.3 (3,061.8)	2,273.6 (2,349.5)	41.4
Lower Quintile	17,603.1 (5,037.6)	5,212.0 (5,743.4)	29.6
Middle Quintile	35,057.0 (8,163.2)	7,336.5 (9,518.6)	20.9
Higher Quintile	64,616.2 (14,922.0)	11,295.1 (16,445.1)	17.5
Highest Quintile	175,176.8(166,440.9)	28,585.6 (62,156.3)	16.3
Total	51,954.1 (87,053.6)	9,781.9 (27,462.7)	18.8

	Per Capita Consumption, gross (₦)	**Health Insurance Contribution (₦)**	**Per capita consumption as % of OOPINSURANCE**
Quintiles of per capita Consumption, gross			
Lowest Quintile	6,603.2 (4,370.3)	3,263.4 (2,948.2)	49.4
Lower Quintile	26,366.1 (6,102.9)	4,841.8 (5,633.6)	18.4
Middle Quintile	52,777.7 (7,433.7)	6,121.6 (7,896.6)	11.6
Higher Quintile	88,179.2 (14,361.9)	8,826.0 (10, 239.5)	10.0
Highest Quintile	274,647.6 (328,879.8)	26,815.6 (52,995.7)	9.8
Total	93,894.2 (174,298.8)	10,265.7 (25,873.0)	10.9

Source*Author's compilation GHS Panel 2012/2013*

Note: Standard deviation estimates are in parenthesis.

4.2.3 Quintile Share of Per Capita Health Care Finance (2015/2016)

The mean per capita consumption expenditure for the lowest, lower and the middle income quintiles as shown in Table 4.6 were N4,403.8, N14,216.1 and N28,794.0 respectively. The figures for the highest quintile were N 53,640.4 and N 145,595.5 respectively. The highest quintile mean consumption expenditure was 7 times more than that of the lowest two quintiles. On the average the out-of-pocket payment by the highest quintile was N25,387.6 which was approximately 17.4 percent of the health care finance. The mean out-of-pocket payment by the lowest two and middle three income deciles were more than that of the previous year at N 1,951.8; N4,494.2 and N6,777.7 respectively. These figures constituted 44.3 per cent; 31.6 per cent and 23.5 per cent of the health care payments by these three deciles. In the rural area the estimate of the out-of-pocket payment in consumption expenditure for the lowest income quintile 45.3 percent was greater than that of the highest income quintile 18.3 percent.

The lowest and lower income quintiles mean contribution towards health insurance were N 3,383.2 and N7,343.9 respectively. These figures amounted to 49.2 per cent and 30.1 per cent of their share of consumption expenditure contributed for health insurance payments. The estimates represented a marginal increase compared to that of the previous year. The health insurance contribution of the higher and highest two quintiles were N65,621 and N143, 528.6 respectively. Their corresponding shares of health insurance finance to the gross per capita consumption expenditure were 23.4 per cent and 15.2 per cent respectively. The results indicated that both quintiles contributed less towards the health insurance co-payments than the lower and lowest quintiles. In the urban area on the average the share of consumption expenditure spent on health insurance contribution for the lowest and lower income quintile 53.5 and 29.1 percent respectively was greater than that spent by the highest and higher income quintiles 15.5 and 12.5 percent respectively.The results suggest that on the average the share of health insurance contribution in per capita consumption expenditure for the lowest income quintile in the rural area 34.1 percent was less than the estimate for the urban area 53.8 percent. In the urban area the estimate for the lowest and lower income quintile 53.8 and 29.1 percent respectively was greater than the estimate of the highest and higher income quintile 12.5 and 17.5 percent respectively.

Table 4.6: Quintile Share of per capita Health Care Finance (2015/2016)

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP Payment
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,412.4 (2,872.2)	2,542.8(2,324.7)	47.0
Lower Quintile	16,537.4 (4,407.8)	5,204.3(5,130.4)	31.5
Middle Quintile	31,385.4 (6,693.1)	7,205.5(8,416.9)	23.0
Higher Quintile	55,346.2(12,162.6)	10,881.5(14,163.1)	19.7
Highest Quintile	145,623.9(119,305.8)	25,482.8(64831.7)	17.5
Total	50,855.1 (73,583.4)	10,262.4 (31,086.1)	20.2

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	6,955.9 (3,876.2)	3,361.7 (3,476.1)	48.3
Lower Quintile	23,802.7 (5,033.4)	6,547.9 (5,085.2)	27.5
Middle Quintile	38,367.1 (4,518.8)	7,539.5 (8,372.8)	19.7
Higher Quintile	59,739.1 (8,640.9)	117,44.8 (15,244.1)	19.7
Highest Quintile	168,138.0 (12,3183.7)	20,313.2 (45,049.0)	12.1
Total	59,013.9 (7,8889.0)	98,65.1 (22,317.8)	16.7

Urban

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,539.3 (2,856.3)	2,508.2(2,345.7)	45.3
Lower Quintile	16,670.4 (4,407.9)	4,721.1(4,933.5)	28.3
Middle Quintile	31,247.9 (6,735.7)	6,522.8(7,729.8)	20.9
Higher Quintile	55,312.0(12,325.6)	10,013.7(13,471.4)	18.1
Highest Quintile	143,716.8(108,437.2)	23,944.0(50,609.4)	16.7
Total	59,830.1(77,163.2)	10,975.6(28,289.7)	18.3

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	7,686.8 (4,000.7)	4,133.1(3,659.5)	53.8
Lower Quintile	24,198.2 (4,922.1)	7,052.5(5,009.5)	29.1
Middle Quintile	38,097.5 (4,481.2)	8,068.8(8,661.3)	21.2
Higher Quintile	59,360.8 (8,588.8)	9,222.8(10,732.2)	15.5
Highest Quintile	148,268.3(126,981.9)	18,526.8(52,289.5)	12.5
Total	52,048.5(68,877.8)	9,111.0(22,604.5)	17.5

Rural

	Per Capita Consumption, gross (₦)	Out-of-pocket (₦)	Per capita consumption as % of OOP
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,364.1 (2,877.0)	2,556.0(2,316.7)	47.7
Lower Quintile	16,471.2 (4,406.5)	5,444.7(5,209.4)	33.1
Middle Quintile	31,464.0 (6,667.9)	7,595.8(8,762.3)	24.1
Higher Quintile	55,369.3(12,052.8)	11,465.0(14,581.9)	20.7
Highest Quintile	147,494.4(129,063.3)	26,992.1(76,221.3)	18.3
Total	45,497.8(70,822.3)	9,836.7(32,634.3)	21.6

	Per Capita Consumption, gross (₦)	Health Insurance Contribution (₦)	Per capita consumption as % of OOPINSURANCE
Quintiles of per capita Consumption, gross			
Lowest Quintile	5,569.7 (3,260.4)	1,898.8 (2,570.4)	34.1
Lower Quintile	19,508.6 (4,463.0)	1,070.7 (1,224.2)	5.5
Middle Quintile	40,335.0 (4,528.5)	3,675.0 (4,440.7)	9.1
Higher Quintile	61,033.2 (8,928.4)	20,372.4 (23,674.3)	33.4
Highest Quintile	204,451.7 (108,804.6)	23,578.0 (27,855.7)	11.5
Total	82,874.02 (103,213.6)	12,448.4 (21,219.5)	15.0

Source*Author's compilation GHS Panel 2015/2016*

Note: Standard deviation estimates are presented in parenthesis.

4.3 Progressivity of Health Care Financing in Nigeria

The result for the progressivity estimatesare presented in this section. The estimation used equivalised household data containing information on out-of-pocket payments for health (OOP), health insurance contributions ($OOP_{insurance}$)for those enrolled in the National Health Insurance Scheme (NHIS) and household consumption expenditure as the ability to pay measure. The results were estimated for three sets of the General Household Panel Survey 2010/ 2011; 2012/2013 and 2015/2016 respectively. The estimation technique employed was the weighted convenient regression.It was used to obtain the estimates for the Gini coefficient, the Coefficient of Concentration and the Kakwani Progressivity Index for the health payment variable and the ATP measure. The Kakwani index of progressivity (KPI) was interpreted in terms of its size, direction (positive or negative sign) and the level of statistical significance (Yu *et al.,* 2008). The value of the KPI ranges from -2 to 1. A positive (negative) coefficient of the KPI implied progressivity (regressivity).

A disaggregated analysis was performed with the Multiple Comparison Estimation Technique (MCET) to assess dominance relationsfor the health payment variables, because the Kakwani Progressivity Index is a summary progressivity measure that does not provide an in-depth assessment of the extent of progressivity or otherwise across the whole percentiles of income distribution (O' Donnell *et al.,* 2008; Ataguba, 2012). The visual representation of the progressivity analysis was displayed using the Lorenz curves and the Concentration Curves. The estimation was conducted at the national level and for the six geopolitical zones of the country.

4.3.1 Progressivity of Health Care Financing in Nigeria (2010/2011)

The Gini coefficient of prepayment income, Concentration coefficient of the out-of-pocket payment and health insurance contributions alongside their respective Kakwani progressivity index for Nigeria and the six geopolitical zones [North-Central (NC), North-East (NE), North-West (NW), South-West (SW), South-East (SE) and South-South (SS)] are presented in Table 4.7.Overall, for the country, the Gini index of the prepayment income 0.55was statistically significant. This implied that the prepayment income was concentrated with the wealthy. Indicating that income inequality existed in the nation's distribution of income. The result was similar to that obtain by Omotosho and Ichoku (2016) for Nigeria. The findings suggested a high level of income inequality in the urban area with a Gini index of 0.65 than in the rural area 0.49.

The results from the zones revealed that the South-South had the highest Gini index of 0.72 and was followed closely by the South- East 0.52. The North-central Zone had the lowest value of 0.41. Intuitively, these results indicated that the South- South and South-East regions had the bulk of their income concentrated among the upper-half of the income distribution.

The concentration indices for the out-of-pocket health care payments for Nigeria (0.51) and the six zones appeared to be significantly positive with the N-C having the highest value of (0.97). This suggest that the out-of-pocket health care payment was concentrated with the better-off who contributed the largest share of health care payment. The concentration indices for the health insurance contribution (0.31) for Nigeria was also positively significant. This impliedthat the health insurance contribution was concentrated on the higher income group. The concentration indices of the North-Central, North West, South East, South West and South- South zones (0.002, 0.50, 0.17, 0.21 and -0.03) although Positive, these values are not statistically significant. The concentration index of the North–East (0.98) was positively significant and this suggest that the bulk of the health insurance contribution was concentrated among the upper half of the income distribution.

In the case of the out-of-pocket health care finance, for Nigeria the estimate of the concentration index valued at 0.51 was less than the Gini coefficient of 0.54. This resulted in a negative but significant value of the KPI at -0.03. These findings clearly suggest that although the OOP was concentrated with the high-income group. The portion of OOPspent by the high-incomegroup decreased as income increased. This finding revealed that the out-of-pocket payment was a regressive form of health care financing. This find is in tandem with the findings obtained from other studies Olaniyan *et al.,* (2013), Almasiankia *et al.,* (2015),Quintal and Lopes (2016).

Figure 4.1, is a visual presentation of the progressivity analysis that displays the concentration curve of health payment, the Lorenz curve of consumption expenditure and the line of equality. The concentration curve of the out-of-pocket health care payment lies above the Lorenz curve of equivalent per capital consumption expenditure, which is the measure of prepayment income.This further confirmed the regressivity of the KPI for the OOP in Nigeria.

The estimates of the KPI for out-of-pocket payment in the urban area -0.05 was negative and statistically significant. The results suggest that the OOP was a regressive health care financing source with individuals on lower income levels bearing the burden of health care financing. The estimate of the KPI for the OOP in the rural area -0.008 was mildly negative and statistically significant. This result indicated that the OOP was less regressive in the rural than in the urban area. This could be attributed to lower utilization of health care services by poor individuals in the rural areas.The estimates from the zones revealed that the North Central and South East zones have a significant positive KPI (0.56 and 0.19). This tends to suggest that the better-off paid more for health out-of-pocket as a proportion of their income. The progressivity of the OOP in these zones was offset by the significant but negative values of the KPI in the other zones North East (-0.13), North West (-0.27), South-South (-0.19), South west (-0.46) culminating overall in a regressive out-of-pocket finance for the country.

For the health insurance contribution ($OOP_{insurance}$), the estimates in table 4.1, revealed that the Gini coefficient of 0.47 was inferior to the concentration index of 0.31 and this resulted in a negative but statistically significant (at the 95 per cent level) KPI of –0.16. This result suggests that although concentration index for the $OOP_{insurance}$ was positive, it was a regressive finance mechanism. The regressive nature of the $OOP_{insurance}$emphasizes the fact that the poor spend a larger proportion of their income in payment for health care though enrolled in the National Health Insurance Scheme (NHIS).

Figure 4.2, gives a graphical representation of the progressivity result and further confirms the regressivity of the health insurance contribution. The concentration curve of the $OOP_{insurance}$ laid above the Lorenz curve of equivalent per capital consumption expenditure. The concentration curve also laid above the 45degree line clearly indicative of the fact that the health insurance contributions was a regressive health care funding source and the burden of payment was more concentrated among the poorest.

The estimate of the KPI for the $OOP_{insurance}$ in the urban part of Nigeria 0.005 was positive and statistically different from zero. The implication of the financing was that in the urban parts of the country the$OOP_{insurance}$ was a progressive health care financing source with individuals on higher income levels bearing the burden of health care payments. The coefficient of the KPI -0.48 in the rural area was negative and statistically significant. This implied that the $OOP_{insurance}$ was a regressive health care financing source in the rural area. Findings suggest that the lower income group were bearing the burden of health care funding using the $OOP_{insurance}$ of the National Health Insurance Scheme (NHIS) in the rural area. The findings from the zones reveal that the negative and significant KPI for the N-C (-0.36), S-E (-0.46) and S-S (0.39) regions were more than offset by the significantly positive KPI of the N-E (0.51) and positive but not statisticallysignificant KPI of the N-W (0.2) and S-W (-0.32). The implication of this result is that the health insurance contribution was a progressive health finance source in the North-East zone, a proportional financing mechanism in the North-West zone and a regressive in the North-Central, South-East, South-South and South-west zones. This culminated in the overall regressivity of the $OOP_{insurance}$.

Table 4.7: Gini Coefficient of Prepayment Income, Concentration Coefficient of Health Payments 2010/2011

	Gini Coefficient	OOP Concentration Coefficient	KPI	Gini Coefficient	OOPINSURANCE Concentration Coefficient	KPI
Overall	0.5464	0.5111	-0.0353*	0.4711	0.3109	-0.1602**
	(0.0062)	(0.0208)	(0.0202)	(0.0206)	(0.0741)	(0.0751)
	0.000	0.000	0.08	0.000	0.000	0.034
Urban	0.6473	0.5964	-0.0508	0.4565	0.4621	0.0055
	(0.0112)	(0.0458)	(0.0438)	(0.0160)	(0.0897)	(0.0870)
	0.000	0.000	0.246	0.000	0.000	0.95
Rural	0.4948	0.4868	-0.0079	0.5421	0.0566	-0.4855**
	(0.0077)	(0.0213)	(0.0210)	(0.0653)	(0.1178)	0.1397
	0.000	0.000	0.704	0.000	0.633	0.001
North-Central	0.4061	0.9654	0.5593**	0.3666	0.0021	-0.3645*
	(0.0105)	(0.1039)	(0.0954)	(0.0325)	(0.2004)	(0.2094)
	0.000	0.000	0.000	0.000	0.992	0.094
North-East	0.4783	0.3494	-0.1289**	0.4807	0.9882	0.5075**
	(0.0145)	(0.0242)	(0.0285)	(0.0226)	(0.1182)	(0.1126)
	0.000	0.000	0.000	0.000	0.000	0.000
North-West	0.4475	0.1776	-0.2699**	0.3064	0.5059	0.1995
	(0.0139)	(0.1329)	(0.0196)	(0.7968)	(0.5092)	(0.4295)
	0.000	0.000	0.000	0.162	0.502	0.723
South-East	0.5246	0.7134	0.1887**	0.6272	0.1704	0.4568***
	(0.0075)	(0.0349)	(0.0337)	(0.0825)	(0.1284)	(0.1624)
	0.000	0.000	0.000	0.000	0.173	0.009
South-South	0.7223	0.5299	-0.1923**	0.5174	0.1272	-0.3902**
	(0.0238)	(0.0621)	(0.0613)	(0.0312)	(0.2024)	(0.1984)
	0.000	0.000	0.002	0.000	0.533	0.056
South-West	0.6389	0.18320	-0.4558**	0.5282	0.2051	-0.3231
	(0.0186)	(0.0233)	(0.0293)	(0.0430)	(0.1874)	(0.2029)
	0.000	0.000	0.000	0.000	0.288	0.128

Source: Author's computation

Note:*** significant at 1%; **significant at 5%; *significant at 10%Standard errors are reported in parenthesis and the probability values are specified below.**OOP**: Out-of-pocket health care payment, **OOPINSURANCE**: Health Insurance Contribution **KPI**: Kakwani Progressivity Index.

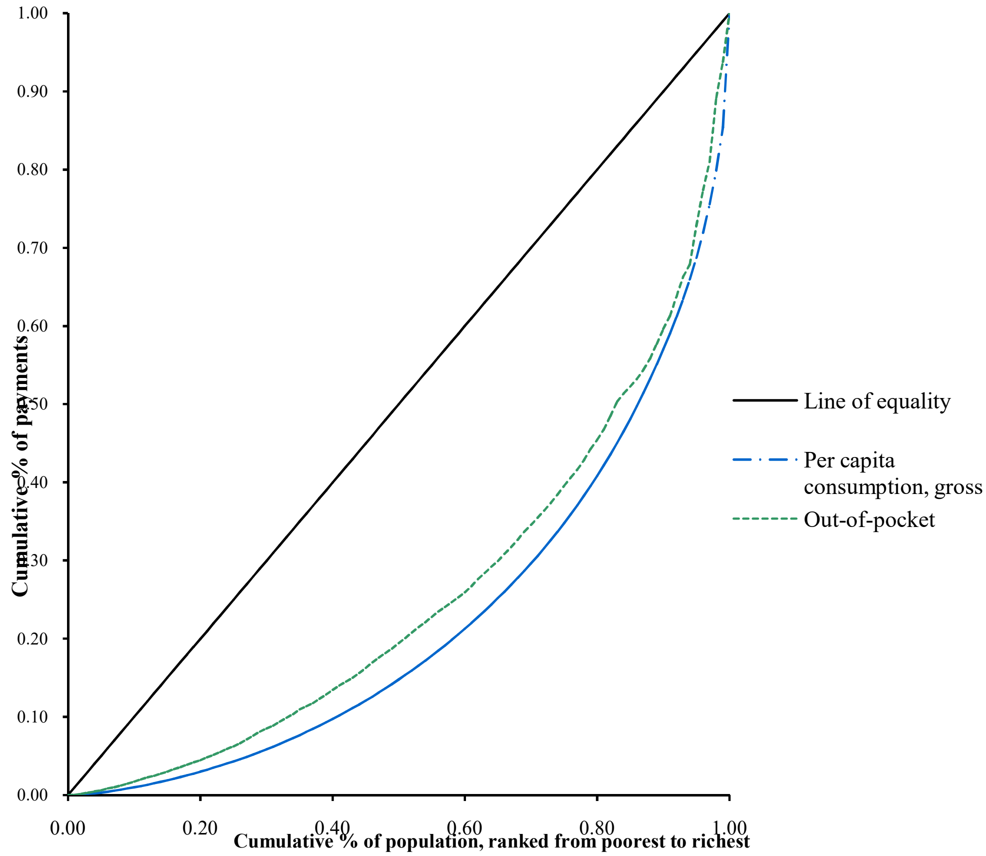

Figure 4.1: Concentration Curve for out-of-pocket Payments Nigeria (2010/2011)

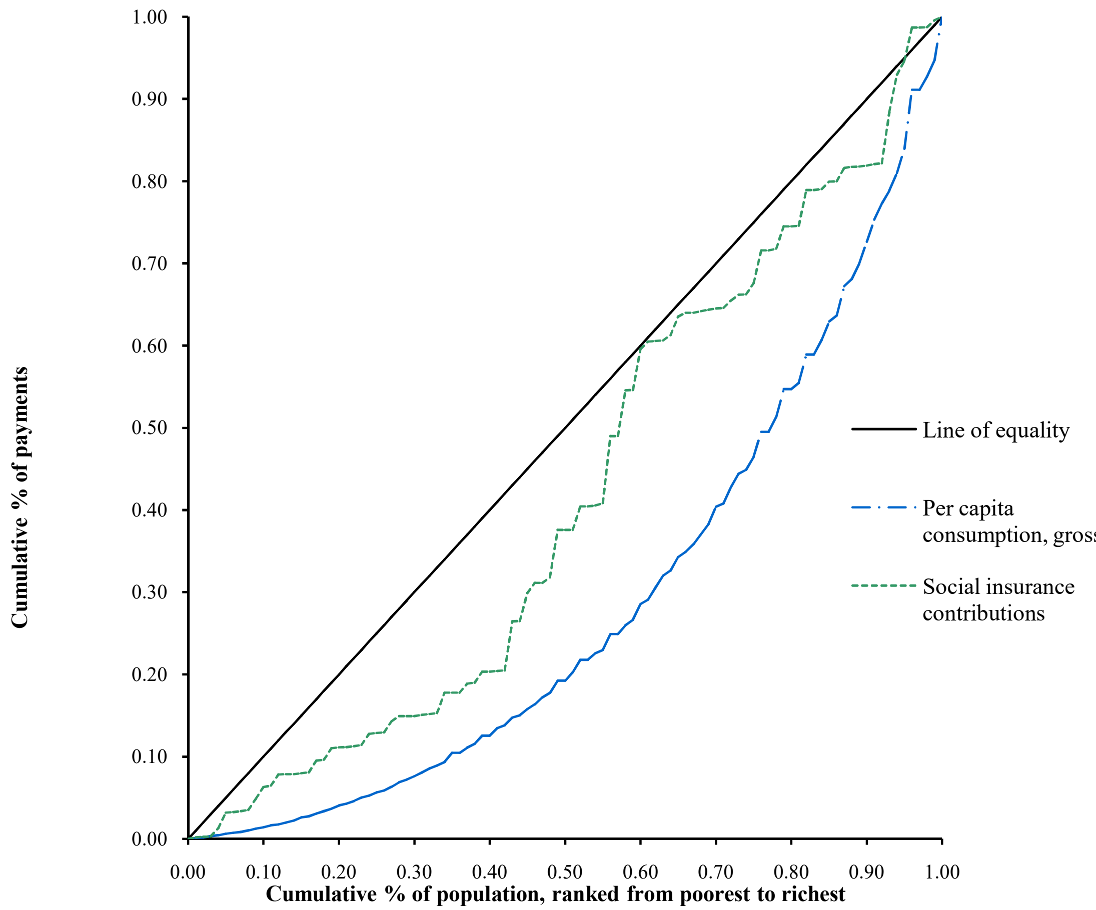

Figure 4.2: Concentration Curve for the Health Insurance Contribution for Nigeria (2010/2011).

4.3.2 Disaggregated Analysis for Progressivity (2010/ 2011)

The results of the disaggregated analysis established using the multiple comparison approach (MCA) to dominance testing shown in Table 4.8, indicated that the Lorenz curve of prepayment income was everywhere dominated at all income quantiles and at a 95 % level of significance by theconcentration curve of out-of-pocket payment. This finding enforced the result of the KPI that the out-of-pocket payment was a regressive financing source.

In Table 4.9, the dominance test results confirmed the findings of the KPI that the health insurance contribution wasregressive. The burden of financing using the $OOP_{insurance}$placed a greater burden on the poor than the better-off. The result showed that the concentration curve of the $OOP_{insurance}$ dominated the Lorenz curve of prepayment income at each quantile point (at a 95 percent significance level). Thus, the $OOP_{insurance}$ was regressive across the entire distribution.

Table 4.8: Dominance Test Result OOP (2010/2011)

Variable	Sort vbl.	Sign. level	# points	Rule
eqoop	exp_p	5%	19	mca

Concentration curve dominates

Test of dominance between concentration curve and 45-degree line

Variable	Sign. level	# points	Rule
eqoop	5%	19	mca

45 degree dominates

cumulative shares of exp_p

Quantile	cum. share	std. error	p-value
q20	3.2782%	0.0448	0.000
q40	10.2140%	0.1257	0.000
q60	21.9097%	0.2509	0.000
q80	41.5458%	0.4375	0.000

cumulative shares of eqoop

Quantile	cum. share	std. error	p-value
q20	4.9540%	0.2189	0.000
q40	13.9375%	0.5205	0.000
q60	27.0057%	0.9632	0.000
q80	46.1108%	1.5860	0.000

Source: Author's computation

Notes:

eqoop: Equivalent out-of-pocket health payment

exp-p: per capita consumption expenditure

mca: Multiple comparison Approach. Where dominance is not accepted if there is at least one significant change in one direction and no significant difference in the other, with comparison performed at 5 % level of statistical significance 19 quantiles points

Table 4.9:Dominance Test Result OOPINSURANCE (2010/2011)

Variable	Sort vbl.	Sign. level	# points	Rule
eqOOPinsurance	exp_p	5%	19	mca

Concentration curve dominates

Test of dominance between concentration curve and 45-degree line

Variable	Sign. level	# points	Rule
eqOOPinsurance	5%	19	mca

45 degree dominates

cumulative shares of exp_p

Quantile	cum. share	std. error	p-value
q20	3.9478%	0.3541	0.000
q40	13.1941%	1.0252	0.000
q60	28.4544%	1.5829	0.000
q80	54.2284%	2.0106	0.000

cumulative shares of eqOOPinsurance

Quantile	cum. share	std. error	p-value
q20	11.2114%	3.1363	0.021
q40	25.8617%	4.9312	0.011
q60	59.3765%	5.9234	0.000
q80	73.5876%	5.9869	0.002

Source: Author's computation

Notes:

eqOOPinsurance: Equivalent Health Insurance Contribution

exp-p: per capita consumption expenditure

mca: Multiple comparison Approach. Where dominance is not accepted if there is at least one significant change in one direction and no significant difference in the other, with comparison performed at 5 % level of statistical significance 19 quantiles points.

4.3.3 Progressivity of Health Care Financing in Nigeria (2012/2013)

The results as presented in Table 4.10shows the Gini indices, concentration indices and the Kakwani progressivity index for Nigeria and itssix geopolitical zones for the period of 2012/ 2013. The Gini coefficient for Nigeria was 0.58, this suggests an increase in income inequality in the country especially when compared with the Gini estimates of 0.55 for the year 2010/ 2011. The finding revealed an unequal distribution of income in the country. Higher level of income inequality was found in the urban area Gini coefficient of 0.66 than in the rural area with a Gini index of 0.51. The estimates from the zones tends to indicate that the South-South and South East had the worst unequal distribution of income with a Gini index of 0.68 and 0.65 respectively. Similar pattern was observed with the use of the 2010/ 2011 data set. The North East and the North West zones had the least values of 0.41 and 0.42 respectively.

The Concentration Indices (CI) for out-of-pocket health care payment (OOP) for Nigeria (0.45), the urban section (0.42), rural section (0.48) and the six geopolitical zones were significantly positive ($P<0.05$). The CI for the health insurance contribution (0.55) was significantly positive at ($P<0.01$). The estimate indicates that the $OOP_{insurance}$was concentratedwith the higher income earners. The estimates of the CI for the North West (- 0.002) and South West zones (– 0.12) were negative and this could infer that the $OOP_{insurance}$ was a pro-poor funding source. The CI for the North Central (0.36), North East (0.36), South-East (0.57) and South South (0.58) zones were significantly positive at ($P<0.05$). These estimates implied that in the four zones, the $OOP_{insurance}$ was a pro-rich financing mechanism with the better- off bearing a larger share of health care financing using the $OOP_{insurance}$.

The CI of out-of-pocket payment (OOP) for Nigeria was estimated at 0.45 and this was lesser than the Gini index of 0.58. This resulted in a negative and statistically significant Kakwani Progressivity index (KPI) of (0.12). The KPI confirms that for the period under review in Nigeria the out-of-pocket finance was regressive with the poor paying more for health care as a proportion of income as it increased. Figure 4.2, which is the graphical representation of the progressivity analysis, confirmed the result of the KPI for the OOP. The Concentration curve of out-of- pocket payment laid above the Lorenz curve of prepayment income indicating that the out-of-pocket finance is a regressive financing mechanism.

The estimates of the CI in the urban (0.43) and rural (0.48) parts of the country was less than the estimate of their respective Gini coefficients (0.66 and 0.51) resulting in negative but statistically significant coefficients of the KPI (-0.23 and -0.032). The OOP was more regressive in the urban area. In the North-Central, North-East, South -East, South -South and South West zones the estimates of CI (0.36, 0.35,0.57, 0.57 and 0.33) were statisticallysignificant at ($P<0.05$) and lowerthan theestimates of theirrespective Gini indices (0.52, 0.41,0.64. 0.68 and 0.59). These values resulted in the negative and significant KPI (-0.16, -0.05, -0.01, -0.11 and -0.26). This suggests that in these zones, the out-of-pocket payment was a regressive health care payment. The KPI for out-of-pocket payment in the North West (0.01) was positive implying progressivity but the estimate of the KPI did not differ significantly from zero ($P = 0.35$) indicating proportionality.

