



Nigerian Pension Scheme and Poverty Reduction in Nigeria: An Empirical Assessment (2004-2015)

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Authors' contributions

This study was carried out in collaboration between all authors. Author JSE conceptualized the study, wrote the first draft of the manuscript and critically reviewed it thereafter. Author EGK sourced and managed relevant literature. Author AAC sourced the data, performed the analysis and interpreted the result of the analysis. All authors read and approved the final manuscript.

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ABSTRACT

This study employed econometric time series analysis to examine the effect of pension scheme contributions into the retirement saving accounts of employees on national, urban and rural poverty levels. Secondary data for the period 2004 to 2015 were collected from the National Pension Commission (PenCom) Annual Reports, National Bureau of Statistics and Worldbank.org. The study applied the Ordinary Least Square (OLS) regression technique in which variations in national, urban and rural poverty levels were regressed on pension contributions into the retirement saving accounts of employees, gross national income, population growth and unemployment rate. The diagnosed results revealed that pension contributions have no significant effect on national, urban and rural poverty levels. The findings also suggest that 60.19%, 63.05% and 65.37% variation in national, urban and rural poverty level respectively were as a result of joint changes in pension scheme contribution I to retirement savings account of employees, gross national income and population growth. The negative relationship between pension contribution

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and poverty level validates the life-cycle hypothesis, which envisaged that a good operational pension scheme has the potential of reducing poverty most especially among the elderly population, which in turn affects the general poverty level of a country. On the basis of the findings, Federal government of Nigeria should intensify the efforts to ensure wider coverage of the pension scheme to the lower tiers of government: States and Local Governments Areas. The National Pension Commission should strengthen its surveillance on the private sector to ensure full compliance with the provisions of the Pension Reform Act of 2014. Finally, there should be sustained promotion of wider publicity of the activities of National Pension Commission with the objective of educating and enlightening the general public on the implementation of the contributory pension scheme.

Keywords: Pension scheme; national poverty; urban poverty; rural poverty.

1. INTRODUCTION

A well designed pension scheme is vital in safeguarding and refining the means of support and alleviating poverty of older people in developing countries. [1] noted that poverty among older people is generally low in countries where there exists a generous pension or safety net coverage for the elderly like in Brazil, Chile or South Africa. Rapidly expanding empirical literature on pension and poverty suggests that the positive effect of pensions in developing countries go beyond the direct beneficiaries (the older people) and spill over on the other members of their households which may lead to poverty reduction in the country in general. In alliance to this, empirical findings of [2] divulged that children within beneficiary households have higher school enrolment rates and better health status than those living in households that do not receive pension in Brazil and South Africa. The Nigerian pension scheme seeks to provide sufficient maintenance income to the citizens to avert social risk associated with old age, long service, permanent disability and death of the family breadwinner. As a result of low average wages of workers especially the non-implementation of the minimum wage by some states in Nigeria, high rate of unemployment, inflation and small share of salaries in total incomes, collected contributions in most cases are little to allow for adequate payment of pensions after employees retirement. Individual and collective savings are key to individual and family development as well as national development [3]. [4] stated that a contributory pension system ensures that a saving culture is imbedded by the workers, which leads to the accumulation of capital that is needed for societal development. Furthermore, according to [5], the incentives provided by contributory pension system such as tax exemption for both

employers and employees as well as for voluntary contributions deepen savings among the employees.

The Federal government in its bid to further reduce poverty rate in Nigeria especially after employee's retirement introduced the Pension Reform Act of 2004. However, the enactment of the Pension Reform Act of 2004 is in addition to other poverty alleviation programmes available in the country. The law reforming the old pension scheme that was riddled with decay, took into consideration adequate contribution which when invested at the prevailing rate of return, would yield the desired benefit; an approach that concentrated on decentralization and privatization of the entire process of making provision for retirement income, such that workers are increasingly allowed to have a say in how and who provides their retirement income. The Pension Scheme of 2004 maintains a method of providing retirement income whereby the pension is financed by prior savings secured through periodic contributions made jointly by both the worker and the employer. The approach takes a fore-view perspective, anticipates assets to defray the liability when it eventually falls due. The contributory pension scheme allows a civil servant in active service to make contributions while employers of labour are also to contribute, upon which a retired civil servant would have his contributions over the years in tact as his pension.

The control and management of pension contributions into the retirement saving accounts of employees in the private and public sectors of the economy was vested in the hands of the private sectors rather than the government. The Act makes provision for the fund of pensioners to be managed by private companies. Put differently, the Pension Scheme of 2004 is a

contributory privately managed pension scheme. The Pension Reform Act established the National Pension Commission (PenCom) to regulate, supervise and ensure effective administration of pension matters in Nigeria. They give out guidelines and ensure that the institutions mandated to take care of pension does that according to the mandate given, ensuring that the pensioners get their entitlement as and when due. The administration, management and custody of pension fund is assigned to private sector companies namely, Pension Fund Administration (PFA) and Pension Fund Custodians (PFC). The Act also mandated the Nigeria Social Insurance Trust Fund (NSITF) to set up its own Pension Fund Administrators to compete with other PFA in the emerging pension industry.

At present, a large number of Nigerian employees have complied with the requirements of the Pension Reform Act of 2004. Small and medium scale enterprises in the private sector are not left out too. The government has faithfully and religiously been contributing and also deducting contributions from its workers without fail. Many Pension Fund Administrators have complied with all the requirements and have been fully licenced to operate. The total membership of pension schemes stood at 6,329,420 as at the end of the third quarter of 2014. In the same period, investigation into retirement saving account membership shows that the private sector dominated total retirement saving account registrations at 3,213,831, thereby accounting for 51.31 percent of total registrations. The public sector also witnessed an increase in retirement saving account membership as total registrations marginally increased by 1.32 percent from 3,010,106 in the second quarter of 2014. In all, the public sector accounted for 48.69 percent of total retirement saving account registrations at the end of the third quarter of 2014. There are about twenty eight licensed Pension Fund Administrators fully authorized to render services in accordance with the provision of the pension law.

This paper is broken down into sections with introduction as section one. Section two comprises review of related literature (concept of pension and poverty, theoretical framework and empirical studies) and *raison d'être* for our study. Section three took care of the methodology, section four for results and discussion while section five features conclusion.

2. REVIEW OF RELATED LITERATURE

2.1 Concepts Clarifications

2.1.1 Pension, pension scheme and retirement savings account

A post-retirement benefit that an employee might receive from some employers is termed pension. A pension is essentially compensation received by the employee after he/she has retired. The [6] defined pension as a regular payment made by the state to people of or above the official retirement age and to some widows and disabled people. It is also a regular payment made during a person's retirement from an investment fund to which that person or their employer has contributed during their working life. [7] see pensions as a form of Social Security for the retired. It is meant to serve as a supplementary source of income to retired workers when their current earning power ceases. [8] also defined pension as a periodic payment to one who retired from work as a result of old age or disability. [9] explained pension as a sum of money paid regularly to a person who no longer work because of age, disablement or to his widow or dependent children, by the state, by his former employers or from funds to which he and his employers have both contributed.

A pension scheme is referred to as a retirement plan, usually tax exempt, wherein an employer makes contributions toward a pool of funds set aside for an employee's future benefit. The pool of funds is then invested on the employee's behalf, allowing the employee to receive benefits upon retirement. The *businessdictionary.com* sees pension scheme an arrangement by which an employer and, usually, an employee pay into a fund that is invested to provide the employee with a pension on retirement. [10] opined that pension scheme serves as a structured method of providing economic security to an individual when he can no longer support himself. [9] described pension scheme as a pre-arranged and well thought out plan, it gives the beneficiaries the confidence that the benefits promised are being properly arranged and will be paid at the appropriate time. In the words of [8], it is a financial plan by which a worker's benefit is provided whenever it falls due according to the rules of the plan. Fig. 1 shows the architecture of Nigerian Pension Scheme.

A Retirement Savings Account is a requirement under the Pensions Reform Act 2014. It is the

account used to capture information of the contributor as well as the monthly pension contributions of the contributors from all sources-employee, employer, and/or AVCs. It also shows the return on investments over time. Contributors can access this account via Internet, SMS, telephone etc. to check their balances, view last few transactions, request a statement and amend or change details. Retirement Saving Account is a dedicated account opened with a Pension Fund Administrator as specified under Sec 11 of the Pension Reform Act of 2004. Every employer employing more than 5 employees is mandated by law to open retirement saving account for all her employees with a Pension Fund Administrators. Both the employer and employee will make monthly contributions into the retirement saving account. The monthly contributions guarantee that the retirement saving account remain fully funded to meet the liquidity needs at retirement. Access to funds begins at 50 years or subject to terms and conditions of service .The contributor has a choice of either a Programmed Withdrawal or Annuity option to receive his pension. It is strictly supervised and regulated by a regulator that has the power of granting licenses and enforcing compliance with Pension Reform Act 2004.

2.2 National, Urban and Rural Poverty

[11] defined national poverty level as is the percentage of the population living below the national poverty lines. National estimates are based on population-weighted subgroup estimates from household surveys [11]. National poverty rates use a country specific poverty line, reflecting the country's economic and social circumstances. In some case, the national poverty line is adjusted for different areas (such as urban and rural) within the country, to account for differences in prices or the availability of goods and services. Typically the urban poverty line is set higher than the rural poverty line; reflecting the relatively higher costs of living in urban areas. National poverty lines are used to make more accurate estimates of poverty consistent with the country's specific economic and social circumstances, and are not intended for international comparisons of poverty rates. National poverty lines tend to increase in purchasing power with the average level of income in a country. According to [12] the World Bank bases its poverty measures for the developing world as a whole and its main regions on two international poverty lines, of about \$1 and \$2 a day (or, more precisely, \$32.74 and

\$65.48 a month) at 1993 purchasing power parity. The \$1 a day line is a deliberately conservative definition of poverty in that it is anchored to the poverty lines typical of low-income countries. Richer countries naturally tend to have higher poverty lines. One could not reasonably argue that there are fewer poor in the world when the count is based on the standards of what poverty means in the poorest countries. The \$2 a day line is more typical of middle-income countries. But good practice is to look at both or, indeed, a wider range of lines in any given country [12].