The estimated Concentration index for the $OOP_{insurance}$ was 0.53. This estimate was smaller than the value of the Gini index of 0.57 but resulted in a negative KPI (-0.03, $P>0.05$) at the 95 percent level of significance. Hence, the null of proportionality was not rejected. The findings indicate that the burden of payment across the distribution was evenly distributed. Figure 4.4, which is the graphical representation of the progressivity analysis, shows that the concentration curve of the health insurance co-payments laid above the Lorenz curve of consumption expenditure at the lower part of the distribution indicating regressivity.At the upper part of the distribution, the concentration curve lies beneath the Lorenz curve and this suggest progressivity. The non-dominance of either curve confirms the proportionality of the KPI for the health insurance contributions.

The estimates of the CI in the urban part of the country (0.58) was greater than the coefficient of the Gini coefficients (0.51) resulting in positive but not statistically significant coefficients of the KPI (-0.65). In the urban area, the $OOP_{insurance}$ was a proportional health care financing source. The implication of the finding was that the burden of health care financing using the $OOP_{insurance}$ was evenly distributed between individuals on lower and higher income levels. In the rural parts, the coefficient of the CI (0.49) was less than the Gini index (0.64). Resulting in a negative value of the KPI (-0.15) which was significantly different from zero. In the rural area, the

$OOP_{insurance}$was a regressive health care financing source.The results of the Kakwani progressivity index for the $OOP_{insurance}$ in zones revealed that the North East and South West had significant and regressive KPI - 0.27 and -0.64 respectively. The Values of the KPI in the North West, South West and South East -0.28, -0.14, 0.08 were not significantly different from zero. The $OOP_{insurance}$ in these zones was a proportional health care finance. The findings suggest that households with different prepayment income were spending the same proportion of income in financing health care.

Table 4.10: Gini Coefficient of Prepayment Income, Concentration Coefficient of Health Payments and Kakwani Indices for Nigeria and Geopolitical Zones 2012/2013

	Gini Coefficient	OOP Concentration Coefficient	KPI	Gini coefficient	OOPINSURANCE Concentration Coefficient	KPI
Overall	0.5780	0.4544	-0.1234***	0.5718	0.5345	-0.0373
	(0.0037)	(0.0075)	(0.0074)	(0.0428)	(0.0916)	(0.0753)
	0.000	0.000	0.000	0.000	0.000	0.621
Urban	0.6624	0.4297	-0.2326**	0.5106	0.5757	0.0651
	(0.0074)	(0.0130)	(0.0132)	(0.0331)	(0.1363)	(0.1164)
	0.000	0.000	0.000	0.000	0.000	0.577
Rural	0.5168	0.4845	-0.0323**	0.6415	0.4879	-0.1535*
	(0.004)	(0.0092)	(0.0088)	(0.0838)	0.1224	0.0932
	0.000	0.000	0.000	0.000	0.000	0.101
North-Central	0.5253	0.3607	-0.1646***	0.6108	1.4682	0.8575**
	(0.1147)	(0.0178)	(0.019)	(0.0760)	(0.4376)	(0.3897)
	0.000	0.000	0.000	0.000	0.002	0.034
North-East	0.4085	0.3578	-0.0505***	0.3142	0.04922	-0.2650***
	(0.0054)	(0.0211)	(0.019)	(0.0129)	(0.0227)	(0.0250)
	0.000	0.000	0.008	0.000	0.033	0.000
North-West	0.4151	0.4279	0.0128	0.2880	-0.0016	-0.2895
	(0.0040)	(0.0140)	(0.0136)	(0.0191)	(0.1887)	(0.2011)
	0.000	0.000	0.348	0.0000	0.99	0.188
South-East	0.6452	0.5674	-0.0778***	0.7961	0.8749	0.0789
	0.0072	(0.0171)	(0.0164)	(0.1048)	(0.2747)	(0.2405)
	0.000	0.000	0.000	0.000	0.003	0.744
South-South	0.6868	0.5752	- 0.1117**	0.7057	0.5636	-0.1421
	0.0109	(0.022)	(0.0214)	(0.1140)	(0.1746)	(0.1219)
	0.000	0.000	0.000	0.000	0.002	0.246
South-West	0.5978	0.3300	-0.2677***	0.5377	-0.1076	-0.6453***
	(0.0096)	(0.0153)	(0.0162)	(0.0611)	(0.1604)	(0.1864)
	0.000	0.000	0.000	0.000	0.508	0.002

Source: Author's computation

Note:*** significant at 1%; **significant at 5%; *significant at 10%Standard errors are reported in parenthesis and the probability values are specified below.**OOP**: Out-of-pocket health care payment, **OOPINSURANCE**: Health Insurance Contribution.**KPI**: Kakwani Progressivity Index

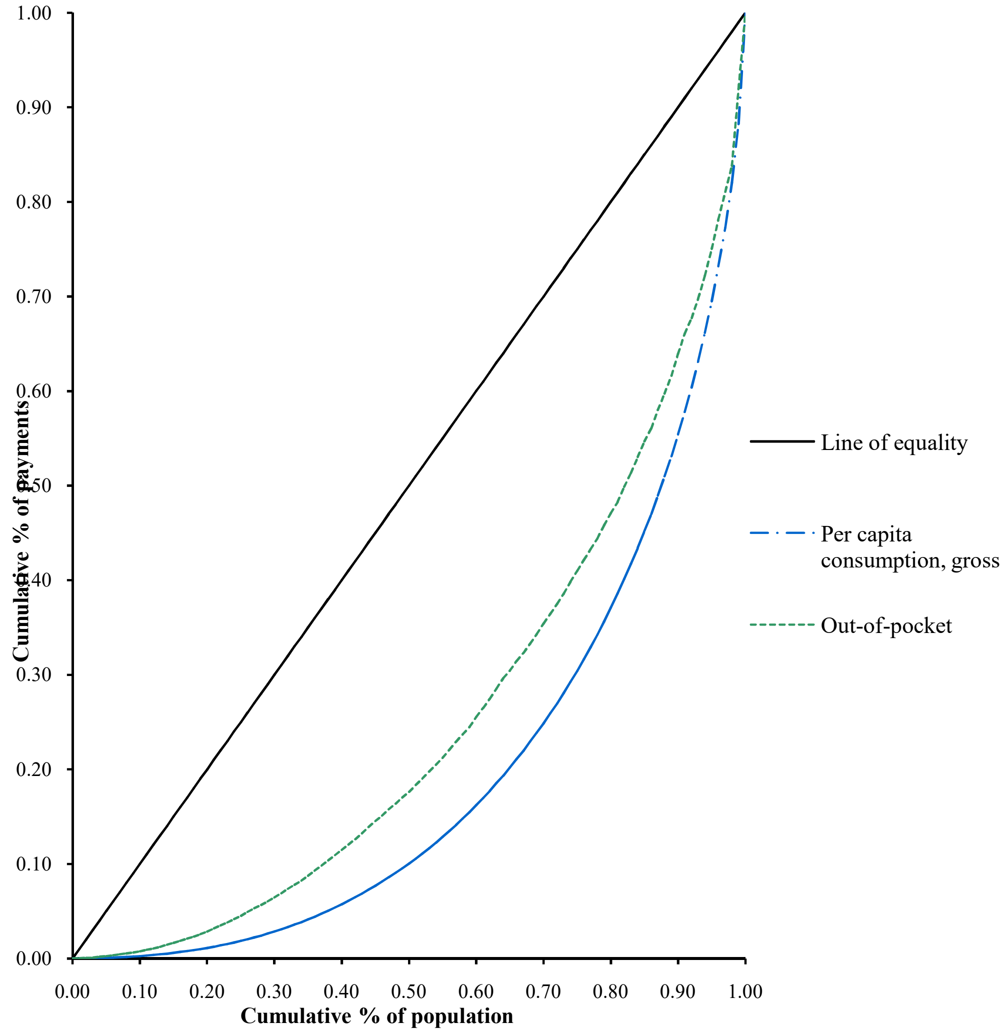

Figure 4.3: Concentration Curve for out-of-pocket Payments Nigeria (2012/2013)

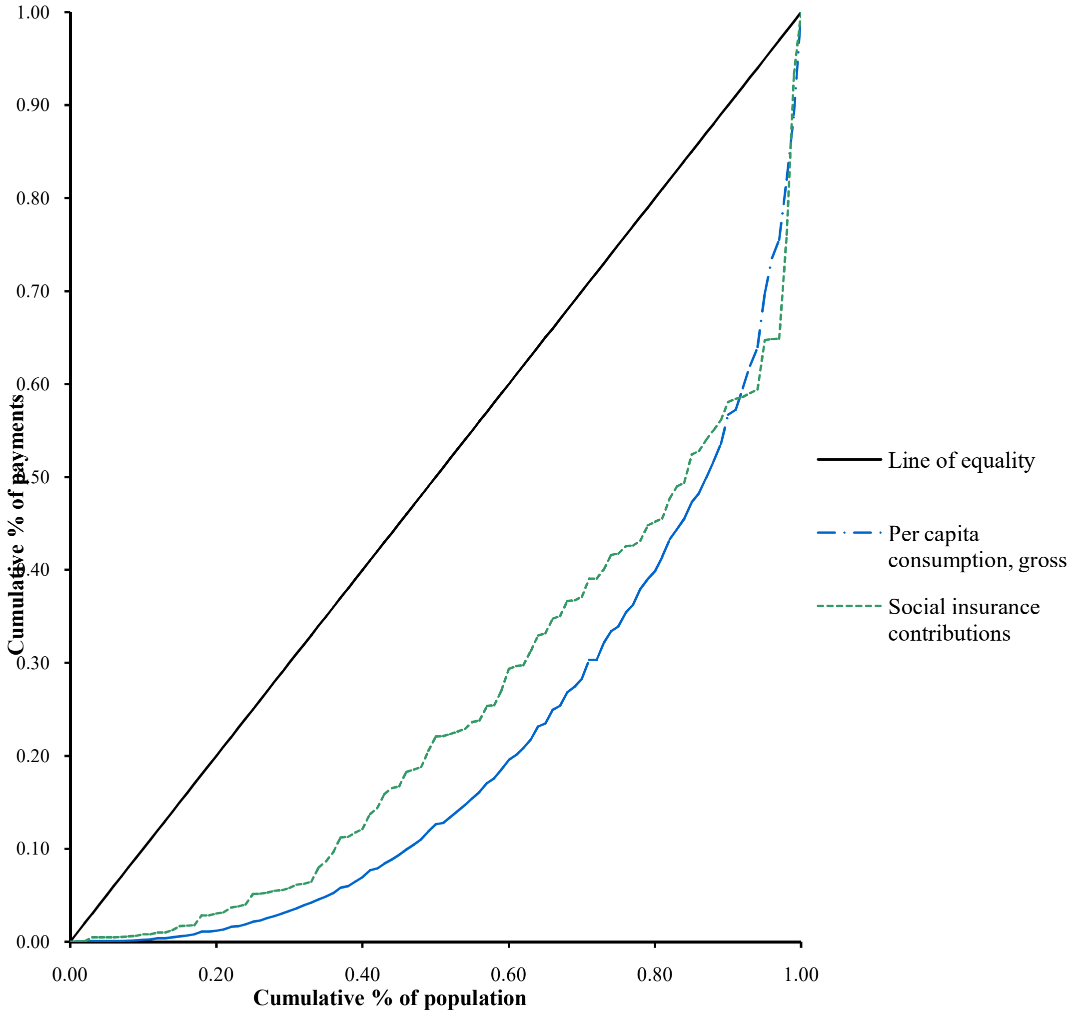

Figure 4.4: Concentration Curve for Health Insurance Contribution for Nigeria (2012/2013).

4.3.4 Disaggregated Analysis for Progressivity (2012/2013)

The result of the disaggregated analysis using the multiple comparison estimation technique (MCET) to dominance testing are presented in Table 4.11. It revealed that the Lorenz curve of prepayment income was everywhere dominated at 19 correspondingly spaced quantiles and a 95 % level of significance by theconcentration curve of out-of-pocket payment. This finding supports the result of the KPI that the out-of-pocket payment was a regressive financing source.

In Table 4.12, the stochastic dominance test results for the $OOP_{insurance}$ indicated that there was no significant dominance relationship between the concentration curve of the health insurance contribution and the Lorenz curve of prepayment income at each quantile point. The findings for 2012-2013 period revealed that the $OOP_{insurance}$was a proportional financing source. This was because although at the lower income quintiles the concentration curve of the $OOP_{insurance}$ dominated the Lorenz curve of prepayment income, at the upper income quantile specifically q80, (with a non -significant value of 46.06%) the Lorenz curve dominates. This finding implies that at the upper end of the income distribution, the burden of health care payment was born by the better-off, while at the lower income quintiles the poor paid more for health care as a share of their income. This created a cancelling effect resulting in the proportionality of the health insurance contribution.

Table 4.11: Dominance Test Result OOP (2012/2013)

Variable	Sort vbl.	Sign. level	# points	Rule
eqoop	exp_p	5%	19	mca

Concentration curve dominates

Test of dominance between concentration curve and 45 -degree line

Variable	Sign. level	# points	Rule
eqoop	5%	19	mca

45 degree dominates

cumulative shares of exp_p

Quantile	cum. share	std. error	p-value
q20	1.6774%	0.0196	0.0000
q40	7.2225%	0.0643	0.0000
q60	18.5126%	0.1367	0.0000
q80	39.5621%	0.2432	0.0000

cumulative shares of eqoop

Quantile	cum. share	std. error	p-value
q20	4.3932%	0.1260	0.0000
q40	14.0561%	0.2249	0.0000
q60	28.7348%	0.4030	0.0000
q80	49.4160%	0.6426	0.0000

Source: Author's computation

Notes:

eqoop: Equivalent out-of-pocket payment

exp-p: per capita consumption expenditure

mca: Multiple comparison Approach. Where dominance is not accepted if there is at least one significant change in one direction and no significant difference in the other, with comparison performed at 5 % level of statistical significance 19 quantiles points

Table 4.12: Dominance Test Result OOP*insurance* (2012/2013)

Variable	Sort vbl.	Sign. level	# points	Rule
eqOOPinsurance	exp_p	5%	19	mca
non-dominance				

Test of dominance between concentration curve and 45-degree line

Variable	Sign. level	# points	Rule
eqOOPinsurance	5%	19	mca

45 degree dominates

cumulative shares of exp_p

Quantile	cum. share	std. error	p-value
q20	2.2140%	0.3023	0.0000
q40	9.4886%	0.9489	0.0000
q60	22.4586%	1.8612	0.0000
q80	42.1444%	3.0473	0.0000

cumulative shares of eqOOPinsurance

Quantile	cum. share	std. error	p-value
q20	5.0324%	0.9620	0.0011
q40	17.7866%	2.7488	0.0008
q60	32.1394%	4.5258	0.0120
q80	46.0663%	6.1568	0.4237

Source: Author's computation

Notes:

eqOOPinsurance: Equivalent Health Insurance Contribution

exp-p: per capita consumption expenditure

mca: Multiple comparison Approach. Where dominance is not accepted if there is at least one significant change in one direction and no significant difference in the other,with comparison performed at 5 % level of statistical significance 19 quantiles points

4.3.5 Progressivity of Health Care Financing in Nigeria (2015/2016)

The Gini coefficient of prepayment income, Concentration coefficient of the out-of-pocket payment and health insurance contributions alongside their respective Kakwani progressivity index for Nigeria and its six geopolitical zones are presented in Table 4.13. In Nigeria, the Gini index of the prepayment income was 0.55. This implied that consumption expenditure was concentrated with the higher income group.This was indicative of high level of income inequality that exist in the nation's distribution of income. The result was similar to that obtain in 2010/2011. The Gini coefficients for the urban and rural areas (0.59 and 0.51) suggest that a wide income gap exist between the poor and non-poor. Across the zones, the South-South had the highest Gini index of 0.72 and was closely followed by the South- West (0.55). The North-East zone had the lowest value of 0.41.

The concentration indices (CI) for the out-of-pocket health care payments for Nigeria, the urban and rural area (0.46 and 0.45) was significantly positive ($P<0.05$). Thus,indicating that the OOP was concentrated among the better-off. The CI for the six zones appeared to be significantly positive with the South East having the highest value of (0.59). This suggested that in the South East the out-of-pocket health care payment was concentrated with the better-off who contributed the largest share of the OOP payment. The concentration indices for the $OOP_{insurance}$for Nigeria, the urban and rural areas (0.34, 0.28 and 0.44) weresignificantly positive ($P<0.05$). These estimates implied that the $OOP_{insurance}$ was concentrated among the higher income group. The concentration indices of the North-East, South East and South- West zones (0.06, 0.04 and 0.02) although positive, these values are not statistically significant. The concentration index of the North-central, North-West and South-South (0.17, 1.35, 0.12, and 0.59) were positively significant and this suggested that the bulk of $OOP_{insurance}$ was concentrated among the upper half of the income distribution.

The estimates of the out-of-pocket health care finance, for Nigeria revealed that the estimate of the concentration index valued (0.45) was less than the Gini coefficient (0.55). Giving rise to a negatively significant KPIestimate -0.1. These results revealed that although the out-of-pocket finance was concentrated with the wealthy, the proportion of health expenses borne by them decreased as income increased. This tended to suggest that the OOP was a regressive source of health care funding.Figure

4.5 is a visual presentation of the progressivity analysis that displays the concentration curve of health payment, the Lorenz curve of consumption expenditure and the line of equality (45-degree line). At the lower-half of the distribution the concentration curve of the out-of-pocket health care payment lies above the Lorenz curve of equivalent per capital consumption indicating regressivity but at the upper half of the distribution the concentration curve laid slightly below the Lorenz Curve indicating mild progressivity.The OOPwas regressive because the KPI attached more weight to inequality at the bottom half of the prepayment income distribution.

In the KPI estimates in the urban (-0.13) and rural (-0.067) parts of the country were significantly negative. In both areas, the OOP was a regressive health care financing source, but it was most regressive as in urban area. The estimates from the zones reveal that the South East zone had a significant positive KPI coefficient (0.06). Thus, indicating that in the south east, the better-off more pay more for health out-of-pocket as a proportion of their income. The progressivity of the OOP in the zone was offset by the significant but negative values of the KPI in the other zones North Central (-0.13), North East (-0.15), North West (-0.07), South-South (-0.19), South west (-0.12) culminating overall in a regressive out-of-pocket finance for the country.

The result in Table 4.13, shows that the Gini coefficient of 0.52 for Nigeria was inferior to the concentration index of 0.34 and this resulted in a negative but statistically significant KPI of – 0.18 for the $OOP_{insurance}$. This result suggested that although concentration index for the $OOP_{insurance}$was positive, it was a regressive finance mechanism. The regressive nature of the $OOP_{insurance}$emphasizes the fact that the poor spent a larger proportion of their income as payment for health care through the $OOP_{insurance}$. Figure 5.6 gives a graphical representation of the progressivity result.Findings confirm the regressivity of the health insurance contribution. The concentration curve of the $OOP_{insurance}$lies above the Lorenz curve of equivalent consumption expenditure and also above the 45-degree line. This indicates that the health insurance co-payment made out-of-pocket by households was a regressive health care funding source and burden of payment was more concentrated among the poorest. The findings were similar to those obtained in 2010/2011 period.

The coefficient of the KPI of the $OOP_{insurance}$for the urban area (-0.18) was negative and statistically different from zero. It was a mildly regressive financing source. This finding suggest that the burden of thehealth insurance contributions rested on the lower income earners. The coefficient of the KPI of the $OOP_{insurance}$ for the rural area -0.19 was not statically different from zero. This showed that the $OOP_{insurance}$ was a proportional financing source with the burden of payment for health care using the $OOP_{insurance}$ being even distributed between individuals on lower income levels and those of higher income. The findings from the zones reveal that the estimate of the KPI was negatively significant for the NE (-0.67), SE (-0.36) and SW (-0.32).The KPI was significantly positive for the NC (0.92).It was negative but not significant for the NW (-0.09) and SS (-0.28).

Table 4.13: Gini Coefficient of Prepayment Income, Concentration Coefficient of Health Payments and Kakwani Indices for Nigeria and Geopolitical Zones (2015/2016)

	Gini Coefficient	OOP Concentration Coefficient	KPI	Gini coefficient	OOPINSURANCE Concentration Coefficient	KPI
Overall	0.5488	0.4520	-0.0968***	0.5291	0.3443	-0.1848***
	(0.0028)	(0.0075)	(0.0068)	(0.0277)	(0.0620)	(0.0650)
	0.000	0.000	0.000	0.000	0.000	0.005
Urban	0.5979	0.4653	-0.1326**	0.4687	0.2870	-0.1816**
	(0.0047)	(0.0111)	(0.011)	(0.0314)	(0.0787)	(0.0785)
	0.000	0.000	0.000	0.000	0.000	0.021
Rural	0.5195	0.4520	-0.0675**	0.6300	0.4448	-0.1852
	(0.0035)	(0.010)	(0.0088)	(0.0548)	(0.0944)	0.1199
	0.000	0.000	0.000	0.000	0.000	0.126
North-Central	0.4432	0.3117	-0.1315***	0.4213	1.3509	0.9296***
	(0.0055)	(0.0134)	(0.0127)	(0.0495)	(0.3482)	(0.3018)
	0.000	0.000	0.000	0.000	0.000	0.003
North-East	0.4352	0.2857	-0.1496***	0.7296	0.0621	-0.6675***
	(0.0071)	(0.0263)	(0.0224)	(0.1361)	(0.0447)	(0.1534)
	0.000	0.000	0.000	0.000	0.17	0.000
North-West	0.4565	0.3800	-0.0765***	0.2741	0.1847	-0.0893
	(0.0044)	(0.0159)	(0.0145)	(0.0134)	(0.0922)	(0.0936)
	0.000	0.000	0.000	0.000	0.058	0.351
South-East	0.5326	0.5963	0.0637***	0.4103	0.0420	-0.3683***
	(0.0066)	(0.0176)	(0.0151)	(0.0303)	(0.0286)	(0.0419)
	0.000	0.000	0.000	0.000	0.145	0.000
South-South	0.7154	0.5265	-0.1889***	0.8468	0.5987	-0.2481
	(0.0091)	(0.0220)	(0.0208)	(0.1090)	(0.2313)	(0.2840)
	0.000	0.000	0.000	0.000	0.012	0.386
South-West	0.5493	0.4302	-0.1191***	0.4231	0.0237	-0.3994**
	(0.0051)	(0.0146)	(0.0140)	(0.0318)	(0.0225)	(0.0392)
	0.000	0.000	0.000	0.000	0.29	0.000

Source: Author's computation

Note: *** significant at 1%; **significant at 5%; *significant at 10%

Standard errors are reported in parenthesis and the probability values are specified below.**OOP**: Out-of-pocket health care payment, **OOPINSURANCE**: Health Insurance Contribution. **KPI**: Kakwani Progressivity Index

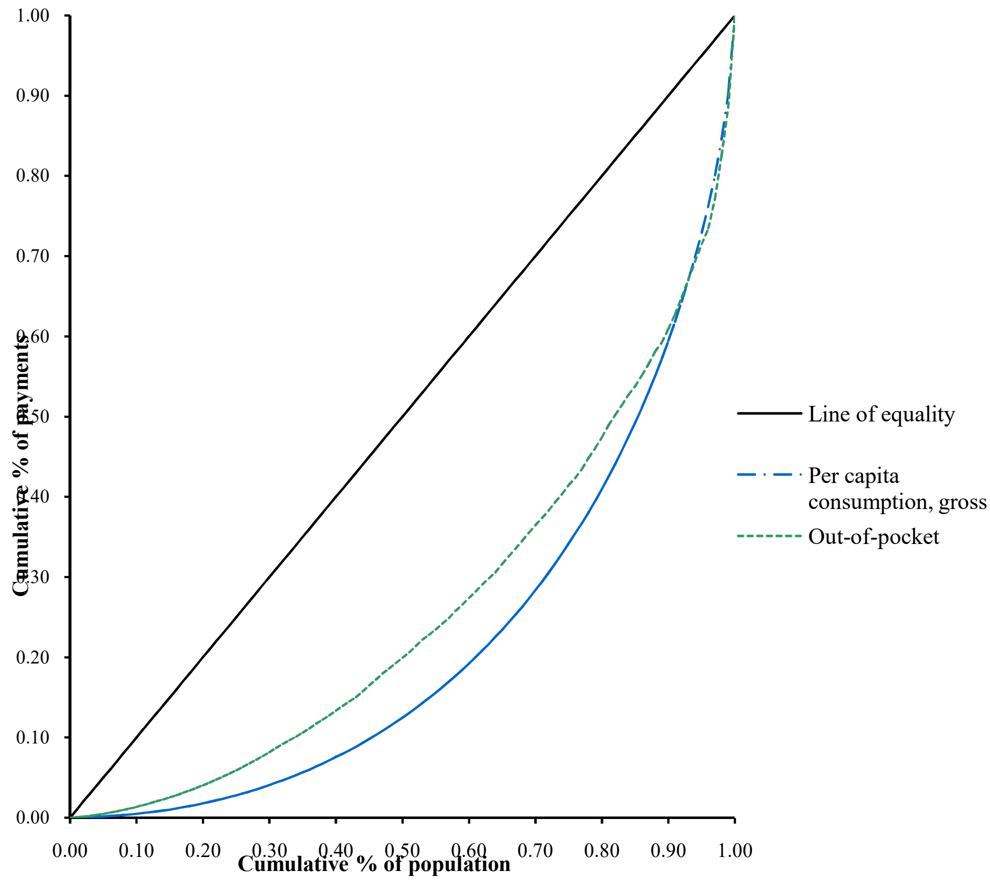

Figure 4.5: Concentration Curve for out-of-pocket Payments Nigeria (2015/2016)

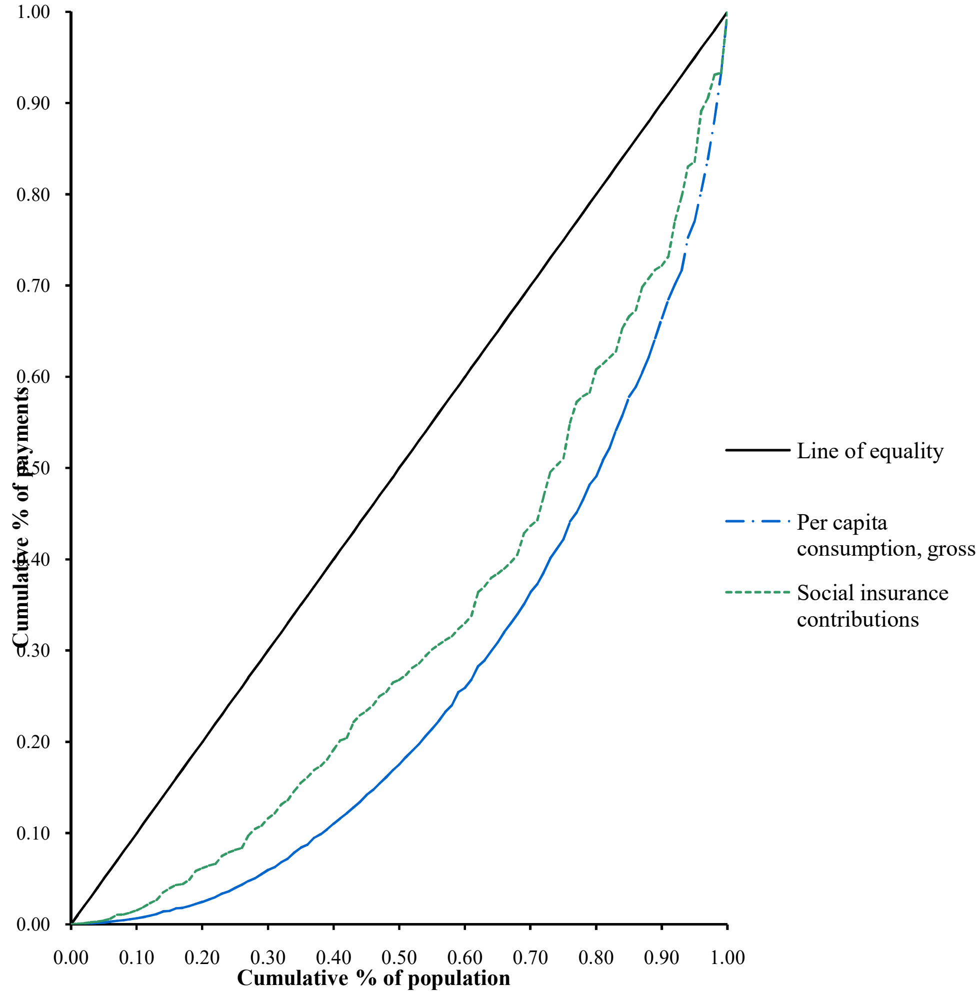

Figure 4.6: Concentration Curve for Health Insurance Contributions Nigeria (2015/2016)

4.3.6 Disaggregated Analysis for Progressivity (2015/ 2016)

The results of the disaggregated analysis establish using the multiple comparison approach (MCA) to stochastic dominance testing are presentedin Table 4.14. The findings reveal that the concentration curve of out-of-pocket payment was dominated at 19 correspondingly spaced quantiles and a 95 % level of significance by the Lorenz curve of prepayment income. This finding supoorts the result of the KPI that the out-of-pocket payment was a regressive financing source.

In Table 4.15, the stochastic dominance test results for the $OOP_{insurance}$ indicated that the concentration curve of the $OOP_{insurance}$ dominated the Lorenz curve of prepayment income at each quantile point. The result of regressivity for the $OOP_{insurance}$ was confirmed across the entire distribution. This implies that the finding obtained from the KPI that the $OOP_{insurance}$ was a regressive financing mechanism is established.

Table 4.24: Dominance Test Result OOP (2015/2016)

Variable	Sort vbl.	Sign. level	# points	Rule
eqoop	exp_p	5%	19	mca

Concentration curve dominates

Test of dominance between concentration curve and 45-degree line

Variable	Sign. level	# points	Rule
eqoop	5%	19	mca

45 degree dominates

cumulative shares of exp_p

Quantile	cum. share	std. error	p-value
q20	2.0811%	0.0207	0.000
q40	8.5200%	0.0635	0.000
q60	20.8145%	0.1242	0.000
q80	42.8216%	0.2087	0.000

cumulative shares of eqoop

Quantile	cum. share	std. error	p-value
q20	4.9042%	0.1090	0.000
q40	15.0772%	0.2217	0.000
q60	29.1045%	0.3963	0.000
q80	49.1473%	0.6378	0.000

Source: Author’s computation

Notes:

eqoop: Equivalent out-of-pocket health payment

exp-p: per capita consumption expenditure

mca: Multiple comparison Approach. Where dominance is not accepted if there is at least one significant change in one direction and no significant difference in the other, with comparison performed at 5 % level of statistical significance 19 quantiles points

Table 4.15: Dominance Test Result OOPINSURANCE (2015/2016)

Variable	Sort vbl.	Sign. level	# points	Rule
eqOOPinsurance	exp_p	5%	19	mca

Concentration curve dominates

Test of dominance between concentration curve and 45-degree line

Variable	Sign. level	# points	Rule
eqOOPinsurance	5%	19	mca

45 degree dominates

cumulative shares of exp_p

Quantile	cum. share	std. error	p-value
q20	3.2109%	0.3633	0.000
q40	12.8386%	0.7905	0.000
q60	27.8867%	1.2838	0.000
q80	51.0433%	1.8208	0.000

cumulative shares of eqOOPinsurance

Quantile	cum. share	std. error	p-value
q20	8.0404%	1.0081	0.000
q40	21.4170%	2.1937	0.000
q60	35.3857%	3.2505	0.021
q80	61.2109%	4.8434	0.031

Source: Author's computation

Notes:

eqOOPinsurance: Equivalent Health Insurance Contribution

exp-p: per capita consumption expenditure

mca: Multiple comparison Approach. Where dominance is not accepted if there is at least one significant change in one direction and no significant difference in the other, with comparison performed at 5 % level of statistical significance 19 quantiles points

4.3.7 Trend of Change of the Kakwani Progressivity Index for Out-of-PocketPayment and the Health Insurance Contribution for Nigeria and the SixGeopolitical Zones.

The result of the trend changes of the KPI for the out-of-pocket (OOP) health care payments and the health insurance contributions ($OOP_{insurance}$) is presented in Table 4.16. In Nigeria, the out-of-pocket payment was regressive for the period under review.The negative KPI for the out-of-pocket payment improved slightly from -0.04 in 2010/2011 to -0.12 in 2012/2013. The KPI experience a slight decline in 2015/2016 year to an estimate of -0.09. The health insurance contribution was regressive in the year 2010/2011 with a negative significant KPI value of -0.16. The health insurance contribution was marginally proportional in 2012/2013 with a negative value of KPI (-0.03) which was not significant different from zero. By 2015/2016 the KPI of the health insurance contributions was negative and significant (-0.18) suggesting that the $OOP_{insurance}$became a regressive payment source. These findings overall suggest that the health care financing system for the period of the study was largely regressive with the poor spending a greater share of their income on health care payments.

The findings form the North central zone revealed that the out-of-pocket payment was a progressive finance in 2010/ 2011 having a KPI (0.56). It was regressive with a negative and significant value of the KPI (-0.16 and -0.13) for the period 2012/2013 and 2015/2016. The health insurance contribution in the North Central zone for the period of 2010/2011 had a significant negative KPI (-0.36). For the period of 2012/2013 and 2015/2016 the $OOP_{insurance}$ was a progressive health care payment source (0.86 and 0.93). The results indicated that the better-off pay more for using health care services. This could also imply that the poor households do not pay for health using the health insurance but rather out-of-pocket. This assertion is supported by the regressivity of the out-of-pocket health care payment which suggested that the payment burden for health care was on the poor households.

The KPI of out-of-pocket finance in the North East zone for the period 2010/2011 and 2012/2013 were negative (-0.12 and -0.05). As at 2015/2016 the KPI was significantly positive (0.15). The findings showed that the out-of-pocket payment was a regressive health from the period of 2010-2013 but became progressive with the better-off bearing the burden of health care payments in the year 2015/2016. This finding could indicate that the poor did not utilize health care during the third period. The findings from the health insurance contributions indicated that the KPI (0.51) was significant positive for the 2010/ 2011 period but experienced a change in trend and for the period of 2012/2013 and 2015/2016 the KPI was significantly negative (-0.26 and -0.68). The estimates for the out-of-pocket health care finance and the health insurance contributions suggest that overall in the North East health care financing is regressive.

The KPI for out-of-pocket payment in the North West zone experienced some oscillatory movements. In 2010/2011 and 2015/2016 the estimates were significantly negative (-0.27 and -0.08). In 2012/2013, the estimate of the KPI although positive was not significantly different from zero suggesting that the OOP was a proportional financing source. The estimates of the KPI for the health insurance contributions (0.19, -0.27 and -0.09) were not significantly different from zero for the three periods. This finding tends to indicate that the $OOP_{insurance}$ was a proportional financing source.

The findings from the South East zone for the periods of the study reveal that the out-of-pocket finance was progressive for the first and third periods with KPI (0.19 and 0.06). The health insurance contribution was a progressive of health care finance in the first period and proportional in the second period with KPI (0.46 and 0.08) respectively. In the year 2012/2013 and 2015/2016 the OOP and the $OOP_{insurance}$ were regressive health care finance (-0.08 and -0.36).

The estimates of the South-South zones for the period of the study revealed that overall the out of pocket payment was regressive in nature with a negative but significant KPI of (-0.19, -0.11 and -0.19). The estimates of the $OOP_{insurance}$further confirmed that the health insurance contribution was a proportional financing mechanism. Only in the year 2010/ 2011 was it progressive with a significantly positive KPI of (0.39).

The findings from the South West zones indicated that for the period of the study both the health insurance contribution and the out-of-pocket payments were generally regressive forms of health care financing except for the period of 2012/2013 when the $OOP_{insurance}$ was progressive. The KPI for the out-of-pocket payment for the period of 2010-2015 was significantly negative (-0.45, -0.26 and -0.11). The KPI of health insurance co-payments for the period of 2012/2015 was progressively significant (0.65).

In summary the estimates from the zones confirmed that while the out-of-pocket health care payment is a regressive form of health finance, the health insurance contributionwasgenerally a proportional or in some cases progressivehealth care financing mechanism.

Table 4.16: The Trend of Change of the Kakwani Progressivity Index for Out-of-Pocket Payment and the Health Insurance Contribution for Nigeria and the Six Geopolitical Zones (2010/2011, 2012/2013 and 2015/2016)

	Kakwani Progressivity Index (OOP)			Kakwani Progressivity Index (OOPINSURANCE)		
	2010/2011	**2012/2013**	**2015/2016**	**2010/2011**	**2012/2013**	**2015/2016**
Overall	-0.0353*	-0.1234***	-0.0968***	-0.1602**	-0.0373	-0.1848**
North central	0.5593***	-0.1646***	-0.1315***	-0.3645*	0.8575**	0.9296**
North East	-0.1289***	-0.0505***	0.1496***	0.5075***	-0.2650***	-0.6675**
North West	-0.2699***	0.0128	-0.0765***	0.1995	-0.2895	-0.0893
South East	0.1887***	-0.0778***	0.0637***	0.4568***	0.0789	0.3683**
South South	-0.19233***	-0.1117**	-0.1889***	0.3902**	-0.1421	-0.2481
South west	-0.4558***	-0.2677***	-0.1191***	-0.3231*	0.6453***	-0.3994**

Source: Author's Computations.

4.4 Results of the Decomposition of the Income Redistributive Effects of Health Care Financing in Nigeria

The estimates of the incomeredistributive effects of health care financing, vertical equity, horizontal inequity and reranking for the out-of-pocket (OOP) health care payment excluding insurance and the health insurance contributions made out-of-pocket ($OOP_{insurance}$) for Nigeria are presented below. The results were obtained from the three rounds of the General Household Survey(GHS) 2010/2011; 2012/2013 and 2015/2016.

4.4.1 Results of the Income Redistributive Effects of Health Care Financing in Nigeria 2010-2011

The estimates for the vertical equity, horizontal inequity and reranking for the Atkinson model and Gini model are presented in Tables 4.17 and 4.18 respectively. The estimates of the Atkinson based model,suggestvertical equity (-0.0032) for the out-of-pocket health care payment. The negative value of the estimate was statistically significant implying that the OOP induced vertical inequity of (0.32%) in the income distribution. The poor were not treated favourable and bear the burden of health care payments when using direct payments as a means of obtaining health care services. The estimate confirmed the regressivity of the OOP. This finding is analogousto that obtained from the Gini based model see Table 4.18, where the estimate of the vertical equity was negative (-0.0044).

The Atkinson (0.0028) and Gini (0.0024) estimates indicated the presence of horizontal inequity. The Atkinson estimate of 0.0028 wasstatistically different from zero indicating that households having similar prepayment income were treated unequally when making direct health care payments. The Atkinson estimate (0.0048) was indicative of a statistically significant reranking associated with the out of pocket payment.

The estimates of the vertical equity of the $OOP_{insurance}$(-0.0097) in Table 4.17, was negative and statistically different from zero. The $OOP_{insurance}$ produced vertical inequity (0.97%) in the income distribution. This was due to the unequal and unfavourable treatment of individuals on different income quintiles when financing health care through the $OOP_{insurance}$.The estimate of the Gini model (-0.0129) also confirmed this finding. Thehealth insurance contributions induced significant Atkinson estimates of horizontal inequity (0.003). This suggested that households on the same income level made different health care payments while using the national health insurance scheme. The Atkinson estimate of reranking (0.0015) was statistically significant implying that households were overtaken by others after paying for health. The estimate of the vertical effectwas greater than that of horizontal inequity (0.0006) and reranking obtained for both models.

Estimates of the Gini model that are not presented in the Atkinson modelare presented in the Table 4.18, these are the average rate of payment (g) and the Kakwani index assuming horizontal equity. The proportion of income spent on health (g) through OOP payment and $OOP_{insurance}$ on the average was 6 percent and 4 percent respectively. Indicating that the out-of-pocket payment was the major source of finance by households. The Kakwani Index assuming horizontal equity (Ke) also revealed that in the absence of horizontal inequity,OOP payments and the $OOP_{insurance}$ would have had a Kakwani index of -0.07 and -0.27 respectively suggesting that both financing mechanism were regressive.

Table 4.17: Estimates of the Atkinson Decomposition of the Income Redistributive Effects of Health Care Payments 2010/2011

	Finance Source	
Redistributive Effects	**Out-of-pocket payment**	**Health Insurance Contribution**
Vertical effect (V)	-0.0032**	-0.0097**
	(0.0002)	(0.0005)
Horizontal Inequity (H)	0.0028**	0.0030**
	(0.00002)	(0.0001)
Reranking (R)	0.0048**	0.0015
	(0.00004)	(0.0000)

Source: Author's computation
Note:

*** significant at 1%; **significant at 5%; *significant at 10%

Standard errors are reported in parenthesis. They are obtained with a nonparametric bootstrap and by taking cognizance of the asymptotic bias.

Table 4.18: Estimates of the Gini Decomposition of the Income Redistributive Effects of Health Care Payments 2010/2011

	Finance Source	
Redistributive Effects	**Out-of-pocket payment**	**Health Insurance Contribution**
Payments as a fraction of income (g)	0.0601	0.0461
Kakwani Index assuming horizontal equity (Ke)	-0.0689	-0.2671
Vertical effect (V)	-0.0044	-0.0129
Horizontal Inequity (H)	0.0024	0.0006
Reranking (R)	0.0028	0.0010

Source: Author's computation
Note:
The estimates of the decomposition obtained from Adept do not have their standard errors specified.

4.4.2 Results of theIncome Redistributive Effects of Health Care Financing in Nigeria 2012-2013

The estimates for the vertical redistributive effect, horizontal inequity and reranking effects for the Atkinson model and Gini model are presented in Tables 4.19 and 4.20 respectively. The Atkinson estimate of the vertical equity for out-of-pocket payment (–0.033)wasstatistically significant. This resulted in vertical inequity(3.3%) in the post-payment period when health care was financed out-of-pocket. The vertical equityestimate of the Gini approach (-0.0194)further supports that vertical inequity is associated with direct payments for health care.

The Atkinson estimates of horizontal inequity (0.0017) was statistically significant. Thisimplies that direct health care payment produces significantly marginal horizontal inequity. The Atkinson and Gini estimate of the reranking effect 0.0008 and 0.0009 were negligible. The Atkinson estimates (0.0008)was statistically significant. This suggests that negligible reranking occurs from making out-of-pocket health care payments. The Atkinson and Gini estimate of -0.0024 and -0.0136 respectively indicated the presence of vertical inequity when payments were made for health care using the $OOP_{insurance}$. The estimate for Horizontal inequity (0.0033) in the Atkinson model was statistically significant. This finding suggests that the use of the $OOP_{insurance}$results in prepayment income equals making different health care payments. The Atkinson and Gini estimates indicated significant reranking estimates of 0.0028 and 0.0018 respectively. The results revealed that $OOP_{insurance}$produced oscillation in the position of households on the income distribution in the pre-financing and post-financing periods.

The estimates of payments as a share of household income (g) for the OOP in Table 4.20, was 15%. Thissuggested that OOP health care payments exceeded the 10% threshold beyond which they are termed catastrophic. The Kakwani index in the absence of horizontal inequity for the OOP (-0.1102)and $OOP_{insurance}$(-0.0851) suggests that the OOP and $OOP_{insurance}$ were regressive financing mechanism.

Table 4.19: Estimates of the Atkinson Decomposition of the Income Redistributive Effects of Health Care Financing in Nigeria 2012-2013.

	Finance Source	
Redistributive Effects	**Out-of-pocket payment**	**Health Insurance Contribution**
Vertical effect (V)	-0.033**	-0.0024**
	(0.0001)	(0.0009)
Horizontal Inequity (H)	0.0017**	0.0033**
	(0.0000)	(0.0001)
Reranking (R)	0.0008**	0.0027**
	(0.0000)	(0.0001)

Source: Author's computation
Note:

*** Significant at 1%; **significant at 5%; *significant at 10%

Standard errors are reported in parenthesis. They are obtained with a nonparametric bootstrap and by taking cognizance of the asymptotic bias.

Table 4.20: Estimates of the Gini Decomposition of the Income Redistributive Effects of Health Care Payments 2012-2013

	Finance Source	
Redistributive Effects	**Out-of-pocket payment**	**Health Insurance Contribution**
Payments as a fraction of income (g)	0.1500	0.1378
Kakwani Index assuming horizontal equity (Ke)	-0.1102	-0.0851
Vertical effect (V)	-0.0194	-0.0136
Horizontal Inequity (H)	0.0129	0.0020
Reranking (R)	0.0009	0.0018

Source: Author's computation
Note: The estimates of the decomposition obtained from Adept do not have their standard errors specified.

4.4.3 Results of the Income Redistributive Effects of Health Care Financing in Nigeria 2015-2016

The estimates for the vertical equity, horizontal inequity and reranking for the Atkinson model and Gini model are presented in Tables 4.21 and 4.22 respectively. In Atkinson model, the estimate of the significantly negative vertical equity(-0.029) for the out-of-pocket payment suggests that there was an unfavourable treatment of unequals such that the poor were spending more as a proportion of their income as OOP payments for health care. A pro-rich vertical effect of (-0.0194) was also obtained from the Gini decomposition. The Atkinson estimates of horizontal inequity (0.0034)was significantly different from zero. This estimate indicated that pre-financing equals were not being treated equally while using the ex-post financing mechanism. The estimates for reranking in both models (0.004) and (0.012) suggests that in the process of paying for health care out-of-pocket some households were being overtaken by others on the income distribution.

The Atkinson estimates of vertical equity (-0.035) indicated that the $OOP_{insurance}$ induced significant vertical inequity of 3.5 per cent in the income distribution. The estimates of the Gini model (-0.032) also indicated vertical inequity. The estimates of horizontal inequity (0.012) and (0.0051) in the Atkinson and Gini framework respectively were significant indicating heterogeneity in payments among individuals who were pre-payment equals. There exist significant estimates of the reranking effect (0.016) and (0.021) in both models. This finding implied that the use of the $OOP_{insurance}$ as a health care financing mechanism resulted in some households being unfavourable outranked by others in the post-payment period.

The estimates of the mean share of payment (g) indicated that on the average individuals spent 20% of their consumption expenditure as out-of-pocket payments for health care. The catastrophic OOP could have result in a vertical inequity of 2.9 % in the post-payment period. The Kakwani index in the absence of horizontal inequity for both payments (-0.079) and (-0.1303)indicated that the OOP and $OOP_{insurance}$ were regressive financing sources.

Table 4.21: Estimates of the Atkinson Decomposition of the Income Redistributive Effects of Health Care Payments 2015-2016

	Finance Source	
Redistributive Effects	**Out-of-pocket payment**	**Health Insurance Contribution**
Vertical effect (V)	-0.029**	-0.035**
	(0.0002)	(0.0016)
Horizontal Inequity (H)	0.0034**	0.0120**
	(0.0000)	(0.0003)
Reranking (R)	0.0040**	0.0159**
	(0.0001)	(0.0007)

Source: Author's computation
Note:

*** significant at 1%; **significant at 5%; *significant at 10%

Standard errors are reported in parenthesis. They are obtained with a nonparametric bootstrap and by taking cognizance of the asymptotic bias.

Table 4.22: Estimates of the Gini Decomposition of the Income Redistributive Effects of Health Care Payments 2015/2016

Redistributive Effects	Finance Source	
	Out-of-pocket payment	Health Insurance Contribution
Payments as a fraction of income (g)	0.1957	0.1960
Kakwani Index assuming horizontal equity (Ke)	-0.0797	-0.1303
Vertical effect (V)	-0.0194	-0.0318
Horizontal Inequity (H)	0.0158	0.0051
Reranking (R)	0.0124	0.0211

Source: Author's computation
Note:
The estimates of the decomposition obtained from Adept do not have their standard errors specified.

4.5 Results of the Total Income Redistributive Effects of Health Care Financing in Nigeria

The estimates of the total redistributive effects of health care financing and the share of vertical inequity, horizontal inequity and reranking in the total income redistributive effect for the out-of-pocket health care payment and the health insurance contributions for Nigeria are presented below. The results were presentedfor three rounds of the General Household Survey(GHS) 2010/2011, 2012/2013 and 2015/2016. The interpretation of the results was based on the estimates of the Atkinson model,which utilizes the bootstrapped standard errors. The bootstrapped standard errorsare useful for making the required inference regarding the overall significance of the estimates. Reference to the Gini based estimates were made for a comparative analysis.

4.5.1 Results of the Total Income Redistributive Effects of Health Care Financing in Nigeria 2010-2011

Presented in Table 4.23, are the estimates for the total income redistributive effects of the Atkinson model and Gini model which are(-0.0108)and (-0.0096) respectively.These estimates confirmed thatthe OOP financing in Nigeria induced a statistically significant pro-rich income redistributive effect and increase the level of inequality in the post-payment income distribution by 1.08%. The estimates from the Atkinson model revealed that the increased inequality would have been 70.03% less in the absence of differential treatment. Horizontal inequity accounted for 25.84% of the income redistributive effect and the reranking estimate was 44.19%.

The estimates of the total income redistributive effect of the $OOP_{insurance}$of the Atkinson and Gini decompositions(-0.0143) and (-0.0146) indicated that the prepayment financing mechanism induces a pro-rich redistributive effect that increased the level of income inequality by 1.4%. In the Atkinson decomposition, the pro-rich redistributive effect would have been reduced by 31.44% but for the presence of horizontal inequity (21.28%) and reranking (10.16%).The high pro-rich vertical inequityfor the Gini based model 88.6 % was worsened by the presence of horizontal inequity (4.27%) and reranking (7.06%) generated by the prepayment contributions.

Table 4.23: Total Redistributive Effects of Health Care Payments in Nigeria (2010-2011)

	Out-of-pocket payment		**Health Insurance Contribution**	
	Gini estimate	Atkinson Estimate	Gini estimate	Atkinson Estimate
(V/RE)%	45.76	29.97	88.67	68.56
(H/HE)%	- 24.97	-25.84	-4.27	-21.28
(R/RE)%	- 29.27	-44.19	-7.06	-10.16
Total Redistributive Effect	-0.0096	-0.0108*** (0.0002)	-0.0146	-0.0143*** (0.0006)

Source: Author's computation

4.5.2 Results of the Total Income Redistributive Effects of Health Care Financing in Nigeria 2012-2013

The estimates of the total redistributive effects of health care financing,the share of vertical equity, horizontal inequity and reranking in the total income redistributive effect for the out-of-pocket health care payment and the health insurance contributions are presented below in Table 4.24. The estimates of the total income redistributive effect of out-of-pocket payment in the Atkinson and Gini modelswere (-0.0355) and (-0.0333). The Atkinson estimate confirmed that the OOP induced significant negative pro-rich income redistribution and causes income inequality to increase by 3.6% in the post-payment period. Vertical inequity in the Atkinson and Gini model (93.04% and 58.47%) was dominant. The negative pro-rich redistributive effect was worsened in both frameworks due to presence of non- significant horizontal inequity (38.72 % and 4.76 %) and non-significant reranking (2.81% and 2.20 %) generated by the OOP.

The estimates of the total income redistributive effect of the $OOP_{insurance}$ in the Gini and Atkinson model -0.0174 and -0.0085 respectively indicated that the prepayment financing induces a pro-rich redistribution that increased the level of income inequality in the post-payment income distribution by 1.74% and 0.85% respectively. In the Atkinson model the pro-rich redistributive effect would have been reduced by 71.94% but for rerankingand horizontal inequity that accounted for about 32.58and 38.91 % of the pro-rich redistributive effect.

Table 4.24: Total Redistributive Effects of Health Care Payments in Nigeria (2012-2013)

	Out-of-pocket payment		**Health Insurance Contribution**	
	Gini estimate	Atkinson Estimate	Gini estimate	Atkinson Estimate
(V/RE)%	58.47	93.04	78.13	28.51
(H/HE)%	-38.72	-4.76	-11.54	-38.91
(R/RE)%	-2.81	-2.20	-10.33	-32.58
Total Redistributive Effect	-0.0333	-0.0355*** (0.0031)	-0.0174	-0.0085*** (0.001)

Source: Author's computation

4.5.3 Results of the Total Income Redistributive Effects of Health Care Financing in Nigeria 2015-2016

Presented below in Table 4.25, are the estimates of the total redistributive effects of health care financing the out-of-pocket health care payment and the health insurance contributions. These estimates are presented for the Atkinson and Gini estimates respectively.

The estimates of the total income redistributive effect of out-of-pocket payment in the Ginimodel and Atkinson model were -0.0476 and -0.0367 respectively. The Atkinson estimate confirmed that the OOP induced a significant negative pro-rich income redistribution and increase income inequality by 3.7% in the post-payment period. In both the Gini and Atkinson estimates, the vertical effect dominated (40.73% and 79.61 %). The negative pro-rich redistributive effect was increased due tohorizontal inequity (33.21% and 9.38 %) and reranking (26.06% and 11.01 %) generated by the OOP.

The estimates of the total income redistributive effect of the $OOP_{insurance}$ for the Gini and Atkinson model were -0.058 and -0.062 respectively. The Atkinson estimate indicated that the prepayment financing source induced a pro-rich redistribution that increased the level of income inequality by 6.2% in the post-payment period. This estimate was worse than thosefor the 2010-2011 and 2012-2013 periods. The Atkinson estimate of the pro-rich total income redistributive effect would have been reduced by 44.7 % but for the presence of horizontal inequity of19.23% and reranking that was25.45 %. The pro-rich Gini estimate of vertical redistributive effect (54.82 %) was worsened by the presence of horizontal inequity 8.8 % and reranking 36.38 % generated by the $OOP_{insurance}$. The increase in the share of prepayment income spent on out-of-pocket payment (g) from 0.15 in the second period to 0.20 in 2015/2016 could partly have been the reason for the worsening pro-rich overall income redistributive estimate for the OOP.

Table 4.25: Total Redistributive Effects of Health Care Payments in Nigeria (2015-2016)

	Out-of-pocket payment		**Health Insurance Contribution**	
	Gini estimate	Atkinson Estimate	Gini estimate	Atkinson Estimate
(V/RE)%	40.73	79.61	54.82	55.32
(H/HE)%	-33.21	-9.38	-8.8	-19.23
(R/RE)%	-26.06	-11.01	-36.38	-25.45
Total Redistributive Effect	-0.0476	-0.0367** (0.0002)	-0.0579	-0.062** (0.0013)

Source: Author's computation

4.5.4 The Trend of Change of the Relative Redistributive Effects of the Out-of-pocket Health care payments and the Health Insurance Contributions Based on Atkinson Estimates (2010/2011, 2012/2013 and 2015/2016)

The estimate of vertical inequity for the OOP in 2010-2011 as shown in Table 4.26, was 0.0032. It increased to an estimate of 0.029 in the year 2015-2016. The estimate for horizontal inequity for the period 2010-2011 and 2012-2013 were 0.0038 and 0.0017. In2015-2016,it marginally increasedto 0.0034.All estimates were significantly different from zero. In 2010/2011, the degree of reranking induced by the OOP was 0.0048. The reranking estimate reduced to 0.001 in 2012/2013.In2015-2016,the estimate rose to 0.004. The total redistributive effect established that the out-of-pocket payment was a pro-rich health care financing mechanism that increased the level of inequality in post-payment income distribution. The negative pro-rich redistributive effect increased from 1.08 % in 2010/2011 to 3.54 % in 2015/2016.

These findings suggest that the out-of-pocket payment created inequities in the distribution of income. The issue of vertical inequity was mostprofound. The estimates confirmed that the use of the direct mode of health care payment resulted in the poor spending a larger proportion of their income on health care services than the non-poor. The poor households due to payments for health risk losing their initial position in the pre-financing income distribution and might be forced to reduce their consumption of other non-health but welfare enhancing goods.

In 2010- 2011 the health insurance contributions generally induced a significant vertical inequity of 0.0097. The estimates of vertical inequity as at 2012-2013 and 2015-2016 periods were0.24%and 3.5%. The estimates of horizontal inequity 0.003 was significantin 2010-2011. By 2012-2013 and 2015-2016,the estimates of the horizontal inequity 0.0033 and 0.012 had increased and they were statistically significant. The $OOP_{insurance}$ induced significant reranking in the distribution of income.The estimate of 1.59% was highest inthe 2015-2016period.

The estimates of the decomposition of the income redistributive effects of health care payments show that for the $OOP_{insurance}$, the issues of vertical inequity,horizontal inequity and reranking was created when it was utilized as a health care funding option.The negative estimates of the total income redistributive effect of the $OOP_{insurance}$ for the periods under review (-0.0143, -0.0085 and -0.062) confirmed a pro-rich redistribution. The estimate of the pro-rich redistributive effectof 6.2% was highest in 2015-2016.

Table 4.26: The Trend of Changes of the Relative Redistributive Effects of the Out-of-pocket Health care payments and the Health Insurance Contributions Based on Atkinson Estimates (2010/2011, 2012/2013 and 2015/2016)

	Out -of -Pocket Payments			Health Insurance Contributions		
	2010-2011	**2012-2013**	**2015-2016**	**2010-2011**	**2012-2013**	**2015-2016**
Vertical effect (V)	-0.0032**	-0.033**	-0.029**	-0.0097**	-0.0024**	-0.0345**
Horizontal Inequity (H)	0.0028**	0.0017**	0.0034	0.0030**	0.0033**	0.0120**
Reranking (R)	0.0048**	0.0008**	0.0040**	0.0015	0.0028**	0.0159**
Total Redistributive Effect (RE=V-H-R)	-0.0108**	-0.0355**	-0.0367**	-0.0143**	-0.0085**	-0.062**

Source: Author's Computation.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter provides a summary of the key findings of the study. Based on these findings, appropriate conclusions are drawn about the following; progressivity of health care financing in Nigeria, the relative redistributive effects of health care payments and the total income redistributive effect of health care financing. Relevant lessons for policy recommendation based on the findings of the study are suggested. Various limitations encountered during the study are presented and areas for further research proposed.

5.1 Summary of Major Findings

This study analysed the progressivity of health care funding in Nigeria and the six geopolitical zones in the country, with focus on the out-of-pocket payments and the health insurance contributions made by those enrolled in the NHIS. The study also estimated the relative redistributive effects of health care payment with reference to vertical inequity, horizontal inequity and reranking induced by health care financing mechanism in the country. Finally, the overall redistributive effect of health care funding sources on the income distributionwas assessed.