Urban poverty rate is the percentage of the urban population living below the national poverty line (or in cases where a separate, urban poverty line is used, the urban poverty line). Typically the urban poverty line is set higher than the rural poverty line; reflecting the relatively higher costs of living in urban areas. The poverty line in urban areas is, on average, about 30 percent higher than in rural areas. In poorer countries, the ratio of the urban line to the rural line tends to be higher than in middle-income countries. This is to be expected because transport infrastructure and internal market integration generally improve as countries climb the income ladder. However, even allowing for the higher cost of living facing the poor in urban areas, the \$1 a day rural poverty rate in 2002 of about 30 percent was more than double the urban rate [12]. Similarly, while 70 percent of the rural population lived on less than \$2 a day in 2002, the proportion in urban areas was less than half that figure. About 75 percent of the developing world's poor still live in rural areas [12].

The rural poverty rate is the percentage of the rural population living below the national poverty line [11]. Issues also arise when comparing poverty measures within countries when urban and rural poverty lines represent different purchasing powers. For example, the cost of living is typically lower in rural than in urban areas. One reason is that food staples tend to be less expensive in rural areas. So the rural monetary poverty line should be lower than the urban poverty line. Urban economic growth often provides new opportunities for those migrating out of rural areas, some of whom escape poverty in the process. On the other, there can be important indirect effects of urbanization on the living standards of those who remain in rural areas. Positive effects stem from the fact that those moving to urban areas often send remittances back to the rural areas and

(importantly) that fewer people are left in rural areas to compete for available jobs. The positive indirect effects, through higher rural living standards, appear to be more important than has generally been thought. Indeed, the evidence suggests that population urbanization has done more to reduce rural "\$1 a day" poverty than to reduce urban poverty [12]. Rural poverty measures tend to fall more rapidly in countries with higher rates of population urbanization.

2.3 Relationship between Pension Scheme and Poverty

The two most prominent arguments in the international arena for pension scheme come from the human rights and the poverty alleviation field. Human rights activists take the position that every elderly person has the fundamental right to a decent living. Depending on how "decent living" is defined, proponents of the human rights-based approach advocate for social pensions with the majority advocating universal pensions. Proponents of the poverty approach tend to focus more on poor elderly and, accordingly, tend to advocate a more targeted approach towards social pensions. In addition, both sides stress that poor elderly are maybe the most vulnerable population group, having a high likelihood of suffering both from ill health and from little chance of social mobility since earnings possibilities and changes in job careers are very limited at old age. Furthermore, pension schemes help to mitigate the large gender inequalities that exist particularly in developing countries with respect to formal pension coverage. In addition to moral or ideological opinions on pension schemes and their different types, academic research has identified a variety of mechanisms for how pension scheme can improve the welfare and economic growth in a country.

Academic research has shown that pension schemes are beneficial for the elderly, their families and, in particular, children residing in an elderly household. [13] show that extending pension coverage to poor black elderly in South Africa significantly improved the health of these elderly. [14] find that increases in social pensions have been a main source of poverty reduction in Thailand. [15] for the United States and [16] and [17] for South Korea and Taiwan find that extending pension coverage fulfils the wishes of the elderly to be able to sustain their own households for longer and to reduce the immediate need for family care. Likewise, [18] finds that since remittances from children seem

to decrease to the elderly parents in societies with high migration rates, such as Indonesia, the elderly seem to be more in need of social assistance than they could have anticipated during their working lives, which leaves them without sufficient lifetime savings. Similarly, [19] find that pension incomes relieve some poor families from having to make financial transfers to elderly persons that could have jeopardised their own welfare levels. Furthermore, studies on South Africa [2] and Brazil [20] find that households with a recipient of social pension have positive effects on the enrolment of children, the health of the children and on reduced levels of child labour in households where eligible elderly beneficiaries reside, emphasising the point that pension benefits are shared among household members. Extending pension coverage through pension schemes has been found to be beneficial not only for the elderly and their families, but also for working age adults. Studies on Pakistan found that potential eligibility for pension payments optimises savings rates and investment decisions of working age adults [21].

2.4 Pension Contributions of Employees in Public and Private Sectors of the Nigeria Economy

In compliance with the provisions of the Pension Reform Act of 2004, employees in public and private sectors of the economy have made significant contributions into their Retirement Saving Accounts (RSA). According to [22], pension contributions into the retirement saving accounts of employees in private and public sectors rose drastically from ₦15.6 billion in 2004 to ₦503.92 billion in 2013, representing a 3,230.26% growth within a period of nine years. On sectorial analysis, the public sector contributions increased from ₦15.6 billion in 2004 to ₦278.5 billion in 2013, indicating a 1,785.26% growth. The private sector contributions surged by 978.81% from ₦23.03 billion in 2006 to ₦225.42 in 2013. The total pension contributions into the retirement saving accounts of employees in private and public sectors stood at 2,305.9 Trillion in 2013. The public sector accounted for 1,405.78 trillion, signifying 60.70% of total pension fund contributed, while the private sector accounted for 910.12 billion or 39.30% of the contributions. Table 1 depicts the pension contributions of employees in public and private sector of the economy in accordance with the Pension Reform Act of 2004.

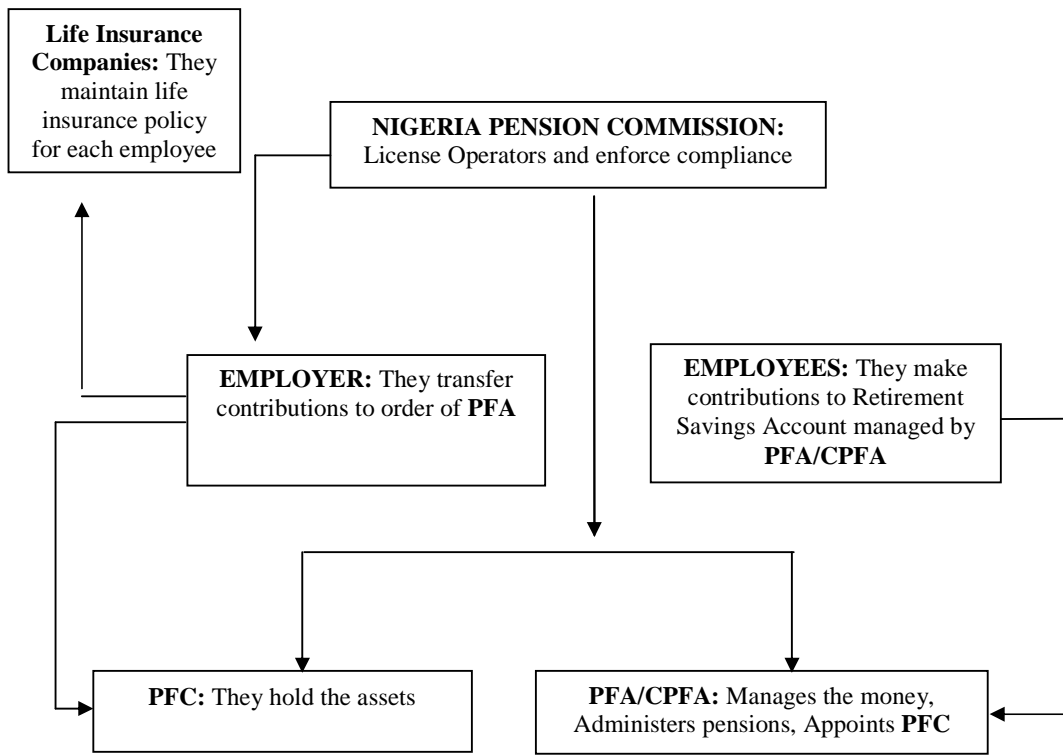


Fig. 1. Nigerian Pension Scheme Organogram
 Source: Nigerian Pension Commission (PenCom, 2014)

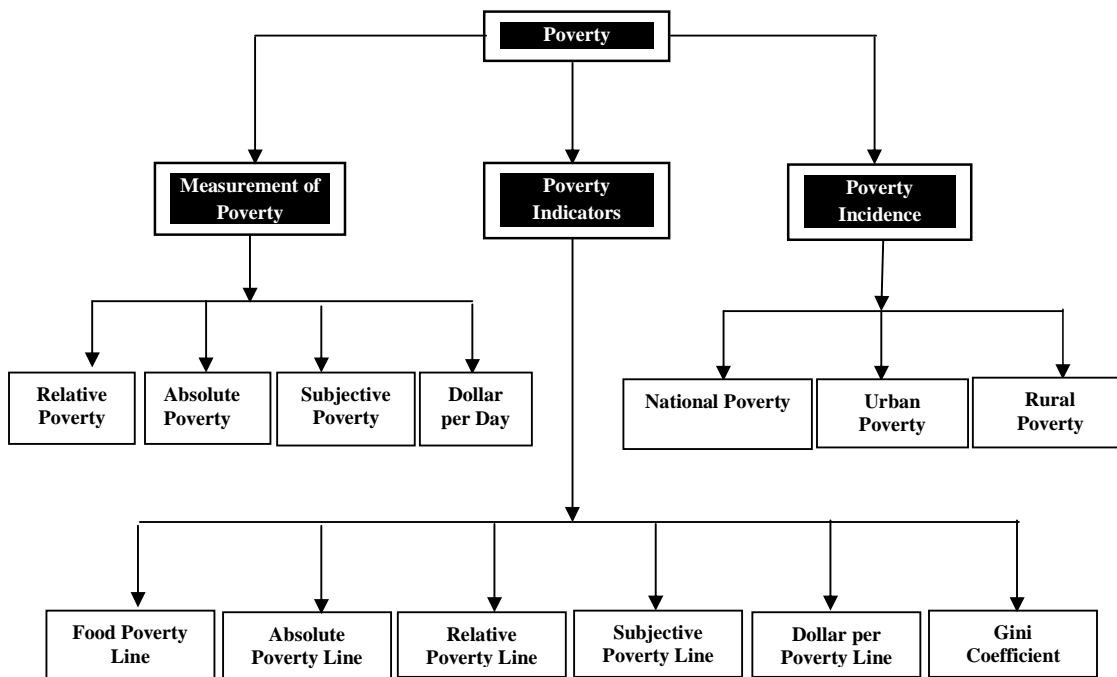


Fig. 2. Poverty taxonomy in Nigeria
 Source: National Bureau of Statistic (NBS) Functional Classification and Measurement of Poverty in Nigeria, 2010