The estimates of the Gini coefficient which is a measure of income inequality revealed that income inequality worsen over time and that the bulk of the nation's income was concentrated with highest income earners. The Kakwani progressivity estimates reveal that for the three-year period, out-of-pocket payment was a regressive health care financing source with the poor spending more on health care financing than the non – poor.The disaggregated analysis indicated that the lowest income earners were the most affected when health care was financed out-of-pocket. This could have occurred because of lack of waivers and exemptions in health facilities to protect the poor from the impoverish effects of direct health care payments. This finding was similar to those Olaniyan et al., (2013), Almasiankia, et al., (2015) and quintal and Lopez, (2016), Mulenga and Ataguba, (2017).Contrary findings were also obtained from studies by

Lawanson and Opeloyeru (2016), Omotosho and Ichoku (2016).They indicated that financing health care out-of-pocket resulted in the wealthy bearing the burden of out-of-pocket health care paymentsbut cautioned that this could suggest that the poor were not utilizing care due to their low income levels. The estimates of the Kakwani Progressivity Index confirmed that out-of-pocket health payment was regressive in the urban and rural areas of the country. The regressivity of the out-of-pocket payment was more in the urban areas this could have occurred because the poor living in the urban areas are prone to diseases conditions stemming from poor nutrition, environmental pollution and deplorable living conditions emanating from urban congestion. Since they do not have access to health insurance they are forced to make direct health care payments. The Kakwani estimates revealed that out-of-pocket health payment was generally regressive in five out of the six geo-political zones of the country, but progressive in the South East zone. The progressivity of the Kakwani estimates in the South East, implied that the wealthy were spending a greater share of their income on out-of-pocket payments for health care than the poor. This finding could also imply that the poor in the zone could not accessmedicalservices due tothe exorbitant user fees charged by both public and private health institutions. In the absence of social protection measures such as waivers in the health institutions, these poor individuals they may be forced to neglect utilization of health care. This finding is similar to that obtained by Ichoku and Fonta (2006) for Enugu state located in the South Eastern part of Nigeria.

The Kakwani estimates of the health insurance contribution for those enrolled in the National Health Insurance Scheme (NHIS) revealed that it was regressive in two out of the three-year period and proportional in 2012-2013. Proportionality implied that the burden for financing health care using the health insurance co-payment was evenly distributed between the poor and non-poor. The drawback of this finding is that a proportional financing source could overtime become regressive and this occurred in the 2015-2016 period. The results further revealed that the health insurance contribution was a proportional financing source in the urban and regressive in the rural parts of the country. Furthermore, in the rural areas the health insurance contribution was more regressive than the out-of-pocket contribution indicating that the rural poor who were enrolled in the NHIS would rather utilized the scheme provision for health care financing than make direct payment for health care. This implies that financing health care using the health insurance contribution rather than out-of-pockethealth payments places a greater financial burden on the rural poor. This could have occurred because of the flat co-payment of 10 percent charged to those enrolled in the NHIS for treatment received which in real terms are regressive and the absence of a rural community based health insurance scheme to provide affordable and equitable health care for the rural poor. These results were similar to those of Yu et al., (2008); Akazili et al., (2012) and contrary to the findings of Abu-Zaineh, (2009) and Mills et al., (2012); Almasiankia et al., (2015) they noted that the increased uptake of community based insurance schemes by the rural poor makes the health insurance contributions progressive.

Findings from the zones on the distributive effect of the health insurance contribution were a mix of regressive and proportional estimates. In the North West zone, the estimate of the KPI was proportional while in the South West it was regressive. In the North Central, North West, South East and South South zones, the results were a combination of regressive and proportional estimates.These results suggest that the poor although enrolled in the scheme still make more insurance contributions than the non-poor. This could be attributed to the scheme membership structure which is not mandatory leaving only the sick and poor as members of the scheme. When health insurance contributions are made mandatory for all irrespective of their income levels they became progressive. Furthermore, a health care financing source could become proportional or regressive when payment is fixed for all income levels as in the case of the NHIS.

The estimates of the income redistributive effects of health care financing revealed that the dominant inequity issue which occurred when health was financed out-of-pocket was vertical inequity which grew by 9.3 percent in 2012/2013 and declined by less than 1 percentin 2015/2016. The estimates of horizontal inequity and reranking were negligible. The direct funding of health care induced a significant pro-rich negative redistributive effect which increased income inequality in the 2012/2013 and 2015/2016 periods. The increased income inequality occurred because of the high levels of vertical inequityassociated with out-of-pocket health care spending. Vertical inequity induced by the out-of-pocket health spending occurred because two-thirds of Nigerians live below the poverty line of one dollar a day and theygrapple withsever disease burden arising from poor nutrition, deplorable living condition and lack of access to financial resources.In the absence of prepayment health care financing mechanism, they would be forced to spend their meagre earning on health care services. The study also revealed that out – of - pocket payments for health constituted about 20 percent of household's consumption expenditure with the greatest incidence being borne by the lowest income earners. This estimate exceeded the 10% threshold beyond which households risk impoverishment due to health care financing. The implication of this findings is that aside from increased income inequality that arise when health care is paid for out-of-pocket poor household risk impoverishment when they fall sick and do not have the effective coping financial mechanism of health insurance. These finding were similar to other studies, Bilger, (2008); Ataguba and Mclntyre (2012), Sanwald and Theurl, (2015) Onyema et al., (2019); Ataguba et al., (2019) but contrary to those of Cavagnero and Bilger (2010), Ichoku et al., (2010). The two latter studies infer from their findings that the out -of -pocket payment induced a pro-poor redistribution that reduced the level of income inequality in the income distribution this occurred due to the dominant presence of a positive vertical redistributive effect. They further note that vertical equity could also suggest that the poor were not utilizing health care. Cavagnero and Bilger, (2010) specifically attributed the positive vertical equity and the pro-poor redistributive effect induced by out-of-pocket health payments to the introduction of a government social security programme that protected poor households from adverse effects of increase health spending.

All inequity issues occurred when health care was financed using the health insurance co-payments. Vertical inequity worsened over the three periods with the estimate increasing to 3.45 percent in the 2015/2016 periods. Vertical inequity induced by health insurance contribution occurred because those working in the informal sector that constitute over 80 percent of the working population were excluded from the scheme. Horizontal inequity ensued because of the limited benefit packages offered by the scheme which does not cover the expensive treatment cost associated with secondary and tertiary care. Member of the scheme seeking such specialized care would have to pay for treatment directly resulting in differential treatment, in the absence of savings, assets or avenues for borrowing these individuals although enrolled in the National Health Insurance Scheme may be pushed below their initial position on the income distribution after payment for medical services culminating in reranking. These inequities induced by the health insurance contribution worsened the level of income inequality in the post-payment period which peaked at 6.5 percent in 2015/2016. Findings revealed that income inequality caused by the health insurance contribution was greater than that of the out-of-pocket health payment. The high level of income inequality occurred because about 80 percent of those employed in the informal sector are not enrolled in the scheme. Also, there were no premium deductions from the basic salaries of the enrolees.Deductions were in the form of flat co-insurance of 10 percent paid for health services received. Although the scheme's proportional co-insurance contribution was put in place to handle the issue of moral hazard amongst its membersunfortunately it creates the problem of adverse selection.Membership of the NHIS is not mandatory, therefore, the wealthy and healthy can opt out of the scheme leaving behind a pool of sick and poor members. The resultant effect are poor benefit packages and limited pool of funds which are not sufficient for risk pooling and cross subsidization of health resources from the healthy to the sick and from the rich to the poor. These findings were similar to those of Cavagnero and Bilger, (2010). Contrary finds were obtained from Abu-Zaineh 2009 who noted that the government social health insurance contribution was progressive for the higher income earners.

The overall implication of the findings of the study is that the National Health Insurance Scheme (NHIS) has failed in its objective of protecting household'sfrom catastrophic out-of-pocket health spending. In view of inequities associated with the prevailing health care financing structure of the country households may be forced to neglect consumption of other welfare enhancing goods that are necessary for their survival or even neglect utilization of health care. This would have adverse effect on the quality and quantity of human capital available in the country.

5.2 Conclusion

It was concluded, from the results of the study that the out-of-pocket health care payments and the health insurance co-payments were regressive means of financing health care in Nigeria.Both health care financing sources induce a pro-rich redistribution and increase income inequalityafter payment for treatment. Out-of-pocket payments induce majorly vertical inequity among households. Vertical inequity, horizontal innnbequity and reranking issues were associated with funding of health care through the National Health Insurance Scheme co-payments made at the point of receiving service. It can be concluded from the findings thatthe use of the out-of-pocket health care paymentresults in the poor paying more for health care than the non-poor as a proportion of their income. More worrisome is the fact that the health insurance contribution under the National Health Insurance Scheme, which was designed to provide universal health care coverage for all especially the poor,isan inequitable health care financing source that worsened income inequality in the country. The inequities associated with the health insurance contributions would definitely result in financial impoverishment of poor households. These households due to the loss of their earning which occurred from payment for health care may be forced to avoid utilization of health care, thus increasing the morbidity and mortality rates for the country.

5.3 Contribution to Knowledge

This study utilized the Aronson Johnson and Lambert (1994) decomposition framework adopted from the field of taxation in public financing to obtain estimates of horizontal inequity occasioned by various health care financing sources. The AJL decomposition framework is an improvement over the Lerman Yitzhaki methodology previously utilized by Ichoku et al., (2011) and Onyema et al., (2019) because it accounts for horizontal inequity arising from health care financing sources which is lacking in the Lerman Yitzhaki methodology. TheLerman Yitzhaki methodology does not address the issue of horizontal inequity that arises due to health care financing because it treats the concept as synonymous with reranking which is theoretically inaccurate. An inclusive measure of income distribution in health care financing should capture vertical inequity, horizontal inequity and income reranking issues. Horizontal inequity was captured in this study by introducing the weighted Gini coefficient of post-payment which is a measure of horizontal inequity into the income distribution model for health care payments. This study provides empirical evidence on the distributive and income redistributive effects of the health insurance contributions of the National Health Insurance Scheme (NHIS). Previous studies have only focused on the out-of-pocket health care financing. Findings from the study reveal that vertical inequity, horizontal inequity and reranking occurs when health care is financing under the NHIS. Findings further indicate that financing health care using the health insurance contribution increases income inequality in the population.

5.4 Recommendations

Based on the findings from this study the following recommendations are suggested.

i. Amendment of the National Health Insurance Scheme (NHIS) Act such that the scheme is made compulsory for formal sector workers. The Act makes membership of the scheme voluntary. The voluntary nature of the scheme does not compel the wealthy and healthy to take up the national health insurance cover. This a factor that has limited the pooling of funds and hindered the scheme's core objective of cross-subsidization of financial resources from the health to the sick. Thus, creating the attendant problem of vertical inequity.

ii. The National Health Insurance Scheme should be expanded to include informal sector workers. This will greatly reduce the inequities and income inequality orchestrated when health care is funded using the health insurance contributions while promoting increased risk pooling and cost sharing across the population. Risk pooling is only possible when the membership of the scheme is heterogeneous and spread across various socio-economic groups of the population. This can be achieved through the effective implementation and operation of the Urban Self-Employed Health Insurance Programme (USSHIP) and the Rural Community Social Health Insurance Programme (RCSHIP) of the National Health Insurance Scheme (NHIS). Both components of the scheme would provide those working in the informal sector either in the rural or urban arears of the country increased access to health care which is affordable and of good quality.

iii. Those enrolled in the NHIS should makepremium contribution. These contributions should be progressive - increasing as the level of income increases. This will promote equity and mitigate the problem of vertical inequity and reranking in the income distribution.

iv. There is need to increase the funding of health care by the federal government. The current budgetary allocation of 6 percent must be scaled up in line with the 15 percent agreement by the African heads of states at the (2001) Abuja declaration.Increased public funding of health care will ensure the provision of subsidies health care especially in the public health institution and would reduce the out-of-pocket health spending of the poor in those health facilities.

v. Increased funding for the National Health Insurance Scheme can also be achieved through the "Basic Health Provision Fund" as recommended in the National Health Act, (2014). The Act provides that 50 per cent of the financial resources in the Basic Health Care Fund be apportioned to the NHIS. This will ensure the provision of primary and secondary health care services to citizen of the country and improved benefit package for members and reduce the challenge of horizontal inequity and reranking associated with the out-of-pocket payment health spending and the health insurance co-payments.

vi. Social protection programmes such as price discriminatorypoliciesinvolving exemptions and waivers for the aged, disabled and unemployed should be effectively implemented at public health institutions. This will mitigate the financial impoverishing effect of out-of-pocket health care payments among poor households.

5.5 Limitation of the Study

The study did not consider the issue of equity in health care utilization and neither was it a study on benefit incidence analysis of public health care funding which are also important issues when considering achieving equity in the health system. The study recognised that there are at least four major health care financing sources (taxes, private health insurance, social health insurance and out-of-pocket payment). The study only analysed the distributional and redistributional impact of out-of-pocket payment and the health insurance contributions because the General Household Survey (GHS) data does not provide information on the other modes of health care funding by the household.Due to lack of information on other sources of health care financing it was impossible to assess the redistributive effect of the entire health care financing system in Nigeria.

5.6 Suggestions for Further Research

This study suggests the following further research. The issue of equity in health care utilization should be investigated. In addition, the redistributive impact of direct, indirect taxes and the private health insurance contribution should also be examined.

This study decomposed the redistributive effects of health care payments individually based on the available methodology. This type of analysis does not account for the joint distribution of the health care sources. Future research should look into analysing the income redistributive effect of health care payments to account for combined distribution across the entire population.

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APPENDIX

APPENDIX I

PROGRESSIVITY REGRESSION RESULT

```
------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\New equivalent scale result no
weights\OOP RESULT
> 2010.log
  log type:  text
 opened on:  29 May 2018, 11:52:38
. do "C:\Users\CHUKWU~1\AppData\Local\Temp\STD0c000000.tmp"
. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data
oop 2010.dta"
(Nigeria GHS-Panel Wave 1 PH HH Section 1 - Roster)
. xtile quintile=prepay_exp, nq(5)

. egen exp_p=pc(eqprepay_exp)

. gen exp_cp=sum(exp_p)

. egen oop_p=pc(eqoop)

. gen oop_cp=sum(oop_p)
. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created

. label variable lorenz "Lorenz curve"

. label variable rank "Cum. Prop. Hholds."

. qui sum rank
. sca var_rank=r(Var)
. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank

      Source |       SS           df       MS      Number of obs   =    21,989
-------------+----------------------------------   F(1, 21987)     =   7726.21
       Model |  547.12452         1  547.12452   Prob > F        =    0.0000
    Residual |  1556.98941    21,987  .07081409   R-squared       =    0.2600
-------------+----------------------------------   Adj R-squared   =    0.2600
       Total |  2104.11393    21,988  .095693739   Root MSE        =    .26611
```

```
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5464255   .0062165    87.90   0.000     .5342407    .5586104
       _cons |  -.1065509   .0035892   -29.69   0.000    -.1135861   -.0995158
------------------------------------------------------------------------------
bysort zone: regr npreexp rank
----------------------------------------------------------------------------------------------------------
-> zone = north ce

      Source |       SS           df       MS      Number of obs   =     3,110
-------------+----------------------------------   F(1, 3108)      =   1488.63
       Model |  39.6387002         1  39.6387002   Prob > F        =    0.0000
    Residual |  82.7584946     3,108  .026627572   R-squared       =    0.3239
-------------+----------------------------------   Adj R-squared   =    0.3236
       Total |  122.397195     3,109   .03936867   Root MSE        =    .16318

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4060611   .0105244    38.58   0.000     .3854256    .4266966
       _cons |  -.0597511    .005783   -10.33   0.000      -.07109   -.0484121
----------------------------------------------------------------------------------------------------------
------------------------------------------------------------------------------
-> zone = north ea

      Source |       SS           df       MS      Number of obs   =     2,500
-------------+----------------------------------   F(1, 2498)      =   1087.47
       Model |  42.7986669         1  42.7986669   Prob > F        =    0.0000
    Residual |  98.3116875     2,498   .03935616   R-squared       =    0.3033
-------------+----------------------------------   Adj R-squared   =    0.3030
       Total |  141.110354     2,499  .056466728   Root MSE        =    .19838

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4783022   .0145042    32.98   0.000     .4498607    .5067436
       _cons |  -.0743355    .007243   -10.26   0.000    -.0885383   -.0601327
---------------------------------------------------------------------------------------------------------->
zone = north we

      Source |       SS           df       MS      Number of obs   =     3,098
-------------+----------------------------------   F(1, 3096)      =   1038.90
       Model |  46.2592317         1  46.2592317   Prob > F        =    0.0000
    Residual |  137.855933     3,096   .04452711   R-squared       =    0.2513
-------------+----------------------------------   Adj R-squared   =    0.2510
       Total |  184.115164     3,097   .05944952   Root MSE        =    .21101
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
        rank |  .4475435   .0138851    32.23   0.000     .4203186    .4747684
       _cons | -.0549842    .006323    -8.70   0.000    -.0673819   -.0425865
------------------------------------------------------------------------------------------------------
-> zone = south ea
Source |       SS           df       MS      Number of obs   =     5,732
-------------+----------------------------------   F(1, 5730)      =   4840.63
       Model |  123.449235         1  123.449235   Prob > F        =    0.0000
    Residual |  146.130538     5,730  .025502712   R-squared       =    0.4579
-------------+----------------------------------   Adj R-squared   =    0.4578
       Total |  269.579773     5,731  .047038872   Root MSE        =     .1597
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  .5246355   .0075406    69.57   0.000      .509853    .5394179
       _cons | -.1071562   .0044607   -24.02   0.000    -.1159008   -.0984116
------------------------------------------------------------------------------
------------------------------------------------------------------------------------------------------
-> zone = south so
      Source |       SS           df       MS      Number of obs   =     4,207
-------------+----------------------------------   F(1, 4205)      =    919.03
       Model |  163.244963         1  163.244963   Prob > F        =    0.0000
    Residual |  746.923725     4,205  .177627521   R-squared       =    0.1794
-------------+----------------------------------   Adj R-squared   =    0.1792
       Total |  910.168688     4,206  .216397691   Root MSE        =    .42146
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  .7222643   .0238249    30.32   0.000     .6755549    .7689737
       _cons | -.2047521   .0159693   -12.82   0.000    -.2360603   -.1734438
------------------------------------------------------------------------------------------------------
-> zone = south we

      Source |       SS           df       MS      Number of obs   =     3,342
-------------+----------------------------------   F(1, 3340)      =   1176.14
       Model |  113.168379         1  113.168379   Prob > F        =    0.0000
    Residual |  321.375145     3,340  .096220103   R-squared       =    0.2604
-------------+----------------------------------   Adj R-squared   =    0.2602
       Total |  434.543524     3,341   .13006391   Root MSE        =    .31019
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .638983    .018632    34.29   0.000     .6024517    .6755143
       _cons | -.1461949   .0113005   -12.94   0.000    -.1683515   -.1240383
------------------------------------------------------------------------------
. glcurve eqoop, sortvar( exp_p) glvar(ccurve_oop) lorenz nograph
new variable ccurve_oop created
. label variable ccurve_oop "OOP payments"
. qui sum rank
. sca var_rank=r(Var)
. qui sum eqoop
```

```
. sca m_eqoop=r(mean)

. gen noop= 2*var_rank*(eqoop/m_eqoop)

. regr noop rank

      Source |       SS           df       MS      Number of obs   =    21,989
-------------+----------------------------------   F(1, 21987)     =    606.01
       Model |  478.606431         1  478.606431   Prob > F        =    0.0000
    Residual |  17364.4966    21,987  .789761976   R-squared       =    0.0268
-------------+----------------------------------   Adj R-squared   =    0.0268
       Total |   17843.103    21,988  .811492768   Root MSE        =    .88869

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5110662   .0207604    24.62   0.000     .4703743    .5517581
       _cons |  -.0888705   .0119864    -7.41   0.000    -.1123648   -.0653762
------------------------------------------------------------------------------
. bysort zone: regr noop rank
-----------------------------------------------------------------------------------------------------------------
-> zone = north ce

      Source |       SS           df       MS      Number of obs   =     3,110
-------------+----------------------------------   F(1, 3108)      =     86.17
       Model |  224.053945         1  224.053945   Prob > F        =    0.0000
    Residual |  8080.82125     3,108  2.60000684   R-squared       =    0.0270
-------------+----------------------------------   Adj R-squared   =    0.0267
       Total |   8304.8752     3,109   2.6712368   Root MSE        =    1.6125


------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .9654016   .1039966     9.28   0.000     .7614927    1.169311
       _cons |  -.2245141   .0571449    -3.93   0.000    -.3365597   -.1124686
-----------------------------------------------------------------------------------------------------------------
-> zone = north ea

      Source |       SS           df       MS      Number of obs   =     2,500
-------------+----------------------------------   F(1, 2498)      =    207.95
       Model |  22.8419401         1  22.8419401   Prob > F        =    0.0000
    Residual |  274.388687     2,498  .10984335    R-squared       =    0.0768
-------------+----------------------------------   Adj R-squared   =    0.0765
       Total |  297.230627     2,499  .118939827   Root MSE        =    .33143

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3494248   .0242312    14.42   0.000     .3019096      .39694
       _cons |   -.026434   .0121003    -2.18   0.029    -.0501616   -.0027063
```

```
------------------------------------------------------------------------------------------------------
-> zone = north we

      Source |       SS           df       MS      Number of obs   =     3,098
-------------+----------------------------------   F(1, 3096)      =    178.64
       Model |  7.28804723         1  7.28804723   Prob > F        =    0.0000
    Residual |  126.310008     3,096  .040797806   R-squared       =    0.0546
-------------+----------------------------------   Adj R-squared   =    0.0542
       Total |  133.598055     3,097  .043137893   Root MSE        =    .20198

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .1776404   .0132909    13.37   0.000     .1515805    .2037003
       _cons |   .0116128   .0060524     1.92   0.055    -.0002544      .02348
------------------------------------------------------------------------------------------------------
-> zone = south ea

      Source |       SS           df       MS      Number of obs   =     5,732
-------------+----------------------------------   F(1, 5730)      =    418.70
       Model |  228.236422         1  228.236422   Prob > F        =    0.0000
    Residual |  3123.42976     5,730   .54510118   R-squared       =    0.0681
-------------+----------------------------------   Adj R-squared   =    0.0679
       Total |  3351.66618     5,731  .584830952   Root MSE        =    .73831

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .7133553    .034862    20.46   0.000     .6450127     .781698
       _cons |  -.1643673   .0206227    -7.97   0.000    -.2047956    -.123939
------------------------------------------------------------------------------------------------------
-> zone = south so

      Source |       SS           df       MS      Number of obs   =     4,207
-------------+----------------------------------   F(1, 4205)      =     72.85
       Model |  87.8815164         1  87.8815164   Prob > F        =    0.0000
    Residual |  5072.78211     4,205  1.20636911   R-squared       =    0.0170
-------------+----------------------------------   Adj R-squared   =    0.0168
       Total |  5160.66362     4,206  1.22697661   Root MSE        =    1.0983

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .529938   .0620892     8.54   0.000     .4082102    .6516657
       _cons |  -.1103257    .041617    -2.65   0.008     -.191917   -.0287344
------------------------------------------------------------------------------

------------------------------------------------------------------------------------------------------
-> zone = south we

      Source |       SS           df       MS      Number of obs   =     3,342
-------------+----------------------------------   F(1, 3340)      =     61.57
       Model |   9.3025872         1   9.3025872   Prob > F        =    0.0000
    Residual |  504.659946     3,340  .151095792   R-squared       =    0.0181
```

```
-------------+----------------------------------   Adj R-squared   =    0.0178
       Total |  513.962533     3,341  .153834939   Root MSE        =    .38871

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .1832013   .0233482     7.85   0.000     .1374232    .2289795
       _cons |  -.0036119   .0141609    -0.26   0.799    -.0313768     .024153
------------------------------------------------------------------------------
. *** for kakwani regression OOP ***
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqoop

. sca m_eqoop = r(mean)

. qui sum exp_p

. sca m_exp = r(mean)

. gen k_oop = 2*var_rank*( eqoop/m_eqoop - exp_p /m_exp)

. reg k_oop rank

      Source |       SS           df       MS      Number of obs   =    21,989
-------------+----------------------------------   F(1, 21987)     =      3.08
       Model |  2.29103848         1  2.29103848   Prob > F        =    0.0794
    Residual |  16369.6314    21,987  .744514093   R-squared       =    0.0001
-------------+----------------------------------   Adj R-squared   =    0.0001
       Total |  16371.9224    21,988  .744584428   Root MSE        =    .86285

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0353593   .0201569    -1.75   0.079    -.0748684    .0041497
       _cons |   .0176805    .011638     1.52   0.129    -.0051309    .0404918
 bysort zone: reg k_oop rank
-----------------------------------------------------------------------------------------------
-> zone = north ce

      Source |       SS           df       MS      Number of obs   =     3,110
-------------+----------------------------------   F(1, 3108)      =     34.38
       Model |  75.2123305         1  75.2123305   Prob > F        =    0.0000
    Residual |  6799.25604     3,108  2.18766282   R-squared       =    0.0109
-------------+----------------------------------   Adj R-squared   =    0.0106
       Total |  6874.46837     3,109  2.21115097   Root MSE        =    1.4791

------------------------------------------------------------------------------
```

```
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5593405   .0953942     5.86   0.000     .3722985    .7463825
       _cons |  -.1647631    .052418    -3.14   0.002    -.2675405   -.0619857
------------------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------
-> zone = north ea

      Source |       SS           df       MS      Number of obs   =     2,500
-------------+----------------------------------   F(1, 2498)      =     20.47
       Model |  3.10726911         1  3.10726911   Prob > F        =    0.0000
    Residual |  379.264473     2,498  .151827251   R-squared       =    0.0081
-------------+----------------------------------   Adj R-squared   =    0.0077
       Total |  382.371742     2,499  .153009901   Root MSE        =    .38965

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1288774    .028488    -4.52   0.000    -.1847399   -.0730148
       _cons |   .0479015   .0142261     3.37   0.001     .0200055    .0757976
------------------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------
-> zone = north we

      Source |       SS           df       MS      Number of obs   =     3,098
-------------+----------------------------------   F(1, 3096)      =    190.15
       Model |  16.8245633         1  16.8245633   Prob > F        =    0.0000
    Residual |  273.931295     3,096    .0884791   R-squared       =    0.0579
-------------+----------------------------------   Adj R-squared   =    0.0576
       Total |  290.755858     3,097  .093883067   Root MSE        =    .29745

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.2699032    .019573   -13.79   0.000    -.3082805   -.2315259
       _cons |    .066597   .0089132     7.47   0.000     .0491207    .0840733
------------------------------------------------------------------------------
-> zone = south ea

      Source |       SS           df       MS      Number of obs   =     5,732
-------------+----------------------------------   F(1, 5730)      =     31.32
       Model |  15.9738057         1  15.9738057   Prob > F        =    0.0000
    Residual |  2922.84864     5,730  .510095748   R-squared       =    0.0054
-------------+----------------------------------   Adj R-squared   =    0.0053
       Total |  2938.82244     5,731  .512794005   Root MSE        =    .71421

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
        rank |   .1887199    .033724     5.60   0.000     .1226081    .2548317
       _cons |  -.0572111   .0199496    -2.87   0.004    -.0963197   -.0181024
------------------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------------
-> zone = south so

      Source |       SS           df       MS      Number of obs   =     4,207
-------------+----------------------------------   F(1, 4205)      =      9.85
       Model |  11.5751084         1  11.5751084   Prob > F        =    0.0017
    Residual |  4941.65297     4,205  1.17518501   R-squared       =    0.0023
-------------+----------------------------------   Adj R-squared   =    0.0021
       Total |  4953.22808     4,206  1.17765765   Root MSE        =    1.0841

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1923264   .0612815    -3.14   0.002    -.3124705   -.0721822
       _cons |   .0944264   .0410756     2.30   0.022     .0138965    .1749562
------------------------------------------------------------------------------
-> zone = south we

      Source |       SS           df       MS      Number of obs   =     3,342
-------------+----------------------------------   F(1, 3340)      =    242.12
       Model |  57.5784798         1  57.5784798   Prob > F        =    0.0000
    Residual |  794.278843     3,340  .237808037   R-squared       =    0.0676
-------------+----------------------------------   Adj R-squared   =    0.0673
       Total |  851.857322     3,341  .254970764   Root MSE        =    .48766

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.4557817   .0292914   -15.56   0.000    -.5132125   -.3983508
       _cons |    .142583   .0177655     8.03   0.000     .1077507    .1774154
------------------------------------------------------------------------------
. dominance eqoop [aw= wt], sortvar( exp_p ) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve

Variable   Sort vbl.   Sign. level   # points   Rule
---------------------------------------------------------

eqoop      exp_p           5%           19        mca

   Concentration curve dominates


Test of dominance between concentration curve and 45 degree line

Variable   Sign. level   # points   Rule
```

```
--------------------------------------------

eqoop         5%          19       mca

   45 degree dominates


cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
------------------------------------------------------

q20         3.2782%       0.0448       0.0000
q40        10.2140%       0.1257       0.0000
q60        21.9097%       0.2509       0.0000
q80        41.5458%       0.4375       0.0000
------------------------------------------------------
cumulative shares of eqoop
Quantile   cum. share     std. error    Diff. from    Diff. from
                          pop. share    income share

                          p-value       p-value
----------------------------------------------------------------

q20         4.9540%       0.2189       0.0000       0.0000
q40        13.9375%       0.5205       0.0000       0.0000
q60        27.0057%       0.9632       0.0000       0.0000
q80        46.1108%       1.5860       0.0000       0.0034
--------------------------------------------------------------------------------------
end of do-file
weights\OOP RESULT
> 2010.log
  log type:  text
 closed on:  29 May 2018, 11:53:42
--------------------------------------------------------------------------------------
-
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\New equivalent scale result no
weights\OOP RESULT
> 2012.log
  log type:  text
 opened on:  29 May 2018, 11:54:11


. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data
oop 2012.dta"
(Nigeria GHS-Panel Wave 2 PH HH Section 1 - Roster)
. xtile quintile=prepay_exp, nq(5)
. egen exp_p=pc(eqprepay_exp)
. gen exp_cp=sum(exp_p)
. egen oop_p=pc(eqoop)
. gen oop_cp=sum(oop_p)
```

```
. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created
. label variable lorenz "Lorenz curve"
. label variable rank "Cum. Prop. Hholds."

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank

      Source |       SS           df       MS      Number of obs   =    45,832
-------------+----------------------------------   F(1, 45830)     =  24339.32
       Model |  1275.76989         1  1275.76989   Prob > F        =    0.0000
    Residual |  2402.22502    45,830  .052415994   R-squared       =    0.3469
-------------+----------------------------------   Adj R-squared   =    0.3469
       Total |  3677.99491    45,831  .080251247   Root MSE        =    .22895

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5779528   .0037046   156.01   0.000     .5706918    .5852138
       _cons |  -.1223124   .0021389   -57.19   0.000    -.1265046   -.1181202
------------------------------------------------------------------------------
bysort zone: regr npreexp rank
----------------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS           df       MS      Number of obs   =     7,389
-------------+----------------------------------   F(1, 7387)      =   2096.70
       Model |  156.964347         1  156.964347   Prob > F        =    0.0000
    Residual |  553.010122     7,387  .074862613   R-squared       =    0.2211
-------------+----------------------------------   Adj R-squared   =    0.2210
       Total |  709.974469     7,388  .096098331   Root MSE        =    .27361

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5253245   .0114725    45.79   0.000     .5028351     .547814
       _cons |  -.1057645    .006333   -16.70   0.000    -.1181789   -.0933501
----------------------------------------------------------------------------------------------------------
-> zone = NORTH EAST
```

```
      Source |       SS           df       MS      Number of obs   =     5,552
-------------+----------------------------------   F(1, 5550)      =   5653.90
       Model |  66.2084738         1  66.2084738   Prob > F        =    0.0000
    Residual |  64.9918373     5,550  .011710241   R-squared       =    0.5046
-------------+----------------------------------   Adj R-squared   =    0.5045
       Total |  131.200311     5,551  .023635437   Root MSE        =    .10821

------------------------------------------------------------------------------
    npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4084798   .0054325    75.19   0.000       .39783    .4191295
       _cons |  -.0624212   .0026832   -23.26   0.000    -.0676812   -.0571611
-------------------------------------------------------------------------------------------------------------
-> zone = NORTH WEST

      Source |       SS           df       MS      Number of obs   =     6,008
-------------+----------------------------------   F(1, 6006)      =  10484.48
       Model |   74.061713         1   74.061713   Prob > F        =    0.0000
    Residual |  42.4260256     6,006   .00706394   R-squared       =    0.6358
-------------+----------------------------------   Adj R-squared   =    0.6357
       Total |  116.487739     6,007  .019391999   Root MSE        =    .08405

------------------------------------------------------------------------------
    npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4150653   .0040536   102.39   0.000     .4071187    .4230118
       _cons |  -.0615242   .0019253   -31.96   0.000    -.0652985     -.05775
---------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS           df       MS      Number of obs   =    10,096
-------------+----------------------------------   F(1, 10094)     =   7990.61
       Model |   350.48257         1   350.48257   Prob > F        =    0.0000
    Residual |  442.740867    10,094  .043861786   R-squared       =    0.4418
-------------+----------------------------------   Adj R-squared   =    0.4418
       Total |  793.223437    10,095  .078575873   Root MSE        =    .20943
------------------------------------------------------------------------------
    npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .6451835   .0072176    89.39   0.000     .6310356    .6593315
       _cons |  -.1492078    .004285   -34.82   0.000    -.1576073   -.1408083
---------------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =     8,752
-------------+----------------------------------   F(1, 8750)      =   3926.52
       Model |  349.515275         1  349.515275   Prob > F        =    0.0000
    Residual |  778.873145     8,750  .089014074   R-squared       =    0.3097
-------------+----------------------------------   Adj R-squared   =    0.3097
       Total |  1128.38842     8,751   .12894394   Root MSE        =    .29835
```

```
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .6868975    .010962    62.66   0.000     .6654095    .7083855
       _cons |  -.1736839    .007166   -24.24   0.000    -.1877309   -.1596369
------------------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS           df       MS      Number of obs   =     8,035
-------------+----------------------------------   F(1, 8033)      =   3864.99
       Model |  230.684626         1  230.684626   Prob > F        =    0.0000
    Residual |  479.454778     8,033  .059685644   R-squared       =    0.3248
-------------+----------------------------------   Adj R-squared   =    0.3248
       Total |  710.139405     8,034  .088391761   Root MSE        =    .24431
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5978229   .0096161    62.17   0.000     .5789729    .6166729
       _cons |  -.1391718   .0058934   -23.61   0.000    -.1507244   -.1276192
------------------------------------------------------------------------------
. glcurve eqoop, sortvar( exp_p) glvar(ccurve_oop) lorenz nograph
new variable ccurve_oop created

. label variable ccurve_oop "OOP payments"

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqoop

. sca m_eqoop=r(mean)

. gen noop= 2*var_rank*(eqoop/m_eqoop)

. regr noop rank

      Source |       SS           df       MS      Number of obs   =    45,832
-------------+----------------------------------   F(1, 45830)     =   3696.52
       Model |  788.751074         1  788.751074   Prob > F        =    0.0000
    Residual |  9779.05612    45,830  .213376743   R-squared       =    0.0746
-------------+----------------------------------   Adj R-squared   =    0.0746
       Total |  10567.8072    45,831  .230582078   Root MSE        =    .46193
------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4544396   .0074745    60.80   0.000     .4397896    .4690897
       _cons |  -.0605545   .0043155   -14.03   0.000    -.0690128   -.0520961
------------------------------------------------------------------------------
bysort zone: regr noop rank
```

```
--------------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

     Source |       SS           df       MS      Number of obs   =     7,389
-------------+----------------------------------   F(1, 7387)      =    412.54
      Model |  74.028468         1  74.028468   Prob > F        =    0.0000
   Residual |  1325.56252     7,387  .179445312   R-squared       =    0.0529
-------------+----------------------------------   Adj R-squared   =    0.0528
      Total |  1399.59099     7,388  .189441119   Root MSE        =    .42361
------------------------------------------------------------------------------
       noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .3607668   .0177621    20.31   0.000     .3259481    .3955855
      _cons |  -.0258596   .0098048    -2.64   0.008    -.0450799   -.0066393
--------------------------------------------------------------------------------------------------------
-> zone = NORTH EAST

     Source |       SS           df       MS      Number of obs   =     5,552
-------------+----------------------------------   F(1, 5550)      =    288.27
      Model |  50.8444799         1  50.8444799   Prob > F        =    0.0000
   Residual |  978.895222     5,550  .176377517   R-squared       =    0.0494
-------------+----------------------------------   Adj R-squared   =    0.0492
      Total |   1029.7397     5,551  .185505261   Root MSE        =    .41997

------------------------------------------------------------------------------
       noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |    .357961   .0210831    16.98   0.000     .3166298    .3992922
      _cons |  -.0294028   .0104132    -2.82   0.005    -.0498167   -.0089888
--------------------------------------------------------------------------------------------------------
-> zone = NORTH WEST

     Source |       SS           df       MS      Number of obs   =     6,008
-------------+----------------------------------   F(1, 6006)      =    936.04
      Model |  78.7032536         1  78.7032536   Prob > F        =    0.0000
   Residual |  504.989107     6,006  .08408077   R-squared       =    0.1348
-------------+----------------------------------   Adj R-squared   =    0.1347
      Total |  583.692361     6,007  .097168697   Root MSE        =    .28997

------------------------------------------------------------------------------
       noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |    .427874   .0139852    30.59   0.000      .400458    .4552899
      _cons |  -.0330374   .0066423    -4.97   0.000    -.0460587   -.0200161
--------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

     Source |       SS           df       MS      Number of obs   =    10,096
-------------+----------------------------------   F(1, 10094)     =   1101.56
      Model |   271.04372         1   271.04372   Prob > F        =    0.0000
```

```
   Residual |  2483.68087    10,094  .246055169   R-squared      =    0.0984
-------------+----------------------------------   Adj R-squared   =    0.0983
      Total |  2754.72459    10,095  .272880098   Root MSE       =    .49604
------------------------------------------------------------------------------
       noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .5673744   .0170949    33.19   0.000      .533865    .6008838
      _cons |  -.1090323    .010149   -10.74   0.000    -.1289264   -.0891381
----------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

     Source |       SS           df       MS      Number of obs   =     8,752
-------------+----------------------------------   F(1, 8750)      =    664.87
      Model |  245.083137         1  245.083137   Prob > F        =    0.0000
   Residual |  3225.39256     8,750  .368616293   R-squared       =    0.0706
-------------+----------------------------------   Adj R-squared   =    0.0705
      Total |   3470.4757     8,751  .396580471   Root MSE        =    .60714
------------------------------------------------------------------------------
       noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .5751956   .0223073    25.79   0.000     .5314682    .6189231
      _cons |  -.1162402   .0145825    -7.97   0.000    -.1448254    -.087655
------------------------------------------------------------------------------
----------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

     Source |       SS           df       MS      Number of obs   =     8,035
-------------+----------------------------------   F(1, 8033)      =    467.37
      Model |    70.30921         1    70.30921   Prob > F        =    0.0000
   Residual |  1208.45786     8,033  .150436681   R-squared       =    0.0550
-------------+----------------------------------   Adj R-squared   =    0.0549
      Total |  1278.76707     8,034  .159169414   Root MSE        =    .38786
------------------------------------------------------------------------------
       noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .3300421   .0152665    21.62   0.000     .3001157    .3599684
      _cons |  -.0194127   .0093564    -2.07   0.038    -.0377536   -.0010717
------------------------------------------------------------------------------
. *** for kakwani regression OOP ***
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqoop

. sca m_eqoop = r(mean)

. qui sum exp_p

. sca m_exp = r(mean)
```

```
. gen k_oop = 2*var_rank*( eqoop/m_eqoop - exp_p /m_exp)

. reg k_oop rank

      Source |       SS           df       MS      Number of obs   =    45,832
-------------+----------------------------------   F(1, 45830)     =    282.00
       Model |  58.2658753         1  58.2658753   Prob > F        =    0.0000
    Residual |  9469.36408    45,830  .206619334   R-squared       =    0.0061
-------------+----------------------------------   Adj R-squared   =    0.0061
       Total |  9527.62996    45,831  .207886146   Root MSE        =    .45455

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1235132   .0073552   -16.79   0.000    -.1379294    -.109097
       _cons |   .0617579   .0042466    14.54   0.000     .0534346    .0700813
------------------------------------------------------------------------------
. bysort zone: reg k_oop rank

-------------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS           df       MS      Number of obs   =     7,389
-------------+----------------------------------   F(1, 7387)      =     74.54
       Model |  15.4021829         1  15.4021829   Prob > F        =    0.0000
    Residual |   1526.4232     7,387  .206636415   R-squared       =    0.0100
-------------+----------------------------------   Adj R-squared   =    0.0099
       Total |  1541.82538     7,388  .208693202   Root MSE        =    .45457

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1645577   .0190603    -8.63   0.000    -.2019214    -.127194
       _cons |   .0799049   .0105215     7.59   0.000     .0592797      .10053
-------------------------------------------------------------------------------------------------------
-> zone = NORTH EAST

      Source |       SS           df       MS      Number of obs   =     5,552
-------------+----------------------------------   F(1, 5550)      =      7.03
       Model |   1.0126949         1   1.0126949   Prob > F        =    0.0080
    Residual |  799.204301     5,550  .144000775   R-squared       =    0.0013
-------------+----------------------------------   Adj R-squared   =    0.0011
       Total |  800.216996     5,551  .144157268   Root MSE        =    .37947

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0505188   .0190501    -2.65   0.008    -.0878644   -.0131732
       _cons |   .0330184    .009409     3.51   0.000      .014573    .0514638
-------------------------------------------------------------------------------------------------------
```

```
-> zone = NORTH WEST

      Source |       SS           df       MS      Number of obs   =     6,008
-------------+----------------------------------   F(1, 6006)      =      0.88
       Model |  .070529444         1  .070529444   Prob > F        =    0.3481
    Residual |  481.030708     6,006  .080091693   R-squared       =    0.0001
-------------+----------------------------------   Adj R-squared   =   -0.0000
       Total |  481.101237     6,007  .080090101   Root MSE        =      .283

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0128087   .0136494     0.94   0.348     -.013949    .0395664
       _cons |   .0284868   .0064828     4.39   0.000     .0157782    .0411955
-----------------------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS           df       MS      Number of obs   =    10,096
-------------+----------------------------------   F(1, 10094)     =     22.39
       Model |  5.09754445         1  5.09754445   Prob > F        =    0.0000
    Residual |  2298.33147    10,094  .227692835   R-squared       =    0.0022
-------------+----------------------------------   Adj R-squared   =    0.0021
       Total |  2303.42902    10,095  .228175237   Root MSE        =    .47717
------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0778091   .0164447    -4.73   0.000    -.1100439   -.0455743
       _cons |   .0401755    .009763     4.12   0.000     .0210381    .0593129
-----------------------------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =     8,752
-------------+----------------------------------   F(1, 8750)      =     27.28
       Model |  9.24279419         1  9.24279419   Prob > F        =    0.0000
    Residual |  2964.87975     8,750    .3388434   R-squared       =    0.0031
-------------+----------------------------------   Adj R-squared   =    0.0030
       Total |  2974.12254     8,751  .339860878   Root MSE        =     .5821
------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1117019   .0213874    -5.22   0.000    -.1536263   -.0697775
       _cons |   .0574437   .0139812     4.11   0.000     .0300372    .0848502
-----------------------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS           df       MS      Number of obs   =     8,035
-------------+----------------------------------   F(1, 8033)      =    271.94
       Model |  46.2841679         1  46.2841679   Prob > F        =    0.0000
    Residual |  1367.20273     8,033  .170198273   R-squared       =    0.0327
-------------+----------------------------------   Adj R-squared   =    0.0326
```

```
      Total |  1413.48689     8,034  .175938125   Root MSE       =    .41255
------------------------------------------------------------------------------
      k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.2677808   .0162383   -16.49   0.000    -.2996121   -.2359495
      _cons |   .1197592    .009952    12.03   0.000     .1002507    .1392676
------------------------------------------------------------------------------
. dominance eqoop [aw= wt], sortvar( exp_p ) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve
Variable   Sort vbl.   Sign. level   # points      Rule
------------------------------------------------------------
eqoop      exp_p           5%           19          mca
  Concentration curve dominates
Test of dominance between concentration curve and 45 degree line

Variable   Sign. level   # points    Rule
---------------------------------------------


eqoop          5%           19       mca
  45 degree dominates
cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
-------------------------------------------------------


q20          1.6774%       0.0196       0.0000
q40          7.2225%       0.0643       0.0000
q60         18.5126%        0.1367       0.0000
q80         39.5621%        0.2432       0.0000
-------------------------------------------------------



cumulative shares of eqoop

Quantile   cum. share     std. error   Diff. from    Diff. from
                           pop. share    income share

                           p-value       p-value
-----------------------------------------------------------------


q20          4.3932%       0.1260       0.0000        0.0000
q40         14.0561%        0.2249       0.0000        0.0000
q60         28.7348%        0.4030       0.0000        0.0000
q80         49.4160%        0.6426       0.0000        0.0000
-----------------------------------------------------------------

end of do-file

. log close
      name:  <unnamed>
```

```
      log:  C:\Users\chukwuedosusan\Desktop\phd analysis\New equivalent scale result no
weights\OOP RESULT
> 2012.log
  log type:  text
 closed on:  29 May 2018, 11:55:01
```