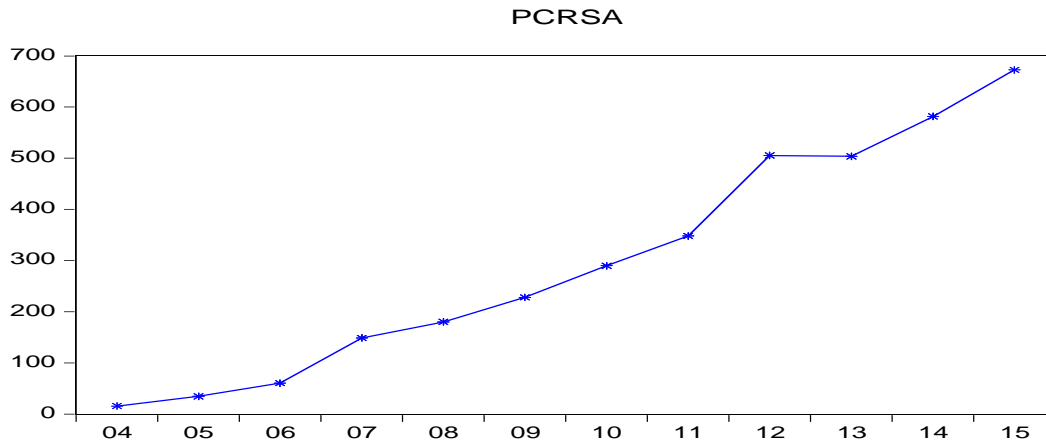


Fig. 3. Pension contribution to retirement saving account 2004 to 2015
Source: National Pension Commission (PenCom) annual report of various issues

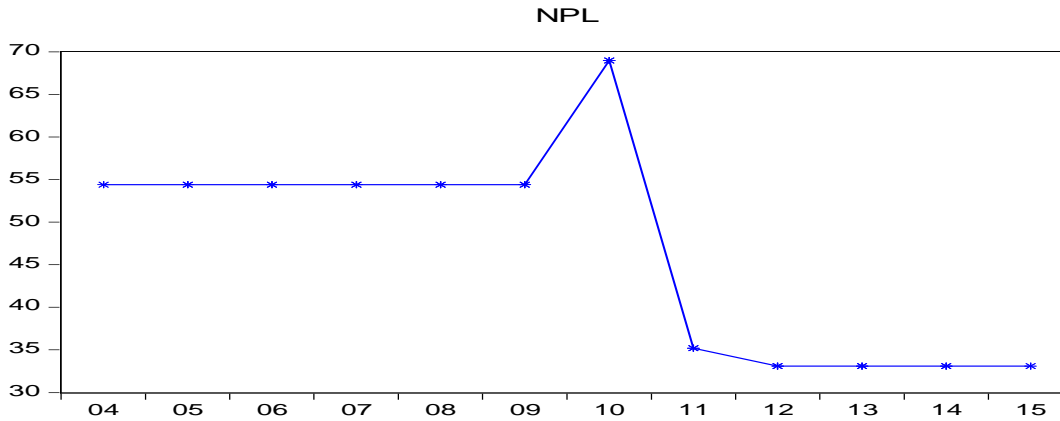


Fig. 4. Trend in national poverty level 2004 to 2015
Source: National Bureau of Statistic (NBS) and World Bank

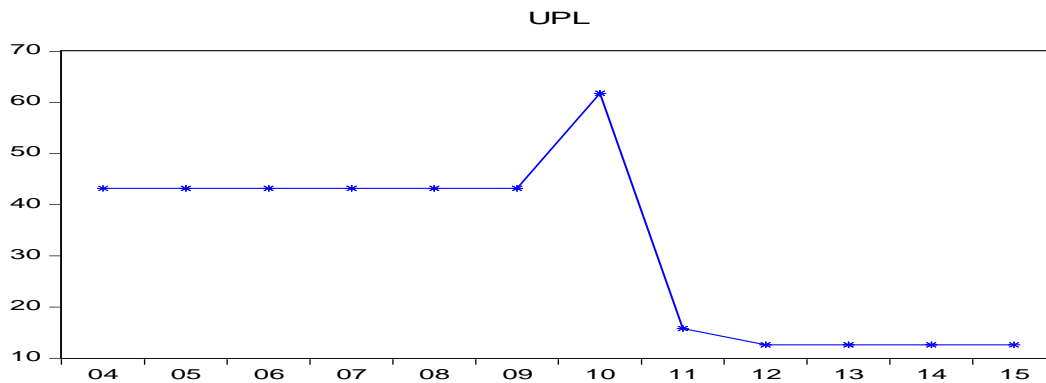


Fig. 5. Trend in urban poverty level 2004 to 2015
Source: National Bureau of Statistic (NBS) and World Bank

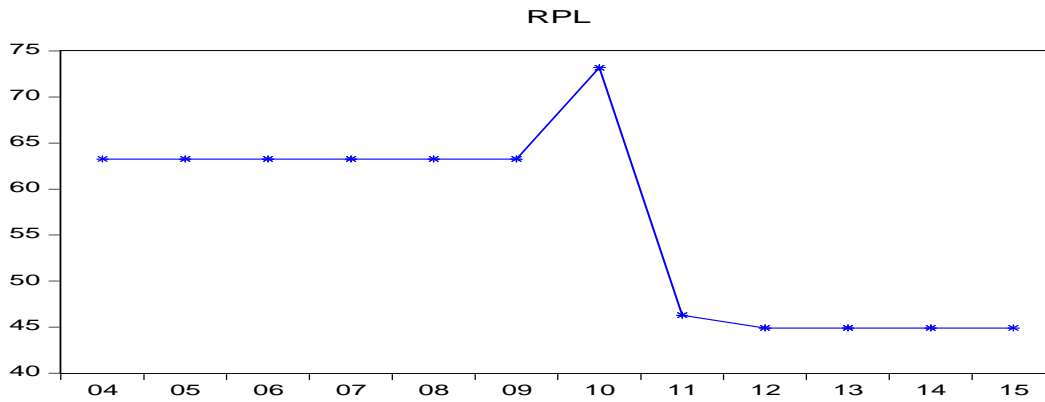


Fig. 6. Trend in rural poverty level 2004 to 2015
Source: National Bureau of Statistic (NBS) and World Bank

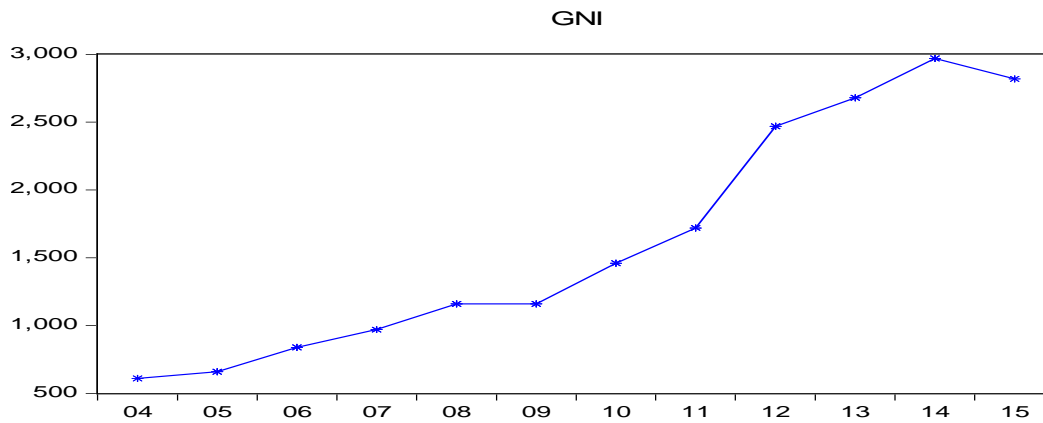


Fig. 7. Trend in gross national income 2004 to 2015
Source: www.worldwank.org

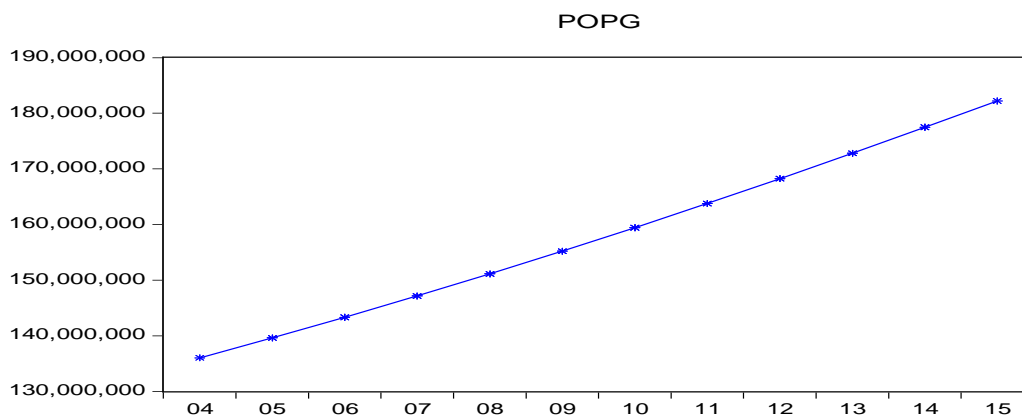


Fig. 8. Population growth 2004 to 2015
Source: www.worldwank.org

Table 1. Nigeria pension scheme contributions as at third quarter of 2015

Year	Public sector		Private sector		Total	
	Amount (₦ Billion)	Percentage of total	Amount (₦ Billion)	Percentage of total	Amount (₦ Billion)	Percentage of total
2004	15.60	1.11	-	-	15.60	0.67
2005	34.68	2.47	-	-	34.68	1.50
2006	37.38	2.66	23.03	2.53	60.41	2.61
2007	80.63	5.74	68.34	7.51	148.97	6.43
2008	99.28	7.06	80.81	8.88	180.09	7.78
2009	137.10	9.75	91.21	10.02	228.31	9.86
2010	162.56	11.56	127.35	13.99	289.91	12.52
2011	228.91	16.28	119.53	13.13	348.44	15.04
2012	331.14	23.56	174.43	19.17	505.57	21.83
2013	278.50	19.81	225.42	24.77	503.92	21.76
2014	237.76	14.23	343.97	26.83	581.73	19.70
Q1:2015	27.50	1.56	52.37	3.41	79.87	2.43
Q2:2015	35.27	2.00	52.55	3.43	87.82	2.67
Q3:2015	53.54	3.04	199.12	12.98	252.66	7.67
Total	1,759.76	100	1,533.81	100	3,293.57	100

Source: National Pension Commission Third Quarter Report, 2015

Table 2. Relative poverty headcount from 1980 to 2013

Year	Poverty Incidence (%)	Estimated Population (Million)	Population in poverty (Million)
1980	27.20	65.00	17.10
1985	46.30	75.00	34.70
1992	42.70	91.50	39.20
1996	65.60	102.30	67.10
2004	54.40	126.30	68.70
2010	69.00	163.00	112.47
2013	33.10	174.20	57.66

Source: National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010 and worldbank.org

2.5 Profile of Poverty in Nigeria

The poverty profile assessment in this subsection is carefully and selectively centred on the Harmonised Nigeria Living Standard Survey (HNLSS) 2009/2010 of the National Bureau of Statistics (NBS). Regardless of the fact that Nigerian economy is paradoxically growing, the proportion of Nigerians living in poverty is increasing every year as shown in Table 2. The proportion of the population living below the poverty line increased significantly from 1980 to 2010. On 22nd July, 2014, the World Bank stated that the population of Nigeria living in poverty reduced significantly from 112,470,000 in 2010 to 57,660,000 in 2013. Further analysis showed that incidence of poverty in Nigeria was heavier on rural population when compared to urban population. The World Bank pegged rural poverty at 44.9% while urban poverty was 12.6%. This divulged a significant reduction in rural and urban poverty from 73.2% and 61.8% based on

Harmonised Nigeria Living Standard Survey (HNLSS) 2009/2010 of the Nigeria Bureau of Statistics to 44.9% and 12.6% in 2013 respectively.