OOP Result 2015

```
---------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\New equivalent scale result no
weights\OOP RESULT
> 2015.log
  log type:  text
 opened on:  29 May 2018, 11:55:43

. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data
oop 2015.dta"

. xtile quintile=prepay_exp, nq(5)

. egen exp_p=pc(eqprepay_exp)

. gen exp_cp=sum(exp_p)

. egen oop_p=pc(eqoop)

. gen oop_cp=sum(oop_p)

. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created

. label variable lorenz "Lorenz curve"

. label variable rank "Cum. Prop. Hholds."

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank

      Source |       SS           df       MS      Number of obs   =    51,114
-------------+----------------------------------   F(1, 51112)     =  38802.81
```

```
       Model |  1282.83162         1  1282.83162   Prob > F        =    0.0000
    Residual |  1689.77663    51,112  .033060272   R-squared       =    0.4316
-------------+----------------------------------   Adj R-squared   =    0.4315
       Total |  2972.60825    51,113  .058157577   Root MSE        =    .18182

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5487891    .002786   196.98   0.000     .5433287    .5542496
       _cons |    -.10773   .0016085   -66.98   0.000    -.1108827   -.1045773
------------------------------------------------------------------------------

.
. bysort zone: regr npreexp rank

-------------------------------------------------------------------------------------------------------
-> zone = 1. NORTH CENTRAL

      Source |       SS           df       MS      Number of obs   =     7,359
-------------+----------------------------------   F(1, 7357)      =   6467.44
       Model |  112.243512         1  112.243512   Prob > F        =    0.0000
    Residual |  127.681927     7,357  .017355162   R-squared       =    0.4678
-------------+----------------------------------   Adj R-squared   =    0.4678
       Total |  239.925438     7,358  .032607426   Root MSE        =    .13174

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4432079   .0055111    80.42   0.000     .4324045    .4540113
       _cons |  -.0703962   .0029549   -23.82   0.000    -.0761887   -.0646037
-------------------------------------------------------------------------------------------------------
-> zone = 2. NORTH EAST

      Source |       SS           df       MS      Number of obs   =     6,007
-------------+----------------------------------   F(1, 6005)      =   3708.20
       Model |   82.804621         1   82.804621   Prob > F        =    0.0000
    Residual |  134.092478     6,005  .022330138   R-squared       =    0.3818
-------------+----------------------------------   Adj R-squared   =    0.3817
       Total |  216.897099     6,006  .036113403   Root MSE        =    .14943

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4352496   .0071475    60.89   0.000     .4212378    .4492613
       _cons |  -.0651428   .0035486   -18.36   0.000    -.0720993   -.0581863
-------------------------------------------------------------------------------------------------------
-> zone = 3. NORTH WEST

      Source |       SS           df       MS      Number of obs   =     7,369
-------------+----------------------------------   F(1, 7367)      =  10871.52
```

```
       Model |  114.192116         1  114.192116   Prob > F        =    0.0000
    Residual |  77.3813737     7,367  .010503784   R-squared       =    0.5961
-------------+----------------------------------   Adj R-squared   =    0.5960
       Total |   191.57349     7,368  .026000745   Root MSE        =    .10249

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4565346   .0043785   104.27   0.000     .4479515    .4651178
       _cons |  -.0665607   .0020834   -31.95   0.000    -.0706447   -.0624767
-----------------------------------------------------------------------------------------------------
-> zone = 4. SOUTH EAST

      Source |       SS           df       MS      Number of obs   =    11,249
-------------+----------------------------------   F(1, 11247)     =   6570.51
       Model |  230.226196         1  230.226196   Prob > F        =    0.0000
    Residual |  394.087334    11,247  .035039329   R-squared       =    0.3688
-------------+----------------------------------   Adj R-squared   =    0.3687
       Total |   624.31353    11,248  .055504403   Root MSE        =    .18719

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5326107   .0065707    81.06   0.000      .519731    .5454904
       _cons |  -.1136531   .0038565   -29.47   0.000    -.1212126   -.1060936
-----------------------------------------------------------------------------------------------------
-> zone = 5. SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =    10,252
-------------+----------------------------------   F(1, 10250)     =   6160.50
       Model |  442.628122         1  442.628122   Prob > F        =    0.0000
    Residual |  736.456294    10,250  .071849395   R-squared       =    0.3754
-------------+----------------------------------   Adj R-squared   =    0.3753
       Total |  1179.08442    10,251  .115021404   Root MSE        =    .26805

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .715425    .009115    78.49   0.000     .6975579    .7332922
       _cons |  -.1850914   .0062366   -29.68   0.000    -.1973163   -.1728665
-----------------------------------------------------------------------------------------------------
-> zone = 6. SOUTH WEST

      Source |       SS           df       MS      Number of obs   =     8,878
-------------+----------------------------------   F(1, 8876)      =  11569.62
       Model |  219.836378         1  219.836378   Prob > F        =    0.0000
    Residual |  168.654408     8,876  .019001173   R-squared       =    0.5659
-------------+----------------------------------   Adj R-squared   =    0.5658
       Total |  388.490787     8,877  .043763748   Root MSE        =    .13784
```

```
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5492677   .0051065   107.56   0.000     .5392578    .5592777
       _cons |  -.1116139   .0030172   -36.99   0.000    -.1175282   -.1056995
------------------------------------------------------------------------------


.
. glcurve eqoop, sortvar( exp_p) glvar(ccurve_oop) lorenz nograph
new variable ccurve_oop created

. label variable ccurve_oop "OOP payments"

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqoop

. sca m_eqoop=r(mean)

. gen noop= 2*var_rank*(eqoop/m_eqoop)

. regr noop rank

      Source |       SS           df       MS      Number of obs   =    51,114
-------------+----------------------------------   F(1, 51112)     =   3658.81
       Model |  870.299234         1  870.299234   Prob > F        =    0.0000
    Residual |  12157.7061    51,112  .237864027   R-squared       =    0.0668
-------------+----------------------------------   Adj R-squared   =    0.0668
       Total |  13028.0054    51,113  .254886338   Root MSE        =    .48771

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4520172   .0074728    60.49   0.000     .4373704    .4666641
       _cons |  -.0593431   .0043145   -13.75   0.000    -.0677996   -.0508866
------------------------------------------------------------------------------
. bysort zone: regr noop rank
-------------------------------------------------------------------------------------------------------
-> zone = 1. NORTH CENTRAL

      Source |       SS           df       MS      Number of obs   =     7,359
-------------+----------------------------------   F(1, 7357)      =    544.31
       Model |  55.5114054         1  55.5114054   Prob > F        =    0.0000
    Residual |  750.298457     7,357  .101984295   R-squared       =    0.0689
-------------+----------------------------------   Adj R-squared   =    0.0688
       Total |  805.809863     7,358  .109514795   Root MSE        =    .31935

------------------------------------------------------------------------------
```

```
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3116865   .0133596    23.33   0.000     .2854978    .3378751
       _cons |   -.009434   .0071631    -1.32   0.188    -.0234757    .0046077
------------------------------------------------------------------------------------------------------
-> zone = 2. NORTH EAST

      Source |       SS           df       MS      Number of obs   =     6,007
-------------+----------------------------------   F(1, 6005)      =    117.63
       Model |  35.6771369         1  35.6771369   Prob > F        =    0.0000
    Residual |   1821.3018     6,005  .303297552   R-squared       =    0.0192
-------------+----------------------------------   Adj R-squared   =    0.0190
       Total |  1856.97894     6,006  .309187302   Root MSE        =    .55072

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .2856972   .0263418    10.85   0.000     .2340578    .3373366
       _cons |   -.004448   .0130781    -0.34   0.734    -.0300858    .0211897
------------------------------------------------------------------------------------------------------
-> zone = 3. NORTH WEST

      Source |       SS           df       MS      Number of obs   =     7,369
-------------+----------------------------------   F(1, 7367)      =    569.92
       Model |  79.1086743         1  79.1086743   Prob > F        =    0.0000
    Residual |   1022.5833     7,367  .138805932   R-squared       =    0.0718
-------------+----------------------------------   Adj R-squared   =    0.0717
       Total |  1101.69198     7,368  .149523884   Root MSE        =    .37257


------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3799861   .0159169    23.87   0.000     .3487843    .4111879
       _cons |  -.0247983   .0075736    -3.27   0.001    -.0396446   -.0099519
------------------------------------------------------------------------------------------------------
-> zone = 4. SOUTH EAST

      Source |       SS           df       MS      Number of obs   =    11,249
-------------+----------------------------------   F(1, 11247)     =   1144.86
       Model |   288.61005         1   288.61005   Prob > F        =    0.0000
    Residual |  2835.26944    11,247  .252091174   R-squared       =    0.0924
-------------+----------------------------------   Adj R-squared   =    0.0923
       Total |  3123.87949    11,248   .27772755   Root MSE        =    .50209

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5963321   .0176243    33.84   0.000     .5617855    .6308788
       _cons |  -.1267712   .0103442   -12.26   0.000    -.1470477   -.1064946
```

```
----------------------------------------------------------------------------------------------------------
-> zone = 5. SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =    10,252
-------------+----------------------------------   F(1, 10250)     =    571.56
       Model |  239.760291         1  239.760291   Prob > F        =    0.0000
    Residual |  4299.74536    10,250  .419487352   R-squared       =    0.0528
-------------+----------------------------------   Adj R-squared   =    0.0527
       Total |  4539.50565    10,251  .442835396   Root MSE        =    .64768

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5265423   .0220244    23.91   0.000     .4833702    .5697144
       _cons |   -.088993   .0150693    -5.91   0.000    -.1185318   -.0594542
----------------------------------------------------------------------------------------------------------
-> zone = 6. SOUTH WEST

      Source |       SS           df       MS      Number of obs   =     8,878
-------------+----------------------------------   F(1, 8876)      =    872.19
       Model |  134.842634         1  134.842634   Prob > F        =    0.0000
    Residual |  1372.25023     8,876  .154602324   R-squared       =    0.0895
-------------+----------------------------------   Adj R-squared   =    0.0894
       Total |  1507.09286     8,877  .169775021   Root MSE        =     .3932

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4301777   .0145661    29.53   0.000     .4016249    .4587306
       _cons |   -.060807   .0086064    -7.07   0.000    -.0776774   -.0439365

. *** for kakwani regression OOP ***
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqoop

. sca m_eqoop = r(mean)

. qui sum exp_p

. sca m_exp = r(mean)

. gen k_oop = 2*var_rank*( eqoop/m_eqoop - exp_p /m_exp)

. reg k_oop rank

      Source |       SS           df       MS      Number of obs   =    51,114
-------------+----------------------------------   F(1, 51112)     =    202.86
```

```
       Model |  39.8893847         1  39.8893847   Prob > F        =    0.0000
    Residual |  10050.3919    51,112  .196634682   R-squared       =    0.0040
-------------+----------------------------------   Adj R-squared   =    0.0039
       Total |  10090.2813    51,113  .197411251   Root MSE        =    .44344

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0967719   .0067944   -14.24   0.000     -.110089   -.0834548
       _cons |   .0483869   .0039228    12.33   0.000     .0406982    .0560756
------------------------------------------------------------------------------
bysort zone: reg k_oop rank
-------------------------------------------------------------------------------------------------------
-> zone = 1. NORTH CENTRAL

      Source |       SS           df       MS      Number of obs   =     7,359
-------------+----------------------------------   F(1, 7357)      =    106.98
       Model |  9.88414671         1  9.88414671   Prob > F        =    0.0000
    Residual |  679.725187     7,357  .092391625   R-squared       =    0.0143
-------------+----------------------------------   Adj R-squared   =    0.0142
       Total |  689.609334     7,358  .093722388   Root MSE        =    .30396

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1315214   .0127158   -10.34   0.000     -.156448   -.1065948
       _cons |   .0609622   .0068179     8.94   0.000     .0475972    .0743272
-------------------------------------------------------------------------------------------------------
-> zone = 2. NORTH EAST

      Source |       SS           df       MS      Number of obs   =     6,007
-------------+----------------------------------   F(1, 6005)      =     44.74
       Model |   9.7760673         1   9.7760673   Prob > F        =    0.0000
    Residual |  1312.10142     6,005  .218501485   R-squared       =    0.0074
-------------+----------------------------------   Adj R-squared   =    0.0072
       Total |  1321.87748     6,006  .220092821   Root MSE        =    .46744

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1495523   .0223583    -6.69   0.000    -.1933826   -.1057221
       _cons |   .0606948   .0111004     5.47   0.000     .0389341    .0824555
-------------------------------------------------------------------------------------------------------
-> zone = 3. NORTH WEST

      Source |       SS           df       MS      Number of obs   =     7,369
-------------+----------------------------------   F(1, 7367)      =     27.92
       Model |  3.21042333         1  3.21042333   Prob > F        =    0.0000
    Residual |  847.136481     7,367  .114990699   R-squared       =    0.0038
-------------+----------------------------------   Adj R-squared   =    0.0036
```

```
       Total |  850.346905     7,368  .115410818   Root MSE      =    .3391

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0765485   .0144873    -5.28   0.000    -.1049477   -.0481493
       _cons |   .0417624   .0068933     6.06   0.000     .0282496    .0552753
-------------------------------------------------------------------------------------------------------
-> zone = 4. SOUTH EAST

      Source |       SS           df       MS      Number of obs   =    11,249
-------------+----------------------------------   F(1, 11247)     =     17.75
       Model |  3.29538906         1  3.29538906   Prob > F        =    0.0000
    Residual |   2088.0644    11,247  .185655233   R-squared       =    0.0016
-------------+----------------------------------   Adj R-squared   =    0.0015
       Total |  2091.35979    11,248  .185931703   Root MSE        =    .43088

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0637215   .0151247     4.21   0.000     .0340745    .0933685
       _cons |  -.0131181   .0088771    -1.48   0.140    -.0305188    .0042827
-------------------------------------------------------------------------------------------------------
-> zone = 5. SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =    10,252
-------------+----------------------------------   F(1, 10250)     =     82.74
       Model |  30.8528502         1  30.8528502   Prob > F        =    0.0000
    Residual |  3822.21583    10,250  .372899106   R-squared       =    0.0080
-------------+----------------------------------   Adj R-squared   =    0.0079
       Total |  3853.06869    10,251   .37587247   Root MSE        =    .61065

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1888827   .0207654    -9.10   0.000     -.229587   -.1481785
       _cons |   .0960984   .0142079     6.76   0.000     .0682482    .1239486
-------------------------------------------------------------------------------------------------------
-> zone = 6. SOUTH WEST

      Source |       SS           df       MS      Number of obs   =     8,878
-------------+----------------------------------   F(1, 8876)      =     72.65
       Model |  10.3343231         1  10.3343231   Prob > F        =    0.0000
    Residual |  1262.55048     8,876  .142243182   R-squared       =    0.0081
-------------+----------------------------------   Adj R-squared   =    0.0080
       Total |  1272.88481     8,877  .143391327   Root MSE        =    .37715

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
       rank |    -.11909   .0139717    -8.52   0.000    -.1464778   -.0917022
      _cons |   .0508069   .0082552     6.15   0.000     .0346248     .066989
------------------------------------------------------------------------------
. dominance eqoop [aw= wt], sortvar( exp_p ) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve

Variable   Sort vbl.    Sign. level    # points      Rule
-------------------------------------------------------------

eqoop      exp_p           5%           19          mca

   Concentration curve dominates

Test of dominance between concentration curve and 45 degree line

Variable   Sign. level    # points    Rule
---------------------------------------------

eqoop         5%           19        mca

   45 degree dominates

cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
-------------------------------------------------------

q20          2.0811%       0.0207       0.0000
q40          8.5200%       0.0635       0.0000
q60         20.8145%       0.1242       0.0000
q80         42.8216%       0.2087       0.0000
-------------------------------------------------------

cumulative shares of eqoop

Quantile   cum. share     std. error   Diff. from    Diff. from
                                   pop. share    income share

                                   p-value       p-value
-----------------------------------------------------------------

q20          4.9042%       0.1090       0.0000        0.0000
q40         15.0772%       0.2217       0.0000        0.0000
q60         29.1045%       0.3963       0.0000        0.0000
q80         49.1473%       0.6378       0.0000        0.0000
-----------------------------------------------------------------
end of do-file

. log close
      name:  <unnamed>
```

log: C:\Users\chukwuedosusan\Desktop\phd analysis\New equivalent scale result no weights\OOP RESULT
> 2015.log
log type: text
closed on: 29 May 2018, 11:56:41