Distributing the population into extremely poor, moderately poor and non-poor in Table 3, the proportion of the core poor increased from 6.2 percent in 1980 to 29.3 percent in 1996, came down to 22.0 percent in 2004 and then rose again to 38.70 percent in 2010. For the moderately poor, the picture was quite different as the proportion recorded increased between 1980 and 1985 from 21.0 percent and 34.2 percent respectively. It went down between 1996 and 2004, from 36.3 percent to 32.4 percent and then 30.30 percent in 2010. On the other hand, the proportion of non-poor was much higher in the country in 1980 (72.8 percent) compared to 1992 (57.3 percent) and 1996 (34.4 percent). Although it rose to 43.3 percent in 2004, it dropped to 31 percent in 2010.

Table 3. Relative poverty: Non-poor, moderate poor and the extremely poor, 1980 – 2010

Year	Non-Poor	Moderately Poor	Extremely Poor
1980	72.80	21.00	6.20
1985	53.70	34.20	12.10
1992	57.30	28.90	13.90
1996	34.40	36.30	29.30
2004	43.30	32.40	22.00
2010	31.00	30.30	38.70

Source: National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010

2.6 The Profile of Poverty in Nigeria Based on Nigeria Bureau of Statistics Harmonised Nigeria Living Standard Survey 2009/2010 Measures

2.6.1 Relative poverty

According to the National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010, the relative poverty line is ₦66, 802.20. This line separates the poor from the non-poor. All persons whose per capita expenditure is less than the above are considered to be poor while those above the stated amount are considered to be non-poor. Households with expenditure greater than two-thirds of the total household per capita expenditure are non-poor whereas those below it are poor. Furthermore, households with less than one-third of total household per capita expenditure are core-poor (extreme poor) while those Households greater than one-third of total expenditure but less than two thirds of the total expenditure are moderate poor. The National Bureau of Statistics Harmonised Nigeria Living Standard Survey 2009/2010 relative poverty measure showed that 69% or 112,470,000 of Nigerians are living in poverty. The percent of people living in poverty increased from 54.4% or 68,700,000 from 2004 to 2010, representing a 38.92% raise in population of Nigerian living in poverty within the period the survey was conducted (2004 to 2010).

2.6.2 Absolute or objective poverty

The National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010 put the absolute poverty line as ₦54, 401.16. Here, this method considers both food expenditure and non- food expenditure using the per capita expenditure of households. This method is otherwise known as food energy intake measure of poverty. Firstly, the food basket of the poorest

40 percent of the population (using quintiles) was obtained. Secondly, the food expenditure that can give 3000 calorie per day based on the national food basket for the poorest 40 percent was computed. Thirdly, with the application of adult equivalence per capita expenditure, the amount in Naira that can be used to purchase food that will meet 3000 calorie was obtained. The addition of non-food component using average non-food expenditure of plus or minus 100 Households around the core poverty line gives the objective (absolute) poverty measure. On the bases of absolute measure of poverty, the percent of people living in poverty increased from 54.7 percent or 69,086,000 from 2004 to 60.2 percent or 89,096,000 in 2010, representing a 9.14% increase in population of Nigerian living in absolute poverty.

2.6.3 Subjective poverty

The subjective poverty measure is the perception of the citizenry. It is neither related to per capita expenditure of household nor the country adult – equivalent scale. The National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010 results indicate that the 46.7% of Nigerians are core poor, 47.2% moderate poor while 6.1% are non-poor.

2.6.4 Dollar per day

The Dollar per day poverty line as put forward by National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010 was ₦54, 750. This measures, consider all individuals whose expenditure per day is less than a dollar per day using the exchange rate of Naira to Dollar in 2009/2010. In computing for 2009/2010, the exchange rate of Naira to US\$1 which stood at ₦150.00. When annualized, it revealed that 61.2% of Nigerians are living in poverty. This is against the 51.6% recorded in the Harmonised Nigeria Living Standard Survey of 2004.

Table 4. National poverty incidence 2003/2004 and 2009/2010

Year	Food poor	Absolute poor	Relative poor	Dollar per day
2004	43.30	32.40	22.00	51.6
2010	31.00	30.30	38.70	61.2

Source: National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010

Table 5. Urban/Rural poverty incidence 2003/2004 and 2009/2010

Year	Food poor	Absolute poor	Relative poor	Dollar per day
2004	26.70	52.00	61.80	52.40
2010	48.30	66.10	73.20	66.30

Source: National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010

Table 6. Zonal poverty incidence 2009/2010

Zone	Food poor	Absolute poor	Relative poor	Dollar per day
North Central	38.60	59.50	67.50	59.70
North East	51.50	69.00	76.30	69.10
North West	51.80	70.00	77.70	70.40
South East	41.00	58.70	67.00	59.20
South-South	35.50	55.90	63.80	56.10
South west	25.40	49.80	59.10	50.10

Source: National Bureau of Statistics Harmonised Nigeria Living Standard Survey, 2010

2.7 Theoretical Framework

In literature, many theories have been modelled relative to pension scheme across the world such as the 2005 theoretical model of Barrientos, utility and preference theory, productivity theory of pension among others. Among these theories, this study selected the Life-Cycle Hypothesis as postulated by [23].

2.7.1 The life-cycle hypothesis

The life-cycle hypothesis suggests that individuals build up a store of wealth during their younger working lives not to pass on these savings to their children but to consume during their own old age to ensure that at old age, they are not subject to poverty. The life-cycle hypothesis according to [23] has the potential of reducing poverty most especially among the elderly population, which in turn affect the general poverty level of a country. The hypothesis helped explain the varying rates of savings in societies with relatively younger or older populations and proved useful in predicting the future effects of various pension plans. The hypothesis assumed that household members choose their current expenditures optimally, taking account of their spending needs and future income over the remainder of their lifetimes. [23] envisaged that households' spending decisions are driven by household

members' assessments of expenditure needs and income over the remainder of their lives, taking into account predictable events such as a precipitous drop in income at retirement.

The life-cycle hypothesis has been utilized extensively to examine savings and retirement behaviour of older persons. Firstly, the hypothesis starts with the observation that consumption needs and income are often unequal at various points in the life cycle. Younger people tend to have consumption needs that exceed their income. Their needs tend to be mainly for housing and education, and therefore they have little savings. Secondly, in middle age, earnings generally rise, enabling debts accumulated earlier in life to be paid off and savings to be accumulated. Finally, in retirement, incomes decline and individuals consume out of previously accumulated savings.

[24] noted that empirical studies have found evidence of a hump-shaped pattern of savings that is consistent with the life-cycle hypothesis. However, most of these studies have tended to underestimate the degree of dissaving among older persons, because these studies have not generally accounted for the decumulation of pension wealth associated with Social Security and private pension payments. [24] recognised pension payments are probably the best example of decumulation of savings in the latter stages of

the life cycle. Under Social Security and defined benefit pension plans or contributory pension scheme, as currently practiced in Nigeria under the provision of the Pension Reform Act of 2004, older persons have established a claim on a future stream of income payments that is generally some function of each person's earnings history and life expectancy. The expected total value of this stream of income payments in current naira over their remaining lifetime is known as their pension wealth. Thus, as retirees receive pension payments, they draw down their pension wealth.

2.8 Empirical Literature

2.8.1 Related studies on pension scheme and national poverty

[25] examined potential role and impacts of a social pension scheme for reducing elderly poverty in Vietnam. The study considered a number of categorical targeting groups of elderly people along with various transfer parameters to assess the impacts of the scheme on social welfare. The finding indicates that, depending on the characteristics of the social pension, there would be beneficial poverty reductions, but also large leakages to the non-poor people. Furthermore, simulations for different budgetary constraints show that, even with limited budgeting, a social pension scheme would significantly reduce poverty incidence for the elderly. [26] investigated the actual impact of the old age pension on poverty reduction among the elderly and their households since its inception. To accomplish this, a sample of 215 Old Age Pensioners was selected in the Manonyane community council area. Results of the analysis using the data revealed that both the incidence and severity of poverty among the elderly declined with the old age pension programme, with headcount ratios of 0.7 and 0.9 with and without the programme, respectively.

[27] explored the role of basic pensions in alleviating poverty in Sub Saharan Africa. Using the most recent Senegalese household income-expenditure data survey, they constructed scenarios of universal and means-tested basic pension schemes with different generosity levels. Simulations indicated that basic pension benefits have sizeable impact on poverty reduction amongst households, with elderly members, which translates into large decreases in aggregate poverty measures. [28] evaluated the possible impact of pension reforms on elderly

poverty in Europe. By focusing on all prospective pension transfers rather than just those at the point of retirement, the results suggested that reforms have tended to reduce the strength of the poverty alleviation function of state pension systems. Though cuts have tended to be stronger for higher wages, and minimum pension provision has improved, men on lower incomes are now much less likely to have an income above the 60% relative poverty threshold, on average, throughout retirement.