OOPINSURANCE Result 2010

```
------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\OOPINSURANCE
corrected 2010.log
  log type:  text
 opened on:  13 Jun 2018, 18:06:22

. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data
OOPinsurance 2010.dta"
(Nigeria GHS-Panel Wave 1 PH HH Section 1 - Roster)

. xtile quintile=prepay_exp, nq(5)

. egen exp_p=pc(eqprepay_exp)

. gen exp_cp=sum(exp_p)

. egen OOPinsurance_p=pc(eqOOPinsurance)

. gen OOPinsurance_cp=sum(OOPinsurance_p)

. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created

. label variable lorenz "Lorenz curve"

. label variable rank "Cum. Prop. Hholds."

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank

      Source |       SS           df       MS      Number of obs   =       176
-------------+----------------------------------   F(1, 174)       =    520.59
```

```
      Model |  3.25507308     1  3.25507308   Prob > F      =  0.0000
   Residual |  1.08795832   174  .006252634   R-squared     =  0.7495
-------------+------------------------------   Adj R-squared =  0.7481
      Total |   4.3430314   175  .024817322   Root MSE      =  .07907

------------------------------------------------------------------------------
    npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .4711093   .0206478    22.82   0.000      .430357    .5118616
      _cons |  -.0692794   .0119718    -5.79   0.000     -.092908   -.0456508
------------------------------------------------------------------------------
. bysort zone: regr npreexp rank
------------------------------------------------------------------------------------------------
-> zone = north ce

     Source |       SS       df       MS      Number of obs =      27
-------------+------------------------------   F(1, 25)      =  127.13
      Model |  .216556326     1  .216556326   Prob > F      =  0.0000
   Residual |  .042586452    25  .001703458   R-squared     =  0.8357
-------------+------------------------------   Adj R-squared =  0.8291
      Total |  .259142778    26   .00996703   Root MSE      =  .04127

------------------------------------------------------------------------------
    npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .3665779   .0325122    11.28   0.000     .2996177    .4335381
      _cons |  -.0264328   .0132606    -1.99   0.057    -.0537434    .0008779
------------------------------------------------------------------------------

-> zone = north ea

     Source |       SS       df       MS      Number of obs =      50
-------------+------------------------------   F(1, 48)      =  451.78
      Model |     1.14819     1     1.14819   Prob > F      =  0.0000
   Residual |  .121990477    48  .002541468   R-squared     =  0.9040
-------------+------------------------------   Adj R-squared =  0.9020
      Total |  1.27018048    49  .025922051   Root MSE      =  .05041

------------------------------------------------------------------------------
    npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .4806852    .022615    21.26   0.000     .4352147    .5261556
      _cons |  -.0538368   .0117207    -4.59   0.000    -.0774029   -.0302708
------------------------------------------------------------------------------------------------
-> zone = north we

     Source |       SS       df       MS      Number of obs =       3
-------------+------------------------------   F(1, 1)       =   14.79
      Model |  .013343635     1  .013343635   Prob > F      =  0.1620
   Residual |  .000902438     1  .000902438   R-squared     =  0.9367
```

```
-------------+------------------------------   Adj R-squared  =   0.8733
       Total |  .014246073     2  .007123037   Root MSE       =   .03004

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3064022   .0796826     3.85   0.162    -.7060612    1.318866
       _cons |   -.014968   .0416613    -0.36   0.780    -.5443248    .5143889
------------------------------------------------------------------------------------------------------
-> zone = south ea

      Source |       SS       df       MS      Number of obs  =       30
-------------+------------------------------   F(1, 28)       =    57.86
       Model |  1.20344375     1  1.20344375   Prob > F       =   0.0000
    Residual |  .582401963    28   .02080007   R-squared      =   0.6739
-------------+------------------------------   Adj R-squared  =   0.6622
       Total |  1.78584571    29  .061580887   Root MSE       =   .14422

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .627237   .0824615     7.61   0.000     .4583223    .7961517
       _cons |  -.1095457   .0492114    -2.23   0.034    -.2103506   -.0087407
------------------------------------------------------------------------------------------------------
-> zone = south so

      Source |       SS       df       MS      Number of obs  =       45
-------------+------------------------------   F(1, 43)       =   274.26
       Model |  .424183338     1  .424183338   Prob > F       =   0.0000
    Residual |  .066506249    43  .001546657   R-squared      =   0.8645
-------------+------------------------------   Adj R-squared  =   0.8613
       Total |  .490689587    44  .011152036   Root MSE       =   .03933

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5173957   .0312423    16.56   0.000     .4543896    .5804018
       _cons |  -.1312844   .0213605    -6.15   0.000     -.174362   -.0882069
------------------------------------------------------------------------------------------------------
-> zone = south we

      Source |       SS       df       MS      Number of obs  =       21
-------------+------------------------------   F(1, 19)       =   151.11
       Model |  .191498788     1  .191498788   Prob > F       =   0.0000
    Residual |   .02407787    19  .001267256   R-squared      =   0.8883
-------------+------------------------------   Adj R-squared  =   0.8824
       Total |  .215576658    20  .010778833   Root MSE       =    .0356

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
        rank |   .5281717   .0429659    12.29   0.000      .438243    .6181005
       _cons |  -.1457239   .0276645    -5.27   0.000    -.2036264   -.0878214
------------------------------------------------------------------------------
. glcurve eqOOPinsurance, sortvar( exp_p) glvar(ccurve_OOPinsurance) lorenz nograph
new variable ccurve_OOPinsurance created

. label variable ccurve_OOPinsurance "OOPINSURANCE payments"

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance=r(mean)

. gen nOOPinsurance= 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance)

. regr nOOPinsurance rank

      Source |       SS       df       MS              Number of obs =     176
-------------+------------------------------           F(1, 174)     =   17.60
       Model |  1.4177247     1  1.4177247             Prob > F      =  0.0000
    Residual |  14.0141046   174  .080540831           R-squared     =  0.0919
-------------+------------------------------           Adj R-squared =  0.0867
       Total |  15.4318293   175  .088181882           Root MSE      =   .2838

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3109118   .0741053     4.20   0.000     .1646508    .4571729
       _cons |   .0112744    .042967     0.26   0.793    -.0735292     .096078
------------------------------------------------------------------------------
. bysort zone: regr nOOPinsurance rank

------------------------------------------------------------------------------------------------
-> zone = north ce

      Source |       SS       df       MS              Number of obs =      27
-------------+------------------------------           F(1, 25)      =    0.00
       Model |  7.2833e-06     1  7.2833e-06           Prob > F      =  0.9916
    Residual |   1.6191074    25  .064764296           R-squared     =  0.0000
-------------+------------------------------           Adj R-squared = -0.0400
       Total |  1.61911469    26  .062273642           Root MSE      =  .25449

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0021259   .2004697     0.01   0.992    -.4107491    .4150009
```

```
       _cons |   .2303265   .0817645     2.82   0.009     .0619294    .3987235
------------------------------------------------------------------------------
-> zone = north ea

      Source |       SS       df       MS              Number of obs =      50
-------------+------------------------------           F(  1,    48) =   69.94
       Model |  4.85238126     1  4.85238126           Prob > F      =  0.0000
    Residual |  3.33037589    48  .069382831           R-squared     =  0.5930
-------------+------------------------------           Adj R-squared =  0.5845
       Total |  8.18275716    49  .166995044           Root MSE      =  .26341

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .9881692   .1181626     8.36   0.000     .7505875    1.225751
       _cons |  -.1504575   .0612403    -2.46   0.018    -.2735893   -.0273256
------------------------------------------------------------------------------
-> zone = north we

      Source |       SS       df       MS              Number of obs =       3
-------------+------------------------------           F(  1,     1) =    0.99
       Model |  .036380614     1  .036380614           Prob > F      =  0.5021
    Residual |   .03685307     1   .03685307           R-squared     =  0.4968
-------------+------------------------------           Adj R-squared = -0.0065
       Total |  .073233684     2  .036616842           Root MSE      =  .19197

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5059292   .5092038     0.99   0.502    -5.964118    6.975976
       _cons |  -.1258612   .2662323    -0.47   0.719    -3.508664    3.256941
------------------------------------------------------------------------------
-> zone = south ea

      Source |       SS       df       MS              Number of obs =      30
-------------+------------------------------           F(  1,    28) =    1.96
       Model |  .088858165     1  .088858165           Prob > F      =  0.1729
    Residual |  1.27165646    28  .045416302           R-squared     =  0.0653
-------------+------------------------------           Adj R-squared =  0.0319
       Total |  1.36051463    29  .046914297           Root MSE      =  .21311

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .1704384   .1218498     1.40   0.173    -.0791595    .4200363
       _cons |   .0234326   .0727175     0.32   0.750    -.1255225    .1723877
------------------------------------------------------------------------------
-> zone = south so

      Source |       SS       df       MS              Number of obs =      45
```

```
-------------+------------------------------   F(1, 43)       =     0.39
       Model |   .0256215        1   .0256215   Prob > F       =   0.5333
    Residual |  2.79304784       43  .064954601   R-squared      =   0.0091
-------------+------------------------------   Adj R-squared  =  -0.0140
       Total |  2.81866934       44  .064060667   Root MSE       =   .25486

------------------------------------------------------------------------------
  nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .1271594   .2024655     0.63   0.533    -.2811512    .5354699
       _cons |   .0284095   .1384266     0.21   0.838    -.2507544    .3075734
------------------------------------------------------------------------------------------------------
-> zone = south we

      Source |       SS       df       MS              Number of obs =      21
-------------+------------------------------           F(1, 19)      =    1.20
       Model |  .028868092     1  .028868092           Prob > F      =  0.2876
    Residual |  .458176869    19  .024114572           R-squared     =  0.0593
-------------+------------------------------           Adj R-squared =  0.0098
       Total |  .487044961    20  .024352248           Root MSE      =  .15529

------------------------------------------------------------------------------
  nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .2050695   .1874269     1.09   0.288    -.1872195    .5973585
       _cons |  -.0412401   .1206787    -0.34   0.736    -.2938236    .2113434
------------------------------------------------------------------------------

. *** for kakwani regression OOPinsurance ***
.
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance = r(mean)

. qui sum exp_p

. sca m_exp = r(mean)

. gen k_OOPinsurance = 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance - exp_p
/m_exp)

. reg k_OOPinsurance rank

      Source |       SS       df       MS              Number of obs =     176
-------------+------------------------------           F(1, 174)     =    4.54
       Model |  .376381834     1  .376381834           Prob > F      =  0.0344
```

```
   Residual |  14.4097768       174  .082814809   R-squared      =   0.0255
-------------+----------------------------------  Adj R-squared  =   0.0199
      Total |  14.7861586       175  .084492335   Root MSE       =   .28778

------------------------------------------------------------------------------
 k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.1601975   .0751442    -2.13   0.034    -.3085089   -.0118861
      _cons |   .0805538   .0435693     1.85   0.066    -.0054386    .1665463
------------------------------------------------------------------------------


.
. bysort zone: reg k_OOPinsurance rank

-----------------------------------------------------------------------------------------------------------
-> zone = north ce

     Source |       SS           df       MS      Number of obs   =        27
-------------+----------------------------------  F(1, 25)        =      3.03
      Model |  .214051836         1  .214051836   Prob > F        =    0.0941
   Residual |  1.76645239        25  .070658096   R-squared       =    0.1081
-------------+----------------------------------  Adj R-squared   =    0.0724
      Total |  1.98050423        26   .07617324   Root MSE        =    .26582

------------------------------------------------------------------------------
 k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   -.364452   .2093928    -1.74   0.094    -.7957046    .0668006
      _cons |   .2567592   .0854039     3.01   0.006     .0808666    .4326518
------------------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------------
-> zone = north ea

     Source |       SS           df       MS      Number of obs   =        50
-------------+----------------------------------  F(1, 48)        =     20.31
      Model |  1.27978505         1  1.27978505   Prob > F        =    0.0000
   Residual |  3.02528043        48  .063026676   R-squared       =    0.2973
-------------+----------------------------------  Adj R-squared   =    0.2826
      Total |  4.30506548        49  .087858479   Root MSE        =    .25105

------------------------------------------------------------------------------
 k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |    .507484   .1126201     4.51   0.000     .2810461     .733922
      _cons |  -.0966206   .0583678    -1.66   0.104     -.213977    .0207357
-----------------------------------------------------------------------------------------------------------
-> zone = north we

     Source |       SS           df       MS      Number of obs   =         3
```

```
-------------+------------------------------   F(1, 1)       =     0.22
       Model |  .005658405         1  .005658405   Prob > F      =   0.7232
    Residual |  .026221622         1  .026221622   R-squared     =   0.1775
-------------+------------------------------   Adj R-squared =  -0.6450
       Total |  .031880027         2  .015940014   Root MSE      =   .16193

------------------------------------------------------------------------------
   k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .199527   .4295211     0.46   0.723    -5.258057    5.657111
       _cons |  -.1108932    .224571    -0.49   0.708    -2.964339    2.742552
------------------------------------------------------------------------------------------------
-> zone = south ea

      Source |       SS       df       MS              Number of obs =      30
-------------+------------------------------   F(1, 28)      =     7.91
       Model |  .638281104         1  .638281104   Prob > F      =   0.0089
    Residual |  2.25876987        28  .080670352   R-squared     =   0.2203
-------------+------------------------------   Adj R-squared =   0.1925
       Total |  2.89705097        29  .099898309   Root MSE      =   .28403

------------------------------------------------------------------------------
   k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.4567986   .1623962    -2.81   0.009    -.7894521   -.1241452
       _cons |   .1329782   .0969148     1.37   0.181    -.0655428    .3314992
------------------------------------------------------------------------------------------------
-> zone = south so

      Source |       SS       df       MS              Number of obs =      45
-------------+------------------------------   F(1, 43)      =     3.87
       Model |  .241303402         1  .241303402   Prob > F      =   0.0557
    Residual |  2.68313089        43  .062398393   R-squared     =   0.0825
-------------+------------------------------   Adj R-squared =   0.0612
       Total |   2.9244343        44  .066464416   Root MSE      =    .2498

------------------------------------------------------------------------------
   k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.3902364   .1984416    -1.97   0.056     -.790432    .0099593
       _cons |    .159694   .1356755     1.18   0.246    -.1139217    .4333096
------------------------------------------------------------------------------------------------
-> zone = south we

      Source |       SS       df       MS              Number of obs =      21
-------------+------------------------------   F(1, 19)      =     2.53
       Model |  .071663083         1  .071663083   Prob > F      =   0.1279
    Residual |  .537191569        19   .02827324   R-squared     =   0.1177
-------------+------------------------------   Adj R-squared =   0.0713
       Total |  .608854651        20  .030442733   Root MSE      =   .16815
```

```
------------------------------------------------------------------------------
  k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.3231022   .2029457    -1.59   0.128    -.7478725    .1016681
       _cons |   .1044838   .1306709     0.80   0.434    -.1690134    .3779811
------------------------------------------------------------------------------

. dominance eqOOPinsurance [aw=wt], sortvar( exp_p) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve

Variable   Sort vbl.    Sign. level    # points      Rule
------------------------------------------------------------

eqOOPinsurance     exp_p           5%          19         mca

   Concentration curve dominates


Test of dominance between concentration curve and 45 degree line

Variable   Sign. level    # points    Rule
---------------------------------------------

eqOOPinsurance         5%          19        mca

   45 degree dominates


cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
-------------------------------------------------------

q20         3.9478%       0.3541       0.0000
q40        13.1941%       1.0252       0.0000
q60        28.4544%       1.5829       0.0000
q80        54.2284%       2.0106       0.0000
-------------------------------------------------------

cumulative shares of eqOOPinsurance

Quantile   cum. share     std. error   Diff. from    Diff. from
                                       pop. share    income share

                                       p-value       p-value
-----------------------------------------------------------------

q20        11.2114%       3.1363       0.0056        0.0209
q40        25.8617%       4.9312       0.0047        0.0107
```

```
q60       59.3765%     5.9234     0.9163     0.0000
q80       73.5876%     5.9869     0.2856     0.0020
-----------------------------------------------------------------

.
end of do-file

. clear

. log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\OOPINSURANCE corrected 2010.log
  log type:  text
 closed on:  13 Jun 2018, 18:16:20
```

OOPINSURANCE Result 2012

```
------------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\OOPINSURANCE corrected 2012.log
  log type:  text
 opened on:  13 Jun 2018, 18:17:30

. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data OOPinsurance 2012.dta"
(Nigeria GHS-Panel Wave 2 PH HH Section 1 - Roster)

. xtile quintile=prepay_exp, nq(5)

. egen exp_p=pc(eqprepay_exp)

. gen exp_cp=sum(exp_p)

. egen OOPinsurance_p=pc(eqOOPinsurance)

. gen OOPinsurance_cp=sum(OOPinsurance_p)

. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created

. label variable lorenz "Lorenz curve"

. label variable rank "Cum. Prop. Hholds."

. qui sum rank

. sca var_rank=r(Var)
```

```
. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank

      Source |       SS       df       MS              Number of obs =     344
-------------+------------------------------           F(1, 342)     =  178.81
       Model |  9.37119374     1  9.37119374           Prob > F      =  0.0000
    Residual |  17.9235332   342  .052407992           R-squared     =  0.3433
-------------+------------------------------           Adj R-squared =  0.3414
       Total |   27.294727   343  .079576463           Root MSE      =  .22893

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .571756   .0427575    13.37   0.000     .4876552    .6558567
       _cons |  -.1195579   .0247399    -4.83   0.000    -.1682193   -.0708964
------------------------------------------------------------------------------
. bysort zone: regr npreexp rank
-----------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      42
-------------+------------------------------           F(1, 40)      =   64.66
       Model |  1.09768249     1  1.09768249           Prob > F      =  0.0000
    Residual |  .679081663    40  .016977042           R-squared     =  0.6178
-------------+------------------------------           Adj R-squared =  0.6082
       Total |  1.77676415    41  .043335711           Root MSE      =   .1303

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .6107504    .075955     8.04   0.000     .4572396    .7642612
       _cons |  -.1381447   .0412344    -3.35   0.002    -.2214825   -.0548069
-----------------------------------------------------------------------------------------------
-> zone = NORTH EAST

      Source |       SS       df       MS              Number of obs =      94
-------------+------------------------------           F(1, 92)      =  592.34
       Model |  .649051139     1  .649051139           Prob > F      =  0.0000
    Residual |  .100808727    92  .001095747           R-squared     =  0.8656
-------------+------------------------------           Adj R-squared =  0.8641
       Total |  .749859866    93  .008063009           Root MSE      =   .0331

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
        rank |   .3142013   .0129099    24.34   0.000      .288561    .3398415
       _cons |   -.033051   .0064369    -5.13   0.000    -.0458354   -.0202667
------------------------------------------------------------------------------------------------------
-> zone = NORTH WEST

      Source |       SS       df       MS              Number of obs =      10
-------------+------------------------------           F(1, 8)       =  227.23
       Model |  .075583451     1  .075583451           Prob > F      =  0.0000
    Residual |  .002661048     8  .000332631           R-squared     =  0.9660
-------------+------------------------------           Adj R-squared =  0.9617
       Total |  .078244499     9  .008693833           Root MSE      =  .01824

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .2879604    .019103    15.07   0.000     .2439089    .3320119
       _cons |  -.0202458   .0098324    -2.06   0.073    -.0429194    .0024278
------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS       df       MS              Number of obs =      54
-------------+------------------------------           F(1, 52)      =   57.66
       Model |    3.080061     1    3.080061           Prob > F      =  0.0000
    Residual |  2.77783649    52  .053419933           R-squared     =  0.5258
-------------+------------------------------           Adj R-squared =  0.5167
       Total |   5.8578975    53  .110526368           Root MSE      =  .23113

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .7960591   .1048377     7.59   0.000      .585687    1.006431
       _cons |  -.1524955   .0528204    -2.89   0.006    -.2584874   -.0465036
------------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS       df       MS              Number of obs =     113
-------------+------------------------------           F(1, 111)     =   38.29
       Model |  4.46067568     1  4.46067568           Prob > F      =  0.0000
    Residual |  12.9301322   111  .116487678           R-squared     =  0.2565
-------------+------------------------------           Adj R-squared =  0.2498
       Total |  17.3908079   112  .155275071           Root MSE      =   .3413

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .7057018    .114041     6.19   0.000      .479722    .9316815
       _cons |  -.1874516     .07333    -2.56   0.012    -.3327598   -.0421434
------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST
```

```
      Source |       SS       df       MS              Number of obs =      31
-------------+------------------------------           F(1, 29)      =   77.56
       Model |  .409959558     1  .409959558           Prob > F      =  0.0000
    Residual |  .153293155    29  .005285971           R-squared     =  0.7278
-------------+------------------------------           Adj R-squared =  0.7185
       Total |  .563252713    30  .01877509            Root MSE      =   .0727

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5376868    .061055     8.81   0.000     .4128153    .6625583
       _cons |  -.1574105   .0443287    -3.55   0.001    -.2480729   -.0667481
------------------------------------------------------------------------------

. glcurve eqOOPinsurance, sortvar( exp_p) glvar(ccurve_OOPinsurance) lorenz nograph
new variable ccurve_OOPinsurance created

. label variable ccurve_OOPinsurance "OOPINSURANCE payments"

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance=r(mean)

. gen nOOPinsurance= 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance)

. regr nOOPinsurance rank

      Source |       SS       df       MS              Number of obs =     344
-------------+------------------------------           F(1, 342)     =   34.04
       Model |  8.18923512     1  8.18923512           Prob > F      =  0.0000
    Residual |  82.2786462   342  .240580837           R-squared     =  0.0905
-------------+------------------------------           Adj R-squared =  0.0879
       Total |  90.4678813   343  .263754756           Root MSE      =  .49049

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5344842   .0916102     5.83   0.000     .3542939    .7146746
       _cons |  -.1008678   .0530065    -1.90   0.058    -.2051275    .0033919
------------------------------------------------------------------------------
. bysort zone: regr nOOPinsurance rank
-----------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      42
```

```
-------------+------------------------------   F(1, 40)      =    11.26
       Model |  6.34366569         1  6.34366569   Prob > F      =   0.0017
    Residual |  22.5408913        40  .563522284   R-squared     =   0.2196
-------------+------------------------------   Adj R-squared  =   0.2001
       Total |   28.884557        41  .704501391   Root MSE      =   .75068

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   1.468235   .4376037     3.36   0.002     .5838049    2.352665
       _cons |  -.3293952   .2375659    -1.39   0.173    -.8095338    .1507433
-------------------------------------------------------------------------------------------------------
-> zone = NORTH EAST

      Source |       SS           df       MS      Number of obs   =        94
-------------+------------------------------   F(1, 92)      =     4.70
       Model |  .015931879         1  .015931879   Prob > F      =   0.0327
    Residual |  .311678806        92  .003387813   R-squared     =   0.0486
-------------+------------------------------   Adj R-squared  =   0.0383
       Total |  .327610685        93  .003522696   Root MSE      =    .0582

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0492268   .0227001     2.17   0.033     .0041424    .0943112
       _cons |   .0021815   .0113184     0.19   0.848    -.0202977    .0246608
-------------------------------------------------------------------------------------------------------
-> zone = NORTH WEST

      Source |       SS           df       MS      Number of obs   =        10
-------------+------------------------------   F(1, 8)       =     0.00
       Model |  2.2774e-06         1  2.2774e-06   Prob > F      =   0.9935
    Residual |  .259824609         8  .032478076   R-squared     =   0.0000
-------------+------------------------------   Adj R-squared  =  -0.1250
       Total |  .259826886         9  .028869654   Root MSE      =   .18022

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0015807    .188762    -0.01   0.994    -.4368666    .4337052
       _cons |   .1475089   .0971572     1.52   0.167    -.0765359    .3715538
-------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS           df       MS      Number of obs   =        54
-------------+------------------------------   F(1, 52)      =    10.14
       Model |  3.72053555         1  3.72053555   Prob > F      =   0.0024
    Residual |   19.076268        52  .366851307   R-squared     =   0.1632
-------------+------------------------------   Adj R-squared  =   0.1471
       Total |  22.7968035        53  .430128368   Root MSE      =   .60568
```

```
------------------------------------------------------------------------------
      nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .8749201   .2747329     3.18   0.002     .3236282    1.426212
       _cons |  -.1788614   .1384188    -1.29   0.202    -.4566191    .0988963
-----------------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS          df       MS      Number of obs   =       113
-------------+----------------------------------   F(1, 111)       =     10.41
       Model |   2.8446608         1   2.8446608   Prob > F        =    0.0016
    Residual |  30.3353219       111  .273291188   R-squared       =    0.0857
-------------+----------------------------------   Adj R-squared   =    0.0775
       Total |  33.1799827       112  .296249845   Root MSE        =    .52277

------------------------------------------------------------------------------
      nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5635548   .1746762     3.23   0.002     .2174222    .9096873
       _cons |  -.1409417   .1123193    -1.25   0.212    -.3635098    .0816264
-----------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS          df       MS      Number of obs   =        31
-------------+----------------------------------   F(1, 29)        =      0.45
       Model |  .016406717         1  .016406717   Prob > F        =    0.5077
    Residual |  1.05752244        29  .036466291   R-squared       =    0.0153
-------------+----------------------------------   Adj R-squared   =   -0.0187
       Total |  1.07392916        30  .035797639   Root MSE        =    .19096

------------------------------------------------------------------------------
      nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1075647   .1603632    -0.67   0.508    -.4355442    .2204149
       _cons |   .3366888    .116431     2.89   0.007     .0985607    .5748169
------------------------------------------------------------------------------

. *** for kakwani regression OOPinsurance ***
.
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance = r(mean)

. qui sum exp_p
```

```
. sca m_exp = r(mean)

. gen k_OOPinsurance = 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance - exp_p
/m_exp)

. reg k_OOPinsurance rank

      Source |       SS       df       MS      Number of obs =     344
-------------+------------------------------   F(1, 342)     =    0.25
       Model |  .039822847     1  .039822847   Prob > F      =  0.6208
    Residual |  55.5530741   342  .162435889   R-squared     =  0.0007
-------------+------------------------------   Adj R-squared = -0.0022
       Total |  55.5928969   343  .162078417   Root MSE      =  .40303

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0372717   .0752756    -0.50   0.621    -.1853332    .1107897
       _cons |     .01869   .0435551     0.43   0.668    -.0669796    .1043597
------------------------------------------------------------------------------
. bysort zone: reg k_OOPinsurance rank
-------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS       df       MS      Number of obs =      42
-------------+------------------------------   F(1, 40)      =    4.84
       Model |  2.16372324     1  2.16372324   Prob > F      =  0.0336
    Residual |  17.8794483    40  .446986206   R-squared     =  0.1080
-------------+------------------------------   Adj R-squared =  0.0857
       Total |  20.0431715    41  .488857842   Root MSE      =  .66857

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .8574845   .3897377     2.20   0.034     .0697951    1.645174
       _cons |  -.1912505   .2115805    -0.90   0.371    -.6188706    .2363696
-------------------------------------------------------------------------------------------------
-> zone = NORTH EAST

      Source |       SS       df       MS      Number of obs =      94
-------------+------------------------------   F(1, 92)      =  112.24
       Model |  .461605501     1  .461605501   Prob > F      =  0.0000
    Residual |  .378368954    92  .004112706   R-squared     =  0.5495
-------------+------------------------------   Adj R-squared =  0.5447
       Total |  .839974454    93  .009031983   Root MSE      =  .06413

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.2649744   .0250111   -10.59   0.000    -.3146486   -.2153003
```

```
        _cons |   .0352326   .0124706     2.83   0.006     .0104649    .0600003
------------------------------------------------------------------------------
-> zone = NORTH WEST

      Source |       SS       df       MS              Number of obs =      10
-------------+------------------------------           F(  1,     8) =    2.07
       Model |  .076415509     1  .076415509           Prob > F      =  0.1878
    Residual |  .294755688     8  .036844461           R-squared     =  0.2059
-------------+------------------------------           Adj R-squared =  0.1066
       Total |  .371171196     9  .041241244           Root MSE      =  .19195

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   -.289541   .2010506    -1.44   0.188    -.7531647    .1740826
       _cons |   .1677547   .1034822     1.62   0.144    -.0708757    .4063852
------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS       df       MS              Number of obs =      54
-------------+------------------------------           F(  1,    52) =    0.11
       Model |  .030226844     1  .030226844           Prob > F      =  0.7443
    Residual |  14.6125221    52   .28101004           R-squared     =  0.0021
-------------+------------------------------           Adj R-squared = -0.0171
       Total |  14.6427489    53  .276278282           Root MSE      =   .5301

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .078861    .240451     0.33   0.744    -.4036393    .5613612
       _cons |  -.0263659   .1211465    -0.22   0.829    -.2694642    .2167324
------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS       df       MS              Number of obs =     113
-------------+------------------------------           F(  1,   111) =    1.36
       Model |  .180981279     1  .180981279           Prob > F      =  0.2459
    Residual |  14.7620432   111   .13299138           R-squared     =  0.0121
-------------+------------------------------           Adj R-squared =  0.0032
       Total |  14.9430245   112  .133419862           Root MSE      =  .36468

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   -.142147    .121852    -1.17   0.246    -.3836048    .0993108
       _cons |   .0465099   .0783526     0.59   0.554    -.1087509    .2017707
------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS       df       MS              Number of obs =      31
```

```
-------------+------------------------------   F(1, 29)       =     11.98
       Model |  .590391815         1  .590391815   Prob > F        =    0.0017
    Residual |  1.42949387        29  .049292892   R-squared       =    0.2923
-------------+------------------------------   Adj R-squared   =    0.2679
       Total |  2.01988569        30  .067329523   Root MSE        =    .22202

------------------------------------------------------------------------------
 k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.6452515   .1864451    -3.46   0.002    -1.026575   -.2639284
       _cons |   .4940993   .1353677     3.65   0.001     .2172414    .7709573
------------------------------------------------------------------------------

. dominance eqOOPinsurance [aw=wt], sortvar( exp_p) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve

Variable   Sort vbl.    Sign. level    # points      Rule
-----------------------------------------------------------

eqOOPinsurance     exp_p           5%          19          mca

   non-dominance

Test of dominance between concentration curve and 45 degree line

Variable   Sign. level    # points    Rule
--------------------------------------------

eqOOPinsurance         5%          19        mca

   45 degree dominates


cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
-----------------------------------------------------

q20          2.2140%       0.3023       0.0000
q40          9.4886%       0.9489       0.0000
q60         22.4586%       1.8612       0.0000
q80         42.1444%       3.0473       0.0000
-----------------------------------------------------

cumulative shares of eqOOPinsurance

Quantile   cum. share     std. error    Diff. from     Diff. from
                                        pop. share     income share

                                        p-value        p-value
```

```
-----------------------------------------------------------------

q20        5.0324%      0.9620      0.0000      0.0011
q40       17.7866%      2.7488      0.0000      0.0008
q60       32.1394%      4.5258      0.0000      0.0120
q80       46.0663%      6.1568      0.0000      0.4237
-----------------------------------------------------------------

.
end of do-file

. do "C:\Users\CHUKWU~1\AppData\Local\Temp\STD0c000000.tmp"

. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data OOPinsurance 2012.dta"
. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data OOPinsurance 2012.dta"
(Nigeria GHS-Panel Wave 2 PH HH Section 1 - Roster)

. xtile quintile=prepay_exp, nq(5)

. egen exp_p=pc(eqprepay_exp)

. gen exp_cp=sum(exp_p)

. egen OOPinsurance_p=pc(eqOOPinsurance)

. gen OOPinsurance_cp=sum(OOPinsurance_p)

.
. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created

. label variable lorenz "Lorenz curve"

. label variable rank "Cum. Prop. Hholds."

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank
```

```
      Source |       SS       df       MS              Number of obs =     344
-------------+------------------------------           F(1, 342)     =  178.81
       Model |  9.37119374     1  9.37119374           Prob > F      =  0.0000
    Residual |  17.9235332   342  .052407992           R-squared     =  0.3433
-------------+------------------------------           Adj R-squared =  0.3414
       Total |   27.294727   343  .079576463           Root MSE      =  .22893

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .571756   .0427575    13.37   0.000     .4876552    .6558567
       _cons |  -.1195579   .0247399    -4.83   0.000    -.1682193   -.0708964
------------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      42
-------------+------------------------------           F(1, 40)      =   64.66
       Model |  1.09768249     1  1.09768249           Prob > F      =  0.0000
    Residual |  .679081663    40  .016977042           R-squared     =  0.6178
-------------+------------------------------           Adj R-squared =  0.6082
       Total |  1.77676415    41  .043335711           Root MSE      =   .1303

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .6107504    .075955     8.04   0.000     .4572396    .7642612
       _cons |  -.1381447   .0412344    -3.35   0.002    -.2214825   -.0548069
------------------------------------------------------------------------------------------------------
-> zone = NORTH EAST

      Source |       SS       df       MS              Number of obs =      94
-------------+------------------------------           F(1, 92)      =  592.34
       Model |  .649051139     1  .649051139           Prob > F      =  0.0000
    Residual |  .100808727    92  .001095747           R-squared     =  0.8656
-------------+------------------------------           Adj R-squared =  0.8641
       Total |  .749859866    93  .008063009           Root MSE      =   .0331

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3142013   .0129099    24.34   0.000      .288561    .3398415
       _cons |   -.033051   .0064369    -5.13   0.000    -.0458354   -.0202667
------------------------------------------------------------------------------------------------------
-> zone = NORTH WEST

      Source |       SS       df       MS              Number of obs =      10
-------------+------------------------------           F(1, 8)       =  227.23
       Model |  .075583451     1  .075583451           Prob > F      =  0.0000
    Residual |  .002661048     8  .000332631           R-squared     =  0.9660
-------------+------------------------------           Adj R-squared =  0.9617
```

```
       Total |  .078244499         9  .008693833   Root MSE        =   .01824

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .2879604    .019103    15.07   0.000     .2439089    .3320119
       _cons |  -.0202458   .0098324    -2.06   0.073    -.0429194    .0024278
------------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS           df       MS      Number of obs   =        54
-------------+----------------------------------   F(1, 52)        =     57.66
       Model |    3.080061         1    3.080061   Prob > F        =    0.0000
    Residual |  2.77783649        52  .053419933   R-squared       =    0.5258
-------------+----------------------------------   Adj R-squared   =    0.5167
       Total |   5.8578975        53  .110526368   Root MSE        =    .23113

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .7960591   .1048377     7.59   0.000      .585687    1.006431
       _cons |  -.1524955   .0528204    -2.89   0.006    -.2584874   -.0465036
------------------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =       113
-------------+----------------------------------   F(1, 111)       =     38.29
       Model |  4.46067568         1  4.46067568   Prob > F        =    0.0000
    Residual |  12.9301322       111  .116487678   R-squared       =    0.2565
-------------+----------------------------------   Adj R-squared   =    0.2498
       Total |  17.3908079       112  .155275071   Root MSE        =     .3413

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .7057018    .114041     6.19   0.000      .479722    .9316815
       _cons |  -.1874516     .07333    -2.56   0.012    -.3327598   -.0421434
------------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS           df       MS      Number of obs   =        31
-------------+----------------------------------   F(1, 29)        =     77.56
       Model |  .409959558         1  .409959558   Prob > F        =    0.0000
    Residual |  .153293155        29  .005285971   R-squared       =    0.7278
-------------+----------------------------------   Adj R-squared   =    0.7185
       Total |  .563252713        30   .01877509   Root MSE        =     .0727

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
        rank |   .5376868    .061055     8.81   0.000     .4128153    .6625583
       _cons |  -.1574105   .0443287    -3.55   0.001    -.2480729   -.0667481
------------------------------------------------------------------------------
. glcurve eqOOPinsurance, sortvar( exp_p) glvar(ccurve_OOPinsurance) lorenz nograph
new variable ccurve_OOPinsurance created

. label variable ccurve_OOPinsurance "OOPINSURANCE payments"

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance=r(mean)

. gen nOOPinsurance= 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance)

. regr nOOPinsurance rank

      Source |       SS       df       MS              Number of obs =     344
-------------+------------------------------           F(  1,   342) =   34.04
       Model |  8.18923512     1  8.18923512           Prob > F      =  0.0000
    Residual |  82.2786462   342  .240580837           R-squared     =  0.0905
-------------+------------------------------           Adj R-squared =  0.0879
       Total |  90.4678813   343  .263754756           Root MSE      =  .49049

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5344842   .0916102     5.83   0.000     .3542939    .7146746
       _cons |  -.1008678   .0530065    -1.90   0.058    -.2051275    .0033919
------------------------------------------------------------------------------

. bysort zone: regr nOOPinsurance rank

-------------------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      42
-------------+------------------------------           F(  1,    40) =   11.26
       Model |  6.34366569     1  6.34366569           Prob > F      =  0.0017
    Residual |  22.5408913    40  .563522284           R-squared     =  0.2196
-------------+------------------------------           Adj R-squared =  0.2001
       Total |   28.884557    41  .704501391           Root MSE      =  .75068

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   1.468235   .4376037     3.36   0.002     .5838049    2.352665
```

```
       _cons |  -.3293952   .2375659    -1.39   0.173    -.8095338    .1507433
------------------------------------------------------------------------------
-> zone = NORTH EAST

      Source |       SS       df       MS              Number of obs =      94
-------------+------------------------------           F(  1,    92) =    4.70
       Model |  .015931879     1  .015931879           Prob > F      =  0.0327
    Residual |  .311678806    92  .003387813           R-squared     =  0.0486
-------------+------------------------------           Adj R-squared =  0.0383
       Total |  .327610685    93  .003522696           Root MSE      =   .0582

------------------------------------------------------------------------------
 nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0492268   .0227001     2.17   0.033     .0041424    .0943112
       _cons |   .0021815   .0113184     0.19   0.848    -.0202977    .0246608
------------------------------------------------------------------------------
-> zone = NORTH WEST

      Source |       SS       df       MS              Number of obs =      10
-------------+------------------------------           F(  1,     8) =    0.00
       Model |  2.2774e-06     1  2.2774e-06           Prob > F      =  0.9935
    Residual |  .259824609     8  .032478076           R-squared     =  0.0000
-------------+------------------------------           Adj R-squared = -0.1250
       Total |  .259826886     9  .028869654           Root MSE      =  .18022

------------------------------------------------------------------------------
 nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0015807    .188762    -0.01   0.994    -.4368666    .4337052
       _cons |   .1475089   .0971572     1.52   0.167    -.0765359    .3715538
------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS       df       MS              Number of obs =      54
-------------+------------------------------           F(  1,    52) =   10.14
       Model |  3.72053555     1  3.72053555           Prob > F      =  0.0024
    Residual |   19.076268    52  .366851307           R-squared     =  0.1632
-------------+------------------------------           Adj R-squared =  0.1471
       Total |  22.7968035    53  .430128368           Root MSE      =  .60568

------------------------------------------------------------------------------
 nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .8749201   .2747329     3.18   0.002     .3236282    1.426212
       _cons |  -.1788614   .1384188    -1.29   0.202    -.4566191    .0988963
------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS       df       MS              Number of obs =     113
```

```
-------------+------------------------------   F(1, 111)      =     10.41
       Model |  2.8446608         1  2.8446608   Prob > F       =    0.0016
    Residual |  30.3353219      111  .273291188   R-squared      =    0.0857
-------------+------------------------------   Adj R-squared  =    0.0775
       Total |  33.1799827      112  .296249845   Root MSE       =    .52277

------------------------------------------------------------------------------
  nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5635548   .1746762     3.23   0.002     .2174222    .9096873
       _cons |  -.1409417   .1123193    -1.25   0.212    -.3635098    .0816264
------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS       df       MS              Number of obs =      31
-------------+------------------------------   F(1, 29)       =      0.45
       Model |  .016406717     1  .016406717   Prob > F       =    0.5077
    Residual |  1.05752244    29  .036466291   R-squared      =    0.0153
-------------+------------------------------   Adj R-squared  =   -0.0187
       Total |  1.07392916    30  .035797639   Root MSE       =    .19096

------------------------------------------------------------------------------
  nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.1075647   .1603632    -0.67   0.508    -.4355442    .2204149
       _cons |   .3366888    .116431     2.89   0.007     .0985607    .5748169
------------------------------------------------------------------------------

. *** for kakwani regression OOPinsurance ***
.
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance = r(mean)

. qui sum exp_p

. sca m_exp = r(mean)

. gen k_OOPinsurance = 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance - exp_p
/m_exp)

. reg k_OOPinsurance rank

      Source |       SS       df       MS              Number of obs =     344
-------------+------------------------------   F(1, 342)      =      0.25
       Model |  .039822847     1  .039822847   Prob > F       =    0.6208
```

```
   Residual |  55.5530741       342  .162435889   R-squared      =    0.0007
-------------+----------------------------------   Adj R-squared   =   -0.0022
      Total |  55.5928969       343  .162078417   Root MSE       =    .40303

------------------------------------------------------------------------------
     k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.0372717   .0752756    -0.50   0.621    -.1853332    .1107897
      _cons |     .01869   .0435551     0.43   0.668    -.0669796    .1043597
------------------------------------------------------------------------------
. bysort zone: reg k_OOPinsurance rank
-----------------------------------------------------------------------------------------------
-> zone = NORTH CENTRAL

     Source |       SS          df       MS      Number of obs   =        42
-------------+----------------------------------   F(1, 40)        =      4.84
      Model |  2.16372324         1  2.16372324   Prob > F        =    0.0336
   Residual |  17.8794483        40  .446986206   R-squared       =    0.1080
-------------+----------------------------------   Adj R-squared   =    0.0857
      Total |  20.0431715        41  .488857842   Root MSE        =    .66857

------------------------------------------------------------------------------
     k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |   .8574845   .3897377     2.20   0.034     .0697951    1.645174
      _cons |  -.1912505   .2115805    -0.90   0.371    -.6188706    .2363696
-----------------------------------------------------------------------------------------------
-> zone = NORTH EAST

     Source |       SS          df       MS      Number of obs   =        94
-------------+----------------------------------   F(1, 92)        =    112.24
      Model |  .461605501         1  .461605501   Prob > F        =    0.0000
   Residual |  .378368954        92  .004112706   R-squared       =    0.5495
-------------+----------------------------------   Adj R-squared   =    0.5447
      Total |  .839974454        93  .009031983   Root MSE        =    .06413

------------------------------------------------------------------------------
     k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.2649744   .0250111   -10.59   0.000    -.3146486   -.2153003
      _cons |   .0352326   .0124706     2.83   0.006     .0104649    .0600003
-----------------------------------------------------------------------------------------------
-> zone = NORTH WEST

     Source |       SS          df       MS      Number of obs   =        10
-------------+----------------------------------   F(1, 8)         =      2.07
      Model |  .076415509         1  .076415509   Prob > F        =    0.1878
   Residual |  .294755688         8  .036844461   R-squared       =    0.2059
-------------+----------------------------------   Adj R-squared   =    0.1066
      Total |  .371171196         9  .041241244   Root MSE        =    .19195
```

```
------------------------------------------------------------------------------
  k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   -.289541   .2010506    -1.44   0.188    -.7531647    .1740826
       _cons |   .1677547   .1034822     1.62   0.144    -.0708757    .4063852
------------------------------------------------------------------------------------------------------------
-> zone = SOUTH EAST

      Source |       SS       df       MS              Number of obs =      54
-------------+------------------------------           F(1, 52)      =    0.11
       Model |  .030226844     1  .030226844           Prob > F      =  0.7443
    Residual |  14.6125221    52   .28101004           R-squared     =  0.0021
-------------+------------------------------           Adj R-squared = -0.0171
       Total |  14.6427489    53  .276278282           Root MSE      =   .5301

------------------------------------------------------------------------------
  k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |    .078861    .240451     0.33   0.744    -.4036393    .5613612
       _cons |  -.0263659   .1211465    -0.22   0.829    -.2694642    .2167324
------------------------------------------------------------------------------------------------------------
-> zone = SOUTH SOUTH

      Source |       SS       df       MS              Number of obs =     113
-------------+------------------------------           F(1, 111)     =    1.36
       Model |  .180981279     1  .180981279           Prob > F      =  0.2459
    Residual |  14.7620432   111   .13299138           R-squared     =  0.0121
-------------+------------------------------           Adj R-squared =  0.0032
       Total |  14.9430245   112  .133419862           Root MSE      =  .36468

------------------------------------------------------------------------------
  k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   -.142147    .121852    -1.17   0.246    -.3836048    .0993108
       _cons |   .0465099   .0783526     0.59   0.554    -.1087509    .2017707
------------------------------------------------------------------------------------------------------------
-> zone = SOUTH WEST

      Source |       SS       df       MS              Number of obs =      31
-------------+------------------------------           F(1, 29)      =   11.98
       Model |  .590391815     1  .590391815           Prob > F      =  0.0017
    Residual |  1.42949387    29  .049292892           R-squared     =  0.2923
-------------+------------------------------           Adj R-squared =  0.2679
       Total |  2.01988569    30  .067329523           Root MSE      =  .22202

------------------------------------------------------------------------------
  k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.6452515   .1864451    -3.46   0.002    -1.026575   -.2639284
```

```
       _cons |   .4940993   .1353677     3.65   0.001     .2172414    .7709573
------------------------------------------------------------------------------
. dominance eqOOPinsurance [aw=wt], sortvar( exp_p) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve

Variable   Sort vbl.    Sign. level    # points      Rule
----------------------------------------------------------

eqOOPinsurance     exp_p           5%          19         mca

    non-dominance


Test of dominance between concentration curve and 45 degree line

Variable   Sign. level    # points    Rule
-------------------------------------------

eqOOPinsurance         5%          19       mca

    45 degree dominates


cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
-----------------------------------------------------

q20          2.2140%       0.3023       0.0000
q40          9.4886%       0.9489       0.0000
q60         22.4586%        1.8612       0.0000
q80         42.1444%        3.0473       0.0000
-----------------------------------------------------

cumulative shares of eqOOPinsurance

Quantile   cum. share     std. error    Diff. from    Diff. from
                                        pop. share    income share

                                        p-value       p-value
--------------------------------------------------------------

q20          5.0324%       0.9620       0.0000       0.0011
q40         17.7866%        2.7488       0.0000        0.0008
q60         32.1394%        4.5258       0.0000        0.0120
q80         46.0663%        6.1568       0.0000        0.4237
--------------------------------------------------------------

.
end of do-file
```

```
. log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\OOPINSURANCE
corrected 2012.log
  log type:  text
 closed on:  13 Jun 2018, 18:23:45
```