[29] determined the impact of social cash transfers on poverty and inequality in Namibia. The study used household and administrative data to review the system for social cash transfers using means-testing and quasi-conditionality. The results showed that social transfers have a positive albeit small impact in terms of reducing inequality and a large effect on poverty reduction, especially among the poorest of the poor. [30] appraised the impact of non-contributory pension programmes upon the wellbeing, participation and security of older people and their households in Brazil and South Africa. The major findings indicated that non-contributory pension programmes have a significant impact on poverty. In the absence of non-contributory pension programmes, the poverty headcount and the poverty gap would be appreciably higher for households with older people. The impact on the poverty gap is much larger for the poorer households. The programmes significantly reduce the probability that individuals in households with a pension recipient will be in poverty.

[31] looked into how pension benefit augments household income and alleviates poverty, and thereby enhances participation in the development process in South Africa. A multi-stage cluster sampling design, a variation of the traditional probability proportional-to-size sampling method, was applied to select the households included in the survey. The survey results demonstrated the importance of the non-contributory social old-age pension in making a positive contribution to the welfare and wellbeing of pensioners and their households. [32] while exploiting a quasi-experimental design whereby the program relies on exogenous geographical and age cut offs to identify its target group and drawing data from Mexico Adultos Mayores Programme, evaluated the effects of non-contributory pension schemes on the well-being of the beneficiary population. They found that non-contributory pension schemes target to the

poor in developing countries can improve the well-being of poor older adults without having any indirect impact (through potential anticipation effects) on the earnings or savings of future program participants. [33] attempted to estimate the financial cost of social pension scheme and quantify its potential role in reducing elderly poverty in Malaysia. By using the HIES 2009 household income expenditure survey, the study estimated the potential roles of social pension in eradicating elderly poverty. The 2009 HIES data indicated that poverty could be eventually be eradicated with social pension while cost of the social pension was kept at reasonable levels.

2.8.2 Related studies on pension scheme and urban poverty

[34] delineated the level of poverty among the elderly in 15 low income Sub Saharan countries and to assess the role of social pensions for the elderly. The study finds, however, that there is a case for a non-contributory social pension to some of the elderly in all countries. Further detailed analysis and simulations suggest that from the perspective of maximum impacts on reduction in poverty among the poor elderly, and for rural poverty reduction, there appears to be a need for a non-contributory pension program restricting the eligibility to the poor among the elderly. [35] determine the influence of pension reforms on the welfare of the retired civil servants in Nigeria with particular reference to Cross River State. In order to achieve the objective; direct and guide the study; three research questions were formulated and developed into hypotheses. Data for the study were collected with the use of structured questionnaire. Data obtained were analysed using simple percentage and Pearson Product Moment Correlation Coefficient. Results and findings revealed that there exists a significant relationship between pension reforms and the welfare of the Pensioners in Urban areas in Cross River State.

[31] assessed how pension benefit augments household income and alleviates poverty, and thereby enhances participation in the development process in South Africa. A multi-stage cluster sampling design, a variation of the traditional probability proportional-to-size sampling method, was applied to select the households included in the survey. Findings suggest that a significantly larger number of coloured household members in urban areas benefitted from employer pensions whose average value was twice that of the social old-

age pension. The coloured households were in a better position than others to pay off their debts and less likely than others to experience financial difficulties. [36] ascertained the impact public pension benefits on the income and poverty of the elderly in Japan during the past two decades, based on cross-sectional data from survey of income redistribution: 1981-1999. The empirical findings revealed that public pension programmes have significantly improved the well-being of urban elderly population, at least in terms of household income as well as relative absolute rate. [37] studied the impact of non-contributory benefits on poverty alleviation in Brazil. On the basis of the 1999 PNAD Household Survey, the paper draws up a profile of the aged poor in Brazil, and finds that non-contributory benefits have had a very important effect on reducing poverty among beneficiaries' urban area and the country poverty level in general.

2.8.3 Related studies on pension scheme and rural poverty

[38] relying on household survey data from Peru and Columbia, studied the ex-ante effects of the implementation of a non-contributory (NCP) program in Colombia and Peru. With the application of Nested Logit Model, the results showed that a non-contributory pension in Colombia and Peru contributes to the reduction of poverty and inequality among the elderly, particularly in rural areas at affordable fiscal costs. [25] examined potential role and impacts of a social pension scheme for reducing elderly poverty in Vietnam. The study considered a number of categorical targeting groups of elderly people along with various transfer parameters to assess the impacts of the scheme on social welfare. Overall, the paper indicates that, even if budgeting is limited, a social pension scheme would be able to help lift a number of elderly people out of poverty, and it is suggested that Vietnam expand the current social pension system with more attention to the elderly living in rural areas. [39] studied the effect of social pension on the poverty rate of the elderly people in rural Brazil and South Africa and computed poverty rate and poverty gaps with and without means-tested minimum pension. The result shows that, in both countries, the non-contributory pension scheme reduces both poverty rates and poverty gaps of elderly people in Brazil and South Africa. [40] explored the effect of pension for health and well-being indicators of rural South Africa men and women.

They analysed data from World Health Organization in-depth Study of Global ageing and Adult Health Survey, carried out in the Agin Court Sub-district. The findings suggests that pension enhances financial well-being of rural men and women. However, the results suggest that their effect on social well-being may be gendered and transitory.

[41] examined the socio-economic impact of old age grant on rural household in Eastern Cape Province, South Africa. The findings of the paper were based on in-depth interviews conducted with twenty five beneficiaries of the old age grant in Alice. The findings shows that old age grant played a vital in households by contributing significantly to household's expenditure. This grant assisted in the provision of food, payment of school fees, transport, rent water as well as the purchases of uniforms, books, electricity and other necessities and in turn a poverty reduction for rural households. [42] assessed the impacted of Livelihood Empowerment against Poverty (LEAP) social grant programme in alleviating household poverty in rural Ghana. Using data from structured household questionnaires, focus group discussion and in-depth interviews, the study established that the LEAP social grant has a significant positive impact on food consumption, frequency of health care facilities utilization and the school enrolment rate for children aged 6-13 years in beneficiary households.

2.9 Gap in Literature

The bulk of the empirical literature were based on the effect of pension scheme on poverty reduction at either national, rural or urban level. However, the available study based on online search on Nigeria context by [35] focused mainly on welfare of civil servants in Nigeria. Therefore, this study bridged the gap in literature by focusing on the effect of pension contribution on national, urban and rural poverty level in Nigeria. The work of [35] was surveyed based but this study is a time series based (2004 to 2014) using the current pension act of 2014 and applying various statistical tools such as unit root, granger causality test, serial correlation, heteroskedasticity and Ramsey Reset specification which were lacking in [35].

2.10 Raison d'être for Our Study

Despite the fact that Nigeria economy is paradoxically growing, the proportion of Nigerians living in poverty is increasing every

year. One of the objective of the pension scheme (Pension Reform Act of 2004) is to reduce poverty rate in Nigeria especially after employee's retirement in addition to existing poverty alleviation programme in the country. However, despite the various programmes of poverty alleviation set up by the government, her citizen continue to wallop in poverty. According to the Nigeria Living Standard Survey (NLSS) 2010, the proportion of the population living below the poverty line increased significantly from 17.10 million in 1980 to 112.47 million in 2010. The World Bank president, Jim Yong Kim, on the 10th of April, 2014 restated that Nigeria is one of the top five countries that have the largest number of people living in poverty. The former Minister of Finance, Mrs. Nenadi Usman in 2007, maintained that the pension reforms in Nigeria was geared toward the reduction of poverty in old age and avert a situation where pension entitlements would exceed the salaries of active workers in the public service.

Empirical studies in other countries of the world have found that pension reform has been able to reduce the level of poverty. [25], [27] and [29] have asserted that pension contribution has reduced poverty in Vietnam, Senegal and Namibia respectively. For Nigeria, such empirical evidence seems lacking as the few studies on pension reforms focused on its effect on economic growth and welfare of civil servants in Nigeria. For instance, [43] and [4] focused on the impact of pension contribution on economic growth while [44] and [35] on welfare of Nigerian civil servants. It is against this identified gap in literature that this study aims at ascertaining the extent the contributions have reduced poverty level in Nigeria.

The main objective of this study is to examine how the pension scheme contributions into the retirement saving accounts of employees influenced poverty level in Nigeria. Specifically, the study examines the effect of pension scheme contributions into the retirement saving accounts of employees on national, urban and rural poverty levels in Nigeria from 2004 to 2015. Accordingly, the directional hypothesis is that pension scheme contributions into the retirement saving accounts of employees has no causation on national, urban and rural poverty levels in Nigeria.

3. METHODOLOGY

The study was anchored on ex-post factor research design. This research work was

basically an analytical study which made use of statistical tools like F-test, the coefficient of determination (R^2) and the Durbin-Watson test for autocorrelation. National, urban, rural poverty and pension contribution into retirement saving accounts were collected for the period of 2004 to 2015. The sources of data were from the National Pension Commission (PenCom) annual reports, National Bureau of Statistics (NBS) and Worldbank.org. National Poverty Level (NPL), Urban Poverty Level (UPL) and Rural Poverty Level (RPL) are the dependent variables and proxies for poverty. This became imperative as the sole aim of the current pension scheme (contributory pension scheme), as stipulated in 2004 Pension Reform Act, is reduction in old age and contagious poverty, which in turn influence the national, urban and rural poverty levels. The independent variable is Pension Contributions into Retirement Saving Accounts of employees (PCRSA), Gross National Income (GNI), Population Growth (POPG). Gross national income and population growth were introduced as control variables capable of influencing the level of poverty in the country.

3.1 Model Specification

In formulating the models employed in this study, three sets of models were developed. Thus, the models are represented in a functional form as:

$$NPL = f(PCRSA + GNI + POPG) \quad (3.1)$$

$$UPL = f(PCRSA + GNI + POPG) \quad (3.2)$$

$$RPL = f(PCRSA + GNI + POPG) \quad (3.3)$$

The models were epitomized in a log-linear econometric construct to get hold of the coefficients of the elasticity of the variables, while lessening the probable effect that any outlier may have. In econometrics, [45] envisaged that logarithmically transforming variables in a regression model is a very common way to handle situations where a non-linear relationship exists between the independent and dependent variables. Using the logarithm of one or more variables instead of the un-logged form makes the effective relationship non-linear, while still preserving the linear model; permits all the variables to be in a uniform base value for easy interpretation.

Model 1

$$\begin{aligned} \log NPL_t = a_0 + a_1 \log PCRSA_t + a_2 \log GNI_t \\ + a_3 \log POPG_t + U_t \end{aligned} \quad (3.4)$$

Model 2

$$\begin{aligned} \log UPL_t = a_0 + a_1 \log PCRSA_t + a_2 \log GNI_t \\ + a_3 \log POPG_t + U_t \end{aligned} \quad (3.5)$$

Model 3

$$\begin{aligned} \log RPL_t = a_0 + a_1 \log PCRSA_t + a_2 \log GNI_t \\ + a_3 \log POPG_t + U_t \end{aligned} \quad (3.6)$$

Where:

NPL is National Poverty Level; UPL is Urban Poverty Level; RPL is Rural Poverty Level; PCRSA is Pension Contributions into Retirement Saving Accounts of employees; GNI is Gross National Income; POPG is population growth; a_0 is a constant term; u is a random error/disturbance term and t is the time trend; these are normally included in standard time-series specifications to account for the omitted variables as well as unexplained random effects within the model.

On the premise of the life-cycle hypothesis, increase in pension contributions into retirement saving accounts of employees is expected to improve the per capita income and consequently trickle down the level of poverty. As a result, an inverse/negative relationship is expected to exist between poverty level and pension contributions. Growth in population with a corresponding decrease in growth of the economy would increase the poverty level, hence a positive relationship is postulated to exist between poverty level, population growth.

4. RESULTS AND DISCUSSION

4.1 Trends in Variables

4.1.1 Pension contributions to retirement savings account

The pension contribution to employees' retirement saving account was ₦15.60 billion in 2004, which had risen to ₦289.91 billion by the end of 2010. The contribution made by employees' to their retirement savings account continued to appreciate as it reached it ₦673.01 billion in 2015. Fig. 3 illustrates the trend in pension contribution to retirement saving accounts.

4.2 National Poverty Level

The national poverty level was averaged 54.40% between 2004 and 2009 based on the survey conducted by National Bureau of Statistic in 2010. The World Bank reported 69.0% and 35.20% in 2010 and 2011 respectively. Nevertheless, between 2012 and 2015 it was averaged 31.10%, an indication of a marginal reduction from 35.20% in 2011. Fig. 4 depicts the trend in national poverty level.

4.3 Urban Poverty Level

The urban poverty level between 2004 and 2009 was averaged 43.19% based on the survey conducted by National Bureau of Statistic in 2010. By the end of 2010, the World Bank surprisingly reported a high urban poverty rate of 61.80%. However, with development in the economy, the level of urban poverty reduced to 15.80 between 2011 and 2015. Fig. 5 depicts the trend in urban poverty level.

4.4 Rural Poverty Level

The rural poverty level was averaged 63.27% between 2004 and 2009 based on the survey conducted by National Bureau of Statistic in 2010. The World Bank reported a high rural poverty rate of 73.20% in 2010. That notwithstanding, between 2012 and 2015 it significantly declined to 44.90%. These changes are illustrated in Fig. 6.

4.5 Gross National Income

The gross national income was \$610 in 2004 which had risen to \$1,460 by the end of 2010.

The gross national income continued to upsurge as it reached \$2,820 in 2015. Fig. 7 illustrates the gross national income trend in from 2004 to 2015.

4.6 Population Growth

The population of Nigeria stood at 136.03 million in 2004. It increased to 139.61 million 2005 representing a growth of 2.56%. From 2004 to 2015, the growth of the population is ranged 2.56% to 2.63%. This is depicted in Fig. 8.

4.7 Result of Descriptive Properties of Variables

In Table 7 detailed the descriptive properties of the variables in the models. Table 7 contained the mean, median, minimum, maximum, standard deviation number of observation and other descriptive features of the variables. The series depicts the mean of 46.91667, 32.26167, 56.56000, 297.5467 and 1.58E+08 for national, urban, rural poverty, pension contributions to retirement savings account of employees', gross national income and population growth respectively. The median are 54.40000 for national poverty, 43.19000 urban poverty, 63.27000 for rural poverty, 259.1100 for pension contributions to retirement savings account of employees', 1310.000 for gross national income and 1.57E+08 for population growth. The maximum values are 69.00000, 61.80000, 73.20000, 673.0100, 2970.000 and 1.82E+08 while the minimum values are 33.10000, 12.60000, 44.90000, 15.60000, 610.0000 and 1.36E+08 for national, urban, rural poverty, pension contributions to retirement savings account of employees', gross national

Table 7. Descriptive properties of variables

	NPL	UPL	RPL	PCRSA	GNI	POPG
Mean	46.91667	32.26167	56.56000	297.5467	1626.667	1.58E+08
Median	54.40000	43.19000	63.27000	259.1100	1310.000	1.57E+08
Maximum	69.00000	61.80000	73.20000	673.0100	2970.000	1.82E+08
Minimum	33.10000	12.60000	44.90000	15.60000	610.0000	1.36E+08
Std. Dev.	12.52110	17.59751	10.42778	224.7784	881.0875	15177882
Skewness	0.054415	-0.021966	-0.083814	0.289635	0.411003	0.115192
Kurtosis	1.699714	1.569942	1.458136	1.750192	1.584247	1.787569
Jarque-Bera	0.851294	1.023498	1.202722	0.948787	1.340025	0.761533
Probability	0.653347	0.599446	0.548065	0.622262	0.511702	0.683337
Sum	563.0000	387.1400	678.7200	3570.560	19520.00	1.90E+09
Sum Sq. Dev.	1724.557	3406.395	1196.124	555778.5	8539467.	2.53E+15
Observations	12	12	12	12	12	12

Source: Computer output data using E-views 8.0

income and population growth respectively. Table 7 reported the standard deviation as 12.52110, 17.59751, 44.90000, 224.7784, 881.0875 and 15177882 for national, urban, rural poverty and pension contributions to retirement savings account of employees', gross national income and population growth respectively. The p-values of Jarque-Bera statistics indicate that all the variables were not normally distributed. This is evidenced on the insignificant level of the p-values for all the variables incorporated in the models.

4.8 Result of Sensitivity Analysis

4.8.1 Serial correlation

To determine whether or not the variables in the models were serially correlated with the regard to Durbin Watson test of autocorrelation, the serial correlation LM test was performed for all the models. The Breusch-Godfrey serial correlation in Table 7 shows that the variables are not serially correlated for all the model as the p-values are insignificant at 5% level of significance.

Table 8a. Serial correlation LM test result

Models	F-statistic	P-value
Model 1	6.814178	0.0766
Model 2	7.644419	0.0664
Model 3	8.602056	0.0572

Source: Computer output data using E-views 8.0

4.8.2 Homoscedastic property

One important assumption for classical linear regression model is that the disturbances appearing in the population regression are homoscedastic. In other words, the variance of the error term should be consistent.

Heteroskedasticity is said to exist if errors do not have a constant variance. The result in Table 8b suggests that the error term in the models are homoscedastic. Put differently, there is no heteroskedasticity in the models.

Table 8b. Homoscedastic result

Models	F-statistic	P-value
Model 1	0.343613	0.8386
Model 2	0.329006	0.8480
Model 3	0.327105	0.8493

Source: Computer output data using E-views 8.0

4.8.3 Ramsey specification test

The Ramsey Reset test is a stability diagnostic that gives an overall fitness of a model/whether a model is well specified or stable. Table 8c suggests that the models were devoid of stability issue. This is on premises of insignificant p-values at 5% significance level.

Table 8c. Ramsey RESET specification result

Models	F-statistic	P-value
Model 1	0.013921	0.9118
Model 2	0.017320	0.9017
Model 3	0.032004	0.8667

Source: Computer output data using E-views 8.0

4.9 Stationarity of Variables

In order to ensure that the variables are free from problem of stationarity defect associated with most time series data, Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) test were conducted. The result of these tests indicates that the variables have unit root and are not encumbered by stationarity weakness. Table 9a and 4.4b reveal the stationarity properties of the variables.

Table 9a. ADF test result

Variables	ADF test statistic	Test critical value at 1%	Test critical value at 5%	Order of integration /remark
NPL	-4.136655 (0.00)*	-2.816740	-1.982344	1(1)/Stationary
UPL	-4.029199 (0.00)*	-2.816740	-1.982344	1(1)/Stationary
RPL	-3.993100 (0.00)*	-2.816740	-1.982344	1(1)/Stationary
PCRSA	-4.254037 (0.00)*	-4.297073	-3.212696	1(1)/Stationary
GNI	-7.790442 (0.00)*	-5.835186	-4.246503	1(1)/Stationary
POPG	-3.316981 (0.04)**	-4.297073	-3.212696	1(1)/Stationary

Source: Computer Output using E-view 8.0. The optimal lag for ADF test is selected based on the Akaike Info Criteria (AIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively

Table 9b. PP test result

Variables	PP test statistic	Test critical value at 1%	Test critical value at 5%	Order of integration /remark
NPL	-4.237193 (0.00)*	-2.816740	-1.982344	1(1)/Stationary
UPL	-4.103452 (0.00)*	-2.816740	-1.982344	1(1)/Stationary
RPL	-4.007328 (0.00)*	-2.816740	-1.982344	1(1)/Stationary
PCRSA	-4.625912 (0.00)*	-4.297073	-3.212696	1(1)/Stationary
GNI	-3.652609 (0.05)**	-2.816740	-1.982344	1(1)/Stationary
POPG	-4.958572 (0.05)**	-4.297073	-3.212696	1(1)/Stationary

Source: Computer Output using E-view 8.0. In determining the truncation lag for PP test, the spectral estimation method selected is Bartlett kernel and Newey-West method for Bandwidth, p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively

4.10 OLS Regression Result

4.10.1 National poverty and pension contributions to retirement saving accounts

The result in Table 10a unveiled that pension contributions into retirement saving accounts is not statistically significant at 5% level of significance. Pension contributions into retirement saving accounts has an inverse relationship with national poverty level. The coefficient of the constant infers that if pension contributions into retirement saving accounts, gross national income and population growth are held constant, national poverty level would be down by a factor of 231.41. The pension contributions into retirement saving accounts coefficient of -0.104094 suggests that a percentage increase in pension contributions into retirement saving accounts resulted in 10.41% reduction in national poverty level within the period covered by the study. A percentage increase in gross national income would reduce national poverty by a factor of 0.036. A percentage increase in Nigeria's population growth would increase national poverty level by a factor of 2.54.

The coefficient of the Adjusted R-squared revealed that 60.19% of changes in national poverty level were explained by the Nigerian pension scheme contributions. Thus, 39.81% systematic variations in the level of poverty Nigeria were not explained by pension scheme contributions in addition to control variables introduced in the model. The p-value of the F-statistic indicates that employees' pension contributions to retirement savings account significantly did not explained the changes in national poverty level. The calculated Durbin Watson (d*) statistic does not indicate the presence of autocorrelation between national

poverty level and pension contributions coupled with control variables.

4.10.2 Urban poverty and pension contributions to retirement saving accounts

The result in Table 10b shows that pension contributions into retirement saving accounts is not statistically significant at 5% level of significance. Pension contributions into retirement saving accounts has a negative relationship with urban poverty level. The implication from the coefficient constant of -363.3919 is that if pension contributions into retirement saving accounts, gross national income and population growth are held constant, urban poverty level would be reduced by a factor of 363.39. The pension contributions into retirement saving accounts coefficient of -0.141108 indicates that a percentage rise in pension contributions into retirement saving accounts resulted in 14.11% reduction in urban poverty level within the period covered by the study. A unit rise in gross national income would reduce urban poverty by a factor of 0.05. A unit increase in Nigeria's population growth would increase urban poverty level by a factor of 3.44.

The coefficient of the Adjusted R-squared suggested that only 63.05% of changes in urban poverty level were explained by the Nigerian pension scheme contributions. Thus, 36.95% systematic variations in the level of urban poverty were not explained by pension scheme contributions. This illustrates that the Nigerian pension scheme has to a fair degree contributed to the reduction of urban poverty. The p-value of the F-statistic indicates that employees' pension contributions to retirement savings account significantly did not explained the changes in urban poverty level. The Durbin Watson (d*) statistic suggests no problem of autocorrelation in the regression model.

Table 10a. National poverty and pension contributions

Dependent Variable: National Poverty Level				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-231.4054	264.2847	-0.875591	0.4213
PCRSA	-0.104094	0.134398	-0.774522	0.4736
GNI	-0.035525	0.019331	-1.837685	0.1255
POPG	2.54E-06	2.02E-06	1.255316	0.2648

Source: Computer output data using E-views 8.0
 R-squared 0.778835
 Adjusted R-squared 0.601902
 S.E. of regression 8.386743
 F-statistic 4.401882
 Prob (F-statistic) 0.067793
 Durbin-Watson stat. 2.951552

Table 10b. Urban poverty and pension contributions

Dependent Variable: Urban Poverty Level				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-363.3919	364.7275	-0.996338	0.3648
PCRSA	-0.141108	0.181594	-0.777050	0.4723
GNI	-0.050034	0.026577	-1.882631	0.1185
POPG	3.44E-06	2.74E-06	1.255801	0.2647

Source: Computer output data using E-views 8.0
 R-squared 0.794728
 Adjusted R-squared 0.630511
 S.E. of regression 11.31724
 F-statistic 4.839494
 Prob (F-statistic) 0.057021
 Durbin-Watson stat. 2.978959

Table 10c. Rural poverty and pension contributions

Dependent Variable: Rural Poverty Level				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-151.3513	203.3480	-0.744297	0.4902
PCRSA	-0.086525	0.105229	-0.822250	0.4484
GNI	-0.030416	0.015581	-1.952048	0.1084
POPG	2.08E-06	1.61E-06	1.292337	0.2527

Source: Computer output data using E-views 8.0
 R-squared 0.807629
 Adjusted R-squared 0.653732
 S.E. of regression 6.470127
 F-statistic 5.247851
 Prob (F-statistic) 0.049003
 Durbin-Watson stat. 3.011125

4.10.3 Rural poverty and pension contributions to retirement saving accounts

The result in Table 10c shows that pension contributions into retirement saving accounts is statistically insignificant at 5% level of significance. Pension contributions into retirement saving accounts has a negative relationship with rural poverty level. The

coefficient constant shows that holding pension contributions into retirement saving accounts, gross national income and population growth constant, rural poverty level would be reduced by a factor of 151.35. The pension contributions into retirement saving accounts coefficient of -0.086525 indicates that a percentage rise in pension contributions into retirement saving accounts resulted in 8.65% reduction in rural poverty level within the study time frame. A

percentage increase in gross national income would reduce rural poverty by a factor of 0.03. A percentage increase in Nigeria's population growth would increase rural poverty level by a factor of 2.08.

The coefficient of the Adjusted R-squared suggested that only 65.37% of systematic variations in rural poverty level were attributed to Nigerian pension scheme contributions. Thus, 34.63% changes in the level of rural poverty were not explained by pension scheme contributions. This signifies that the Nigerian pension scheme has to a fair measure reduced the level rural poverty in Nigeria. The p-value of the F-statistic in Table 10c indicates that employees' pension contributions to retirement savings account significantly explained the changes in rural poverty level. The Durbin Watson (d^*) statistic indicates no problem of autocorrelation in the regression model.

4.11 Discussion of Findings

The result in Table 10a reveals that pension contribution into retirement saving account has no significant inverse relationship with national poverty level in Nigeria. The pension contributions into retirement saving accounts coefficient of 0.104094 suggests that a percentage increase in pension contributions into retirement saving accounts resulted in 10.41% reduction in national poverty level. This suggests that the Nigerian pension scheme has reduced national poverty incidence within the period covered by the study, however, this is not statistically significant. This supports the works of [25], [26] and [1] that a good operational pension scheme reduces the level of poverty in a country. The result validates the life-cycle hypothesis, which envisaged that a good operational pension scheme has the potential of reducing poverty most especially among the elderly population, which in turn affect the general poverty level of a country. It also authenticates the empirical findings of [28], [29] and [36] that pension scheme reduces the level of poverty especially among the elderly population. We also found that increase in gross national income reduces national poverty level by 3.55%. This is expected based on the fact that when the GNI increases, the level of poverty in the country would reduce accordingly. An interesting finding from the result in Table 10a envisages that based on current economic climate in Nigeria, an increase in the population growth would result to 2.54 factor upsurge in the country's poverty level. It was

really amazing to observe that on based on the reforms carried out by past administrations coupled with the current economic recession in the country.

For urban poverty level, pension contributions into retirement saving accounts exert no significant influence on it. The pension contributions into retirement saving accounts coefficient of -0.141108 in Table 10b indicates that a percentage rise in pension contributions into retirement saving accounts resulted in 14.11% reduction in urban poverty level within the period covered by the study. This supports the works of [33], [38] and [32] that pension schemes has the capability of reducing level of poverty. We also observed that gross national income reduces urban poverty level by a factor of 0.05; population growth at current economic condition increases urban poverty level by a factor of 3.44 and surprisingly.

Finally, the effect of pension contributions into retirement saving accounts on rural poverty level is insignificant as evidenced in Table 10c. The pension contributions into retirement saving accounts coefficient of -0.086525 indicates that a percentage rise in pension contributions into retirement saving accounts resulted in 8.65% reduction in rural poverty level within the study time frame. This is in unison with the findings of [37], [31] and [30] that pension schemes has significant impact on poverty reduction. Rural poverty in Nigeria would be reduced by a factor of 0.030416 if gross national income increases by one percent. On the other hand, rural poverty would rise by 2.08 factor if there is one percent increase in population growth at current economic recession.

4.12 Test of Hypotheses

4.12.1 Decision criteria

If the F-statistic in Granger causality test is less than 0.05, the null hypothesis is rejected. On the other hand, if the F-statistic in Granger causality test is greater than 0.05, the null hypothesis is accepted.

4.12.1.1 Hypothesis one

4.12.1.1.1 Restatement of research hypothesis

H_0 : Pension scheme contributions into the retirement saving accounts of employees have no causation on national poverty level.

Table 11a depicts that pension scheme contributions into the retirement saving accounts of employees has no significant effect on national poverty level. Put differently, that pension scheme contributions into the retirement saving accounts of employees does not significantly result to reduction in national poverty level. Causality does not flow from pension scheme contributions into the retirement saving accounts of employees to national poverty level at 5% significance level. However, gross national income was found to have significantly affect national poverty level as evidenced by the p-value of 0.0452. The p-value of 0.058 for the F-statistic in Table 11a is greater than 0.05 and against the hypothesis decision criteria. To this effect, the null hypothesis that pension scheme contributions into the retirement saving accounts of employees has no causation on national poverty level would not be rejected that is, the null hypothesis that pension scheme contributions into the retirement saving accounts

of employees has no causation on national poverty level is accepted.

4.12.1.2 Hypothesis two

4.12.1.2.1 Restatement of research hypothesis

H₀: Pension scheme contributions into the retirement saving accounts of employees have no causation on urban poverty level.

The result in Table 11b shows no unidirectional relationship between pension scheme contributions into the retirement saving accounts of employees and urban poverty level with no causality flowing from pension scheme contributions to the retirement saving accounts of employees to urban poverty level at 5% level of significance. This finding implies that pension scheme contributions into the retirement saving accounts of employees has no significant effect on urban poverty level in Nigeria. We observed

Table 11a. Granger causality result NPL and PCRSA

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
PCRSA does not Granger Cause NPL	11	4.88771	0.0580	No Causality
NPL does not Granger Cause PCRSA		0.20063	0.6661	No Causality
GNI does not Granger Cause NPL	11	5.62088	0.0452	Causality
NPL does not Granger Cause GNI		0.66629	0.4380	No Causality
POPG does not Granger Cause NPL	11	4.25636	0.0730	No Causality
NPL does not Granger Cause POPG		1.42203	0.2672	No Causality

Source: Computer analysis using E-views 8.0

Table 11b. Granger causality result UPL and PCRSA

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
PCRSA does not Granger Cause UPL	11	4.88206	0.0581	No Causality
UPL does not Granger Cause PCRSA		0.21127	0.6580	No Causality
GNI does not Granger Cause UPL	11	5.45015	0.0478	Causality
UPL does not Granger Cause GNI		0.76873	0.4062	No Causality
POPG does not Granger Cause UPL	11	4.29420	0.0720	No Causality
UPL does not Granger Cause POPG		1.43787	0.2648	No Causality

Source: Computer analysis using E-views 8.0

Table 11c. Granger causality result IIBOE and GRGDP

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
PCRSA does not Granger Cause RPL	11	4.91616	0.0574	No Causality
RPL does not Granger Cause PCRSA		0.27802	0.6123	No Causality
GNI does not Granger Cause RPL	11	5.26808	0.0508	No Causality
RPL does not Granger Cause GNI		1.00847	0.3447	No Causality
POPG does not Granger Cause RPL	11	4.38220	0.0697	No Causality
RPL does not Granger Cause POPG		1.32753	0.2825	No Causality

Source: Computer analysis using E-views 8.0

that gross national income exert significant effect on urban poverty level. The p-value of 0.0581 for the F-statistic in Table 11b is higher than 0.05. In the light of this, the null hypothesis that pension scheme contributions into the retirement saving accounts of employees have no causation on urban poverty level is accepted while the alternate hypothesis is rejected.

4.12.1.3 Hypothesis three

4.12.1.3.1 Restatement of research hypothesis

H_0 : Pension scheme contributions into the retirement saving accounts of employees have no causation on rural poverty level.

From Table 11c, there is no unidirectional relationship pension scheme contributions into the retirement saving accounts of employees and rural poverty level as causality does flows from pension scheme contributions into the retirement saving accounts of employees to rural poverty level neither does it flow from rural poverty level to pension scheme contributions into the retirement saving accounts of employees at 5% level of significance. This result suggest that pension scheme contributions into the retirement saving accounts of employees has no causation on rural poverty level. We would not found any evidence that gross national income significantly influence rural poverty in Nigeria. The p-value of 0.0574 for the F-statistic in Table 11c is greater than 0.05. In the light of this, the null hypothesis that pension scheme contributions into the retirement saving accounts of employees have no causation on rural poverty level would not be rejected.

5. CONCLUSION, RECOMMENDATIONS AND CONTRIBUTION TO STUDY

5.1 Conclusion

This study ascertained the effect of pension scheme contributions into the retirement saving accounts of employees on poverty level in Nigeria by specifically examining the effect of pension scheme contributions into the retirement saving accounts of employees on national, urban and rural poverty levels covering a time frame of 2004 to 2015. The findings of the study revealed the following:

- Pension scheme contributions into the retirement saving accounts of employees is insignificantly and positively relates with

national poverty level in Nigeria. Pension scheme contributions into the retirement saving accounts, gross national income and population growth contributed to 60.19% variation in national poverty level.

- Pension scheme contributions into the retirement saving accounts of employees insignificantly and positively relates with urban poverty level, 63.05% variation in urban poverty level was as a result of employees' contributions to their retirement savings accounts incorporated with gross national income and population growth.
- Pension scheme contributions into the retirement saving accounts of employees insignificantly relates with level of rural poverty, 65.37% variation in rural poverty level was as a result of employees' contributions to their retirement savings accounts incorporated with gross national income and population growth.

The negative relationship between pension contribution and poverty level suggests that the Nigerian pension scheme has the potential of reducing poverty incidence within the period covered by the study, however, this is not statistically significant following the p-values in Tables 10a-10c. This result validates the life-cycle hypothesis, which envisaged that a good operational pension scheme has the potential of reducing poverty most especially among the elderly population, which in turn affect the general poverty level of a country. In regard to this, this study therefore, conclude that the Nigeria pension scheme is a powerful tool for improving the quality of life of those individuals whose chances of escaping poverty are almost null after retirement.

5.2 Recommendations

A good pension scheme should focused on providing satisfactory pension to all retirees and instituting an equitable nexus between the contributions and the pensions. Taking into consideration the positive impact of pension scheme on poverty reduction as evidenced from our analysis, we put forward the following recommendations:

- Efforts should be made by the federal government to ensure wider coverage of the pension scheme. The Pension Reform Act of 2014 covers employees of the federal public service, federal capital territory and private sectors organizations

having up to five employees. The state and local government should be mandated to promulgate legislations to put into operation the contributory pension scheme as envisaged in Pension Reform Act of 2014. According to the 2015 fourth quarter report of National Pension Commission, only 26 states in Nigeria have enacted laws for the implementation of the contributory pension scheme while 10 states were at the bill stage. This is not good for employees in those states that have not implemented the contributory pension scheme as they would continue to be affected by the corruptions in the defined benefit system principally with regard to inadequate fund to pay retirees.

- The private sector should be mandated to comply fully with the provisions of the Pension Reform Act of 2014 as they are the biggest employer of labour. As contained in the 2013 National Pension Commission annual report, letters were mailed to 12,914 private sector organizations whose compliance statuses were yet to be ascertained. The letters required the organisations to comply with the Pension Reform Act 2014 and provide appropriate evidence. Majority of the private organizations are corporate entities, as such, they could be reached through their addresses registered with the Corporate Affairs Commission (CAC) for compliance. Furthermore, collaboration with various agencies including the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), Federal Inland Revenue Service (FIRS) and Bureau for Public Procurement (BPP) with the aim of also ensuring compliance with the provisions of the Pension Reform Act 2004 among private sector organizations that were not publicly quoted.
- There should be sustained promotion of wider publicity of the activities of National Pension Commission with the objective of educating and enlightening the general public on the implementation of the contributory pension scheme. Employees specifically from the private sector should be educated to know their rights and demand it from their employers in compliance with Pension reform of 2014. Trade and labour unions that also seem to show disapproval of the contributory pension scheme should be also clarified on

the benefits and supremacy of the scheme to the ones being replaced.

- Finally, the pooled fund should be invested in federal government securities to make resources available for economic growth and national welfare/improved standard of living. Investment in federal government guarantees the safety of pooled funds as it is a risk free investment.

5.3 Contribution to Study

This study makes a contribution by providing a time series assessment for a developing country on the effect of pension contribution into retirement saving accounts of employees on poverty level in Nigeria, using a regressed data as against structured questionnaire. To the best of our knowledge, this is new dimension on the study of pension reform and poverty in Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Faye O. Basic pensions and poverty reduction in sub-Saharan Africa, CREPP, HEC management school – University of Liège. CREPP Working Paper Series; 2007.
2. Duflo E. Grandmothers and granddaughters: Old age pension and intra household allocation in South Africa. The World Bank Economic Review. 2003; 17(1):1-25.
3. Barrow G. Pension Fund Administration in Nigeria. Abuja, Nigeria: Pen and Pages Ltd.; 2008.
4. Gunu U, Tsado E. Contributory pension system as a tool for economic growth in Nigeria. International Journal of Business and Behavioural Sciences. 2012;2(8):6-13.
5. Adetola A. Pension industry development in Nigeria: The thrust of the Pension Reform Act 2004; 2006. Accessed 25th July, 2016. Available:www.leadway.com/pensiondev.pdf
6. Oxford Advanced Learners Dictionary; 2016. Accessed 27th August, 2016. Available:http://www.oxfordlearnersdictionaries.com/definition/english/pension1_1

7. Modigliani F, Muralidhar A. Rethinking pension reform. *Journal of Pension Economic and Finance*. 2005;4(1):109-110.
8. Chinwuba E. Legal and regulatory framework for pension scheme in Nigeria. All Nigerian stakeholders summit; 2003.
9. Onifade OS. An examination of the Nigerian public service pension system; 2001. Accessed 25th July, 2016. Available: www.cii.co.uk/documents/qualifications/fcii_eample1.pdf
10. Yusuf IM. An evaluation of the Nigerian pension reform. A thesis submitted to the Department of economics, Ahmadu Bello University, Zaria, Kaduna State, Nigeria; 2000.
11. World Bank. Looking beyond averages in the trade and poverty debate, World Bank; 2004. Accessed 25th August, 2016. Available: www.worldbank.org
12. Ravallion M, Chen S, Sangraula P. New Evidence on the Urbanization of Global Poverty; 2007. Background paper for the world development report 2008. World Bank Policy Research Working Paper 4199.
13. Case A, Deaton A. Large cash transfers to the elderly in South Africa; 1996. NBER Working Paper No. 5572.
14. Inchauste G, Olivieri S, Saavedra J, Winkler H. What is behind the decline in poverty since 2000? Evidence from Bangladesh, Peru and Thailand. Background paper for the world development report 2013; 2012.
15. Costa DL. The Evolution of Retirement: An American Economic History, 1880-1990; 1997. Accessed 25th August, 2016. Available: <http://www.nber.org/books/cost98-1>
16. De-Vos, S, Lee YJ. Change in extended family living among elderly people in South Korea 1970-1980. *Economic Development and Cultural Change*. 1993;41(2):377-393.
17. Pal S. Effects of intergenerational transfers on elderly co-residence with adult children: Evidence from rural India; 2007. IZA discussion papers 2847.
18. Antman FM. Adult child migration and the health of elderly parents left behind in Mexico, *American Economic Review: Papers and Proceedings*. 2010;100:205-208.
19. Maitra P, Ray R. The effect of transfers on household expenditure patterns and poverty in South Africa. *Journal of Development Economics*. 2003;71(1):23-49.
20. Ponczek V. Income and bargaining effects on education and health in Brazil. *Journal of Development Economics*. 2012;94(2): 242-253.
21. Kochar A. Ill-health, savings and portfolio choices in developing countries. *Journal of Development Economics*. 2004; 73(1):257-285.
22. Nigerian Pension Commission (PenCom) annual report 2013. Accessed 25th August, 2016. Available: www.pencom.gov.ng
23. Modigliani F, Brumberg R. Utility analysis and consumption function. In *Post-Keynesian economics*. Edited by K. Kurihara, New Brunswick, N. J., Rutgers University Press, 1954; 338-436.
24. Crown HW. Life-cycle theories of savings and consumption, *encyclopedia of aging*; 2002. Accessed 4th August, 2016. Available: www.encyclopedia.com/doc/IG2-3402200229.html
25. Long GT, Pfau WD. Aging, Poverty, and the Role of a Social Pension in Vietnam; 2008. GRIPS Policy Information Centre, Discussion Paper Series 07-10.
26. Bello HM, Letete EM, Rapapa MT, Chokobane, LL. An evaluation of the poverty reduction impact of the non-contributory old age pension scheme in Lesotho: The case of Manonyane; 2007. A paper presented at the 1st annual conference on the economics of social protection 12-15th June, 2007 at Ivory tree lodge, Pilansberg, South Africa.
27. Faye O. Basic pensions and poverty reduction in sub-Saharan Africa; 2010. The WDA –HSG discussion paper series on demographic issues, University of Saint Gallen, Switzerland.
28. Grech GA. Evaluating the possible impact of pension reforms on elderly poverty in Europe; 2014. Munich Personal RePEc Archive MPRA Paper No. 57639. Accessed 15th July, 2016. Available