OOPINSURANCE Result 2015

```
------------------------------------------------------------------------------------------------------

. use "C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\data in use\equivalent data
OOPinsurance 2015.dta"

. xtile quintile=prepay_exp, nq(5)

. egen exp_p=pc(eqprepay_exp)

. gen exp_cp=sum(exp_p)

. egen OOPinsurance_p=pc(eqOOPinsurance)

. gen OOPinsurance_cp=sum(OOPinsurance_p)

. glcurve eqprepay_exp, glvar(lorenz) pvar(rank) lorenz nograph
new variable lorenz created
new variable rank created

. label variable lorenz "Lorenz curve"

. label variable rank "Cum. Prop. Hholds."

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqprepay_exp

. sca m_eqprepay=r(mean)

. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

. regr npreexp rank

      Source |       SS           df       MS      Number of obs   =       416
-------------+----------------------------------   F(1, 414)       =    365.35
       Model |  9.70365799         1  9.70365799   Prob > F        =    0.0000
    Residual |  10.9956465       414  .026559533   R-squared       =    0.4688
-------------+----------------------------------   Adj R-squared   =    0.4675
       Total |  20.6993045       415  .049877842   Root MSE        =    .16297
```

```
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5290698   .0276793    19.11   0.000     .4746602    .5834793
       _cons |  -.0981035   .0160095    -6.13   0.000    -.1295735   -.0666335
------------------------------------------------------------------------------
. bysort zone: regr npreexp rank
-------------------------------------------------------------------------------------------------------------
-> zone = 1. NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      62
-------------+------------------------------           F(1, 60)      =   72.33
       Model |  .72622247     1  .72622247           Prob > F      =  0.0000
    Residual |  .602414211    60  .010040237           R-squared     =  0.5466
-------------+------------------------------           Adj R-squared =  0.5390
       Total |  1.32863668    61  .021780929           Root MSE      =   .1002

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4213098    .049538     8.50   0.000      .322219    .5204005
       _cons |  -.0583828    .023749    -2.46   0.017    -.1058879   -.0108777
-------------------------------------------------------------------------------------------------------------
-> zone = 2. NORTH EAST

      Source |       SS       df       MS              Number of obs =      58
-------------+------------------------------           F(1, 56)      =   28.73
       Model |  2.40468969     1  2.40468969           Prob > F      =  0.0000
    Residual |  4.68734186    56  .083702533           R-squared     =  0.3391
-------------+------------------------------           Adj R-squared =  0.3273
       Total |  7.09203155    57  .124421606           Root MSE      =  .28931

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .7295863   .1361183     5.36   0.000     .4569086    1.002264
       _cons |  -.1214596   .0622171    -1.95   0.056    -.2460955    .0031762
-------------------------------------------------------------------------------------------------------------
-> zone = 3. NORTH WEST

      Source |       SS       df       MS              Number of obs =      23
-------------+------------------------------           F(1, 21)      =  416.75
       Model |  .098312982     1  .098312982           Prob > F      =  0.0000
    Residual |  .004954001    21  .000235905           R-squared     =  0.9520
-------------+------------------------------           Adj R-squared =  0.9497
       Total |  .103266984    22  .004693954           Root MSE      =  .01536

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
        rank |   .2740757   .0134256    20.41   0.000     .2461557    .3019958
       _cons |  -.0159147   .0068347    -2.33   0.030    -.0301281   -.0017012
------------------------------------------------------------------------------
-> zone = 4. SOUTH EAST

      Source |       SS       df       MS              Number of obs =     123
-------------+------------------------------           F(  1,   121) =  183.44
       Model |  1.21890704     1  1.21890704           Prob > F      =  0.0000
    Residual |  .803997842   121  .00664461            R-squared     =  0.6026
-------------+------------------------------           Adj R-squared =  0.5993
       Total |  2.02290488   122  .016581188           Root MSE      =  .08151

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4102736   .0302917    13.54   0.000     .3503033    .4702439
       _cons |  -.0593964    .014706    -4.04   0.000    -.0885108    -.030282
------------------------------------------------------------------------------
-> zone = 5. SOUTH SOUTH

      Source |       SS       df       MS              Number of obs =      57
-------------+------------------------------           F(  1,    55) =   60.31
       Model |  3.02597258     1  3.02597258           Prob > F      =  0.0000
    Residual |  2.75938699    55  .050170672           R-squared     =  0.5230
-------------+------------------------------           Adj R-squared =  0.5144
       Total |  5.78535957    56  .103309992           Root MSE      =  .22399

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .8468075   .1090378     7.77   0.000     .6282908    1.065324
       _cons |   -.259538   .0842158    -3.08   0.003    -.4283103   -.0907658
------------------------------------------------------------------------------
-> zone = 6. SOUTH WEST

      Source |       SS       df       MS              Number of obs =      93
-------------+------------------------------           F(  1,    91) =  177.41
       Model |  1.11663768     1  1.11663768           Prob > F      =  0.0000
    Residual |  .572751652    91  .006293974           R-squared     =  0.6610
-------------+------------------------------           Adj R-squared =  0.6572
       Total |  1.68938934    92  .018362928           Root MSE      =  .07933

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4231378   .0317679    13.32   0.000     .3600348    .4862407
       _cons |  -.0777553    .021813    -3.56   0.001    -.1210842   -.0344264
------------------------------------------------------------------------------

. glcurve eqOOPinsurance, sortvar( exp_p) glvar(ccurve_OOPinsurance) lorenz nograph
```

```
new variable ccurve_OOPinsurance created

. label variable ccurve_OOPinsurance "OOPINSURANCE payments"

. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance=r(mean)

. gen nOOPinsurance= 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance)

. regr nOOPinsurance rank

      Source |       SS       df       MS              Number of obs =     416
-------------+------------------------------           F(1, 414)     =   30.84
       Model |  4.10981274     1  4.10981274           Prob > F      =  0.0000
    Residual |  55.1734745   414  .133269262           R-squared     =  0.0693
-------------+------------------------------           Adj R-squared =  0.0671
       Total |  59.2832872   415  .142851295           Root MSE      =  .36506

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .3443152   .0620026     5.55   0.000      .222436    .4661945
       _cons |  -.0055041   .0358618    -0.15   0.878     -.075998    .0649897
------------------------------------------------------------------------------
. bysort zone: regr nOOPinsurance rank
-----------------------------------------------------------------------------------------------
-> zone = 1. NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      62
-------------+------------------------------           F(1, 60)      =   15.05
       Model |  7.46637253     1  7.46637253           Prob > F      =  0.0003
    Residual |  29.7689208    60  .49614868            R-squared     =  0.2005
-------------+------------------------------           Adj R-squared =  0.1872
       Total |  37.2352933    61  .610414645           Root MSE      =  .70438

------------------------------------------------------------------------------
nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   1.350895   .3482351     3.88   0.000     .6543207    2.047469
       _cons |   -.219176   .1669473    -1.31   0.194    -.5531203    .1147684
-----------------------------------------------------------------------------------------------
-> zone = 2. NORTH EAST

      Source |       SS       df       MS              Number of obs =      58
-------------+------------------------------           F(1, 56)      =    1.93
```

```
       Model |  .017432547         1  .017432547   Prob > F        =    0.1702
    Residual |  .505608674        56  .009028726   R-squared       =    0.0333
-------------+----------------------------------   Adj R-squared   =    0.0161
       Total |  .523041221        57  .009176162   Root MSE        =    .09502

------------------------------------------------------------------------------
      nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0621194   .0447054     1.39   0.170    -.0274363    .1516752
       _cons |   .0572375    .020434     2.80   0.007     .0163032    .0981717
-----------------------------------------------------------------------------------------------------
-> zone = 3. NORTH WEST

      Source |       SS           df       MS      Number of obs   =        23
-------------+----------------------------------   F(1, 21)        =      4.01
       Model |  .044671234         1  .044671234   Prob > F        =    0.0584
    Residual |  .234146055        21  .011149812   R-squared       =    0.1602
-------------+----------------------------------   Adj R-squared   =    0.1202
       Total |  .278817289        22  .012673513   Root MSE        =    .10559

------------------------------------------------------------------------------
      nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .1847477   .0922994     2.00   0.058    -.0071994    .3766949
       _cons |   .1499974   .0469875     3.19   0.004     .0522815    .2477132
-----------------------------------------------------------------------------------------------------
-> zone = 4. SOUTH EAST

      Source |       SS           df       MS      Number of obs   =       123
-------------+----------------------------------   F(1, 121)       =      2.16
       Model |  .012780286         1  .012780286   Prob > F        =    0.1447
    Residual |  .717504433       121  .005929789   R-squared       =    0.0175
-------------+----------------------------------   Adj R-squared   =    0.0094
       Total |  .730284719       122   .00598594   Root MSE        =    .07701

------------------------------------------------------------------------------
      nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0420106   .0286159     1.47   0.145    -.0146422    .0986634
       _cons |   .0323091   .0138925     2.33   0.022     .0048053     .059813
-----------------------------------------------------------------------------------------------------
-> zone = 5. SOUTH SOUTH

      Source |       SS           df       MS      Number of obs   =        57
-------------+----------------------------------   F(1, 55)        =      6.70
       Model |  1.51275835         1  1.51275835   Prob > F        =    0.0123
    Residual |  12.4201804        55  .225821461   R-squared       =    0.1086
-------------+----------------------------------   Adj R-squared   =    0.0924
       Total |  13.9329387        56  .248802477   Root MSE        =    .47521
```

```
------------------------------------------------------------------------------
     nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5987382   .2313315     2.59   0.012     .1351395    1.062337
       _cons |  -.0635347   .1786699    -0.36   0.724    -.4215971    .2945277
------------------------------------------------------------------------------------------------------------
-> zone = 6. SOUTH WEST

      Source |       SS       df       MS              Number of obs =      93
-------------+------------------------------           F(  1,    91) =    1.11
       Model |  .00349958     1  .00349958             Prob > F      =  0.2955
    Residual |  .287595493    91  .00316039            R-squared     =  0.0120
-------------+------------------------------           Adj R-squared =  0.0012
       Total |  .291095073    92  .003164077           Root MSE      =  .05622

------------------------------------------------------------------------------
     nOOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .0236883   .0225111     1.05   0.295    -.0210272    .0684037
       _cons |   .1140454    .015457     7.38   0.000     .0833421    .1447488
------------------------------------------------------------------------------

. *** for kakwani regression OOPinsurance ***
.
. qui sum rank

. sca var_rank=r(Var)

. qui sum eqOOPinsurance

. sca m_eqOOPinsurance = r(mean)

. qui sum exp_p

. sca m_exp = r(mean)

. gen k_OOPinsurance = 2*var_rank*( eqOOPinsurance/m_eqOOPinsurance - exp_p
/m_exp)

. reg k_OOPinsurance rank

      Source |       SS       df       MS              Number of obs =     416
-------------+------------------------------           F(  1,   414) =    8.08
       Model |  1.18331357     1  1.18331357           Prob > F      =  0.0047
    Residual |  60.6414962   414  .146477044           R-squared     =  0.0191
-------------+------------------------------           Adj R-squared =  0.0168
       Total |  61.8248097   415  .148975445           Root MSE      =  .38272

------------------------------------------------------------------------------
    k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
        rank |  -.1847545   .0650025    -2.84   0.005    -.3125306   -.0569785
       _cons |   .0925993   .0375969     2.46   0.014     .0186948    .1665039
------------------------------------------------------------------------------
. bysort zone: reg k_OOPinsurance rank
-------------------------------------------------------------------------------------------------------
-> zone = 1. NORTH CENTRAL

      Source |       SS       df       MS              Number of obs =      62
-------------+------------------------------           F(  1,    60) =    9.49
       Model |  3.53545084     1  3.53545084           Prob > F      =  0.0031
    Residual |  22.3619065    60  .372698441           R-squared     =  0.1365
-------------+------------------------------           Adj R-squared =  0.1221
       Total |  25.8973573    61  .424546841           Root MSE      =  .61049

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .9295849   .3018182     3.08   0.003     .3258586    1.533311
       _cons |  -.1607932   .1446946    -1.11   0.271    -.4502255    .1286391
-------------------------------------------------------------------------------------------------------
-> zone = 2. NORTH EAST

      Source |       SS       df       MS              Number of obs =      58
-------------+------------------------------           F(  1,    56) =   18.93
       Model |  2.01263532     1  2.01263532           Prob > F      =  0.0001
    Residual |  5.95388181    56  .106319318           R-squared     =  0.2526
-------------+------------------------------           Adj R-squared =  0.2393
       Total |  7.96651714    57  .139763459           Root MSE      =  .32607

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.6674668   .1534098    -4.35   0.000    -.9747837     -.36015
       _cons |   .1786971   .0701208     2.55   0.014     .0382283    .3191658
------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------------------
-> zone = 3. NORTH WEST

      Source |       SS       df       MS              Number of obs =      23
-------------+------------------------------           F(  1,    21) =    0.91
       Model |  .010443466     1  .010443466           Prob > F      =  0.3508
    Residual |  .240814673    21  .011467365           R-squared     =  0.0416
-------------+------------------------------           Adj R-squared = -0.0041
       Total |  .251258139    22  .011420825           Root MSE      =  .10709

------------------------------------------------------------------------------
k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
       rank |  -.089328   .0936046    -0.95   0.351    -.2839893    .1053333
      _cons |   .165912   .0476519     3.48   0.002     .0668144    .2650096
------------------------------------------------------------------------------
-> zone = 4. SOUTH EAST

     Source |       SS       df       MS              Number of obs =     123
-------------+------------------------------           F(1, 121)     =   77.27
      Model |  .982063781     1  .982063781           Prob > F      =  0.0000
   Residual |  1.5379475    121  .01271031            R-squared     =  0.3897
-------------+------------------------------           Adj R-squared =  0.3847
      Total |  2.52001128   122  .02065583            Root MSE      =  .11274

------------------------------------------------------------------------------
     k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.368263   .0418954    -8.79   0.000    -.451206     -.28532
      _cons |  .0917055   .0203394     4.51   0.000     .0514383    .1319727
------------------------------------------------------------------------------
-> zone = 5. SOUTH SOUTH

     Source |       SS       df       MS              Number of obs =      57
-------------+------------------------------           F(1, 55)      =    0.76
      Model |  .259681796     1  .259681796           Prob > F      =  0.3863
   Residual |  18.7239521    55  .340435493           R-squared     =  0.0137
-------------+------------------------------           Adj R-squared = -0.0043
      Total |  18.9836339    56  .338993462           Root MSE      =  .58347

------------------------------------------------------------------------------
     k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.2480693   .2840335    -0.87   0.386    -.8172852    .3211467
      _cons |  .1960033   .2193745     0.89   0.376    -.243633     .6356396
------------------------------------------------------------------------------
-> zone = 6. SOUTH WEST

     Source |       SS       df       MS              Number of obs =      93
-------------+------------------------------           F(1, 91)      =  103.79
      Model |  .995113058     1  .995113058           Prob > F      =  0.0000
   Residual |  .872476684    91  .009587656           R-squared     =  0.5328
-------------+------------------------------           Adj R-squared =  0.5277
      Total |  1.86758974    92  .020299889           Root MSE      =  .09792

------------------------------------------------------------------------------
     k_OOPinsurance |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       rank |  -.3994495   .0392086   -10.19   0.000    -.4773327   -.3215663
      _cons |  .1918007   .0269222     7.12   0.000     .1383232    .2452783
------------------------------------------------------------------------------
. dominance eqOOPinsurance [aw=wt], sortvar( exp_p) shares(quintiles)
Test of dominance between concentration curve and Lorenz curve
```

```
Variable   Sort vbl.    Sign. level    # points      Rule
----------------------------------------------------------

eqOOPinsurance     exp_p           5%          19         mca

    Concentration curve dominates


Test of dominance between concentration curve and 45 degree line

Variable   Sign. level    # points    Rule
--------------------------------------------

eqOOPinsurance         5%          19        mca

    45 degree dominates


cumulative shares of exp_p

Quantile   cum. share     std. error      p-value
-----------------------------------------------------

q20          3.2109%       0.3633       0.0000
q40         12.8386%       0.7905       0.0000
q60         27.8867%       1.2838       0.0000
q80         51.0433%       1.8208       0.0000
-----------------------------------------------------

cumulative shares of eqOOPinsurance

Quantile   cum. share     std. error   Diff. from    Diff. from
                                       pop. share    income share

                                       p-value       p-value
---------------------------------------------------------------

q20          8.0404%       1.0081       0.0000       0.0000
q40         21.4170%       2.1937       0.0000       0.0001
q60         35.3857%       3.2505       0.0000       0.0208
q80         61.2109%       4.8434       0.0001       0.0313
---------------------------------------------------------------

.
end of do-file

. log close
      name:  <unnamed>
```

```
      log:  C:\Users\chukwuedosusan\Desktop\phd analysis\analysis\OOPINSURANCE
corrected 2015.log

. label variable lorenz "Lorenz curve"

.
. label variable rank "Cum. Prop. Hholds."

.
. qui sum rank

.
. sca var_rank=r(Var)

.
. qui sum eqprepay_exp

.
. sca m_eqprepay=r(mean)

.
. gen npreexp= 2*var_rank*( eqprepay_exp /m_eqprepay)

.
. regr npreexp rank

      Source |       SS           df       MS      Number of obs   =    51,114
-------------+----------------------------------   F(1, 51112)     =  38802.81
       Model |  1282.83162         1  1282.83162   Prob > F        =    0.0000
    Residual |  1689.77663    51,112  .033060272   R-squared       =    0.4316
-------------+----------------------------------   Adj R-squared   =    0.4315
       Total |  2972.60825    51,113  .058157577   Root MSE        =    .18182

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5487891    .002786   196.98   0.000     .5433287    .5542496
       _cons |    -.10773   .0016085   -66.98   0.000    -.1108827   -.1045773
------------------------------------------------------------------------------
. bysort sector: regr npreexp rank
-------------------------------------------------------------------------------------------------------
-> sector = 1. URBAN

      Source |       SS           df       MS      Number of obs   =    19,106
-------------+----------------------------------   F(1, 19104)     =  15949.86
       Model |  555.948463         1  555.948463   Prob > F        =    0.0000
    Residual |  665.889172    19,104  .034856008   R-squared       =    0.4550
-------------+----------------------------------   Adj R-squared   =    0.4550
       Total |  1221.83764    19,105  .063953815   Root MSE        =     .1867
```

```
------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5979591   .0047347   126.29   0.000     .5886787    .6072395
       _cons |  -.1349932    .002949   -45.78   0.000    -.1407735   -.1292129
------------------------------------------------------------------------------
-> sector = 2. RURAL

      Source |       SS           df       MS      Number of obs   =    32,008
-------------+----------------------------------   F(1, 32006)     =  22213.83
       Model |  706.474408         1  706.474408   Prob > F        =    0.0000
    Residual |  1017.89829    32,006  .031803358   R-squared       =    0.4097
-------------+----------------------------------   Adj R-squared   =    0.4097
       Total |   1724.3727    32,007  .053874862   Root MSE        =    .17833

------------------------------------------------------------------------------
     npreexp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .5195969   .0034862   149.04   0.000     .5127638    .5264301
       _cons |  -.0940457   .0019119   -49.19   0.000     -.097793   -.0902983
------------------------------------------------------------------------------


. glcurve eqoop, sortvar( exp_p) glvar(ccurve_oop) lorenz nograph
new variable ccurve_oop created

.
. label variable ccurve_oop "OOP payments"

.
. qui sum rank

.
. sca var_rank=r(Var)

.
. qui sum eqoop

.
. sca m_eqoop=r(mean)

.
. gen noop= 2*var_rank*(eqoop/m_eqoop)

.
. regr noop rank

      Source |       SS           df       MS      Number of obs   =    51,114
-------------+----------------------------------   F(1, 51112)     =   3658.81
       Model |  870.299234         1  870.299234   Prob > F        =    0.0000
```

```
   Residual |  12157.7061    51,112  .237864027   R-squared       =    0.0668
-------------+----------------------------------   Adj R-squared   =    0.0668
      Total |  13028.0054    51,113  .254886338   Root MSE        =    .48771

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4520172   .0074728    60.49   0.000     .4373704    .4666641
       _cons |  -.0593431   .0043145   -13.75   0.000    -.0677996   -.0508866
------------------------------------------------------------------------------
. bysort sector: regr noop rank
-------------------------------------------------------------------------------------------------------------------
-> sector = 1. URBAN

      Source |       SS           df       MS      Number of obs   =    19,106
-------------+----------------------------------   F(1, 19104)     =   1739.87
       Model |  336.632429         1  336.632429   Prob > F        =    0.0000
    Residual |  3696.27336    19,104  .193481646   R-squared       =    0.0835
-------------+----------------------------------   Adj R-squared   =    0.0834
       Total |  4032.90579    19,105   .21109164   Root MSE        =    .43987

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4652991   .0111551    41.71   0.000     .4434341    .4871641
       _cons |  -.0793741    .006948   -11.42   0.000    -.0929927   -.0657555
-------------------------------------------------------------------------------------------------------------------
--------------------
-> sector = 2. RURAL

      Source |       SS           df       MS      Number of obs   =    32,008
-------------+----------------------------------   F(1, 32006)     =   2023.98
       Model |  534.751453         1  534.751453   Prob > F        =    0.0000
    Residual |  8456.25513    32,006  .264208434   R-squared       =    0.0595
-------------+----------------------------------   Adj R-squared   =    0.0594
       Total |  8991.00659    32,007  .280907507   Root MSE        =    .51401

------------------------------------------------------------------------------
        noop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |   .4520582   .0100483    44.99   0.000     .4323632    .4717532
       _cons |  -.0517951   .0055106    -9.40   0.000    -.0625961   -.0409942
------------------------------------------------------------------------------


. glcurve eqOOPinsurance, sortvar( exp_p) glvar(ccurve_OOPinsurance) lorenz nograph
new variable ccurve_OOPinsurance created

.
```

```
. *** for kakwani regression OOP ***

.
. qui sum rank

.
. sca var_rank=r(Var)

.
. qui sum eqoop

.
. sca m_eqoop = r(mean)

.
. qui sum exp_p

.
. sca m_exp = r(mean)

.
. gen k_oop = 2*var_rank*( eqoop/m_eqoop - exp_p /m_exp)

.
. reg k_oop rank

      Source |       SS           df       MS      Number of obs   =    51,114
-------------+----------------------------------   F(1, 51112)     =    202.86
       Model |  39.8893847         1  39.8893847   Prob > F        =    0.0000
    Residual |  10050.3919    51,112  .196634682   R-squared       =    0.0040
-------------+----------------------------------   Adj R-squared   =    0.0039
       Total |  10090.2813    51,113  .197411251   Root MSE        =    .44344

------------------------------------------------------------------------------
       k_oop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rank |  -.0967719   .0067944   -14.24   0.000     -.110089   -.0834548
       _cons |   .0483869   .0039228    12.33   0.000     .0406982    .0560756
------------------------------------------------------------------------------

. bysort sector: reg k_oop rank

------------------------------------------------------------------------------------------------------------
--------------------
-> sector = 1. URBAN

      Source |       SS           df       MS      Number of obs   =    19,106
-------------+----------------------------------   F(1, 19104)     =    149.78
       Model |  27.3635062         1  27.3635062   Prob > F        =    0.0000
```

```
   Residual |  3490.2164    19,104  .182695582   R-squared      =    0.0078
-------------+----------------------------------   Adj R-squared   =    0.0077
```

APPENDIX II: DJA Decomposition Analysis Result (OOP)

```
-------------------------------------------------------------------------------------------------------------
---------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\2010OOP.log
  log type:  text
 opened on:  18 Sep 2018, 01:56:21

. set more off

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave2) hs( eqhhsize) eps(0.4) rho(2)
variable wt_wave2 not found
(error in option hweight())
r(111);
. bootdja eqprepay_exp eqpostpay_exp, hw( wt_wave1) hs( eqhhsize) eps(0.4) rho(1.5)
nboot(50)
# boot :1  over 50
# boot :2  over 50
# boot :3  over 50
# boot :4  over 50
# boot :5  over 50
# boot :6  over 50
# boot :7  over 50
# boot :8  over 50
# boot :9  over 50
# boot :10  over 50
# boot :11  over 50
# boot :12  over 50
# boot :13  over 50
# boot :14  over 50
# boot :15  over 50
# boot :16  over 50
# boot :17  over 50
# boot :18  over 50
# boot :19  over 50
# boot :20  over 50
# boot :21  over 50
# boot :22  over 50
# boot :23  over 50
# boot :24  over 50
# boot :25  over 50
# boot :26  over 50
# boot :27  over 50
# boot :28  over 50
# boot :29  over 50
```

```
# boot :30  over 50
# boot :31  over 50
# boot :32  over 50
# boot :33  over 50
# boot :34  over 50
# boot :35  over 50
# boot :36  over 50
# boot :37  over 50
# boot :38  over 50
# boot :39  over 50
# boot :40  over 50
# boot :41  over 50
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
---------------------------------------------------
                   |       Estimate           STE
-------------------+-------------------------------
    Redistribution |      -0.010748       0.000158
   Vertical Equity |      -0.003220       0.000167
Horizontal Inequilty|       0.002777       0.000015
         Reranking |       0.004750       0.000040
---------------------------------------------------
. log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\2010OOP.log
  log type:  text
 closed on:  21 Sep 2018, 04:31:52
```

Decompostion DJA 2012 (OOP)

```
----------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\2012OOP.log
  log type:  text
 opened on:  18 Sep 2018, 01:52:31

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave2) hs( eqhhsize) eps(0.4) rho(2)

  +-------------------------------------------+
  |      I_X        I_N       I_NP       I_NE |
  |-------------------------------------------|
  | 0.642659   0.678623   0.677697   0.676109 |
  +-------------------------------------------+
```

```
+---------------------------------------------+
|       RE          V         H         R |
|---------------------------------------------|
| -0.035964   -0.033450   0.001588   0.000926 |
+---------------------------------------------+
```

.
. bootdja eqprepay_exp eqpostpay_exp, hw(wt_wave2) hs(eqhhsize) eps(0.4) rho(1.5)
nboot(50)
# boot :1 over 50
# boot :2 over 50
# boot :3 over 50
# boot :4 over 50
# boot :5 over 50
# boot :6 over 50
# boot :7 over 50
# boot :8 over 50
# boot :9 over 50
# boot :10 over 50
# boot :11 over 50
# boot :12 over 50
# boot :13 over 50
# boot :14 over 50
# boot :15 over 50
# boot :16 over 50
# boot :17 over 50
# boot :18 over 50
# boot :19 over 50
# boot :20 over 50
# boot :21 over 50
# boot :22 over 50
# boot :23 over 50
# boot :24 over 50
# boot :25 over 50
# boot :26 over 50
# boot :27 over 50
# boot :28 over 50
# boot :29 over 50
# boot :30 over 50
# boot :31 over 50
# boot :32 over 50
# boot :33 over 50
# boot :34 over 50
# boot :35 over 50
# boot :36 over 50
# boot :37 over 50
# boot :38 over 50
# boot :39 over 50
# boot :40 over 50
# boot :41 over 50

```
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
----------------------------------------------------
                  |      Estimate          STE
------------------+--------------------------------
     Redistribution |      -0.035473       0.000113
    Vertical Equity |      -0.033005       0.000102
Horizontal Inequity |       0.001688       0.000015
          Reranking |       0.000780       0.000017
----------------------------------------------------
. log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\2012OOP.log
  log type:  text
 closed on:  18 Sep 2018, 07:16:53
```

Decomposition OOP 2015

```
--------------------------------------------------------------------------------------------------------------
---------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\2015OOP.log
  log type:  text
 opened on:  18 Sep 2018, 01:54:08

. set more off

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave2) hs( eqhhsize) eps(0.4) rho(2)
variable wt_wave2 not found
(error in option hweight())
r(111);


.
. bootdja eqprepay_exp eqpostpay_exp, hw( wt_wave3) hs( eqhhsize) eps(0.4) rho(1.5)
nboot(50)
# boot :1  over 50
# boot :2  over 50
# boot :3  over 50
# boot :4  over 50
# boot :5  over 50
# boot :6  over 50
# boot :7  over 50
# boot :8  over 50
# boot :9  over 50
```

```
# boot :10  over 50
# boot :11  over 50
# boot :12  over 50
# boot :13  over 50
# boot :14  over 50
# boot :15  over 50
# boot :16  over 50
# boot :17  over 50
# boot :18  over 50
# boot :19  over 50
# boot :20  over 50
# boot :21  over 50
# boot :22  over 50
# boot :23  over 50
# boot :24  over 50
# boot :25  over 50
# boot :26  over 50
# boot :27  over 50
# boot :28  over 50
# boot :29  over 50
# boot :30  over 50
# boot :31  over 50
# boot :32  over 50
# boot :33  over 50
# boot :34  over 50
# boot :35  over 50
# boot :36  over 50
# boot :37  over 50
# boot :38  over 50
# boot :39  over 50
# boot :40  over 50
# boot :41  over 50
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
----------------------------------------------------
                    |       Estimate           STE
--------------------+-------------------------------
      Redistribution |      -0.036658        0.000146
     Vertical Equity |      -0.029182        0.000185
Horizontal Inequilty|        0.003439        0.000041
           Reranking |       0.004037        0.000088
----------------------------------------------------
```

```
. dja eqprepay_exp eqpostpay_exp, hw( wt_wave3) hs( eqhhsize) eps(0.4) rho(2)

  +-------------------------------------------+
  |      I_X        I_N       I_NP       I_NE |
  |-------------------------------------------|
  | 0.634134   0.669498   0.664986   0.662726 |
  +-------------------------------------------+

  +---------------------------------------------+
  |        RE          V          H          R |
  |---------------------------------------------|
  | -0.035365   -0.028592   0.002260   0.004512 |
  +---------------------------------------------+

. log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\2015OOP.log
  log type:  text
 closed on:  18 Sep 2018, 08:58:26
```

Decomposition DJA OOPINSURANCE (2010)

```
------------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\Result using
Bootstrap\2010_OOPinsurance eqhhi 1.5.log
  log type:  text
 opened on:  19 Sep 2018, 11:07:31

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave1) hs( eqhhsize) eps(0.4) rho(1.5)

  +-------------------------------------------+
  |      I_X        I_N       I_NP       I_NE |
  |-------------------------------------------|
  | 0.361017   0.379149   0.377955   0.376099 |
  +-------------------------------------------+

  +---------------------------------------------+
  |        RE          V          H          R |
  |---------------------------------------------|
  | -0.018132   -0.015082   0.001855   0.001194 |
  +---------------------------------------------+

.
. bootdja eqprepay_exp eqpostpay_exp, hw( wt_wave1) hs( eqhhsize) eps(0.4) rho(15)
nboot(50)
# boot :1  over 50
# boot :2  over 50
# boot :3  over 50
# boot :4  over 50
# boot :5  over 50
```

```
# boot :6  over 50
# boot :7  over 50
# boot :8  over 50
# boot :9  over 50
# boot :10  over 50
# boot :11  over 50
# boot :12  over 50
# boot :13  over 50
# boot :14  over 50
# boot :15  over 50
# boot :16  over 50
# boot :17  over 50
# boot :18  over 50
# boot :19  over 50
# boot :20  over 50
# boot :21  over 50
# boot :22  over 50
# boot :23  over 50
# boot :24  over 50
# boot :25  over 50
# boot :26  over 50
# boot :27  over 50
# boot :28  over 50
# boot :29  over 50
# boot :30  over 50
# boot :31  over 50
# boot :32  over 50
# boot :33  over 50
# boot :34  over 50
# boot :35  over 50
# boot :36  over 50
# boot :37  over 50
# boot :38  over 50
# boot :39  over 50
# boot :40  over 50
# boot :41  over 50
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
-----------------------------------------------------
                    |     Estimate          STE
--------------------+-------------------------------
     Redistribution |     -0.022469       0.001417
    Vertical Equity |     -0.012364       0.000917
```

```
Horizontal Inequilty|       -0.003902        0.000442
         Reranking |        0.014007        0.000845
----------------------------------------------------

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave1) hs( eqhhsize) eps(0.4) rho(
> 2.0)

  +-------------------------------------------+
  |      I_X       I_N      I_NP      I_NE |
  |-------------------------------------------|
  | 0.488097   0.509567   0.507436   0.505699 |
  +-------------------------------------------+

  +---------------------------------------------+
  |       RE          V         H         R |
  |---------------------------------------------|
  | -0.021470   -0.017602   0.001737   0.002131 |
  +---------------------------------------------+

. bootdja eqprepay_exp eqpostpay_exp, hw( wt_wave1) hs( eqhhsize) eps(0.4)
> rho(1.5) nboot(50)
# boot :1  over 50
# boot :2  over 50
# boot :3  over 50
# boot :4  over 50
# boot :5  over 50
# boot :6  over 50
# boot :7  over 50
# boot :8  over 50
# boot :9  over 50
# boot :10  over 50
# boot :11  over 50
# boot :12  over 50
# boot :13  over 50
# boot :14  over 50
# boot :15  over 50
# boot :16  over 50
# boot :17  over 50
# boot :18  over 50
# boot :19  over 50
# boot :20  over 50
# boot :21  over 50
# boot :22  over 50
# boot :23  over 50
# boot :24  over 50
# boot :25  over 50
# boot :26  over 50
# boot :27  over 50
# boot :28  over 50
# boot :29  over 50
```

```
# boot :30  over 50
# boot :31  over 50
# boot :32  over 50
# boot :33  over 50
# boot :34  over 50
# boot :35  over 50
# boot :36  over 50
# boot :37  over 50
# boot :38  over 50
# boot :39  over 50
# boot :40  over 50
# boot :41  over 50
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
----------------------------------------------------
                  |      Estimate          STE
------------------+--------------------------------
    Redistribution |      -0.014255       0.000640
   Vertical Equity |      -0.009773       0.000539
Horizontal Inequilty|       0.003034       0.000114
         Reranking |       0.001448       0.000047
----------------------------------------------------
 log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\Result using
Bootstrap\2010_OOPinsurance eqhhi 1.5.log
  log type:  text
 closed on:  19 Sep 2018, 11:45:00
```

DJA Decomposition OOPINSURANCE, (2012)

```
------------------------------------------------------------------------------------------------------------
---------------------------------
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\Result using
Bootstrap\2012_OOPinsurance eqhhi 1.5.log
  log type:  text
 opened on:  18 Sep 2018, 10:25:14

. set more off

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave2) hs( eqhhsize) eps(0.4) rho(2)

  +------------------------------------------+
```

```
  |      I_X        I_N       I_NP       I_NE |
  |-------------------------------------------|
  | 0.601103   0.624963   0.620681   0.617613 |
  +-------------------------------------------+

  +---------------------------------------------+
  |       RE          V          H          R |
  |---------------------------------------------|
  | -0.023860   -0.016509   0.003068   0.004283 |
  +---------------------------------------------+

.
. bootdja eqprepay_exp eqpostpay_exp, hw( wt_wave2) hs( eqhhsize) eps(0.4) rho(1.5)
nboot(50)
# boot :1  over 50
# boot :2  over 50
# boot :3  over 50
# boot :4  over 50
# boot :5  over 50
# boot :6  over 50
# boot :7  over 50
# boot :8  over 50
# boot :9  over 50
# boot :10  over 50
# boot :11  over 50
# boot :12  over 50
# boot :13  over 50
# boot :14  over 50
# boot :15  over 50
# boot :16  over 50
# boot :17  over 50
# boot :18  over 50
# boot :19  over 50
# boot :20  over 50
# boot :21  over 50
# boot :22  over 50
# boot :23  over 50
# boot :24  over 50
# boot :25  over 50
# boot :26  over 50
# boot :27  over 50
# boot :28  over 50
# boot :29  over 50
# boot :30  over 50
# boot :31  over 50
# boot :32  over 50
# boot :33  over 50
# boot :34  over 50
# boot :35  over 50
# boot :36  over 50
```

```
# boot :37  over 50
# boot :38  over 50
# boot :39  over 50
# boot :40  over 50
# boot :41  over 50
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
----------------------------------------------------
                  |      Estimate          STE
------------------+--------------------------------
    Redistribution |      -0.008540       0.001021
   Vertical Equity |      -0.002435       0.000987
Horizontal Inequilty|       0.003323       0.000119
         Reranking |       0.002782       0.000086
----------------------------------------------------
 log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\Result using Bootstrap\2
> 012_OOPinsurance eqhhi 1.5.log
  log type:  text
 closed on:  18 Sep 2018, 10:43:30
```

Decompostion DJA (OOPINSURANCE) 2015

```
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\Result using
Bootstrap\2015_OOPinsurance eqhhi 1.5.log
  log type:  text
 opened on:  18 Sep 2018, 10:27:51

. dja eqprepay_exp eqpostpay_exp, hw( wt_wave3) hs( eqhhsize) eps(0.4) rho(1.5)
  +-------------------------------------------+
  |      I_X        I_N       I_NP       I_NE |
  |-------------------------------------------|
  | 0.385168   0.449994   0.430288   0.414766 |
  +-------------------------------------------+

  +---------------------------------------------+
  |       RE          V          H          R |
  |---------------------------------------------|
  | -0.064825   -0.029597   0.015522   0.019706 |
  +---------------------------------------------+
```

```
. bootdja eqprepay_exp eqpostpay_exp, hw( wt_wave3) hs( eqhhsize) eps(0.4) rho(1.5)
nboot(50)
# boot :1  over 50
# boot :2  over 50
# boot :3  over 50
# boot :4  over 50
# boot :5  over 50
# boot :6  over 50
# boot :7  over 50
# boot :8  over 50
# boot :9  over 50
# boot :10  over 50
# boot :11  over 50
# boot :12  over 50
# boot :13  over 50
# boot :14  over 50
# boot :15  over 50
# boot :16  over 50
# boot :17  over 50
# boot :18  over 50
# boot :19  over 50
# boot :20  over 50
# boot :21  over 50
# boot :22  over 50
# boot :23  over 50
# boot :24  over 50
# boot :25  over 50
# boot :26  over 50
# boot :27  over 50
# boot :28  over 50
# boot :29  over 50
# boot :30  over 50
# boot :31  over 50
# boot :32  over 50
# boot :33  over 50
# boot :34  over 50
# boot :35  over 50
# boot :36  over 50
# boot :37  over 50
# boot :38  over 50
# boot :39  over 50
# boot :40  over 50
# boot :41  over 50
# boot :42  over 50
# boot :43  over 50
# boot :44  over 50
# boot :45  over 50
# boot :46  over 50
```

```
# boot :47  over 50
# boot :48  over 50
# boot :49  over 50
# boot :50  over 50
----------------------------------------------------

                   |      Estimate          STE
--------------------+--------------------------------
     Redistribution |      -0.062318       0.001322
    Vertical Equity |      -0.034475       0.001587
Horizontal Inequilty|       0.011986       0.000277
          Reranking |       0.015857       0.000703
----------------------------------------------------
. log close
      name:  <unnamed>
       log:  C:\Users\chukwuedosusan\Desktop\Araar\Result using Bootstrap\2
> 015_OOPinsurance eqhhi 1.5.log
  log type:  text
 closed on:  18 Sep 2018, 10:44:32
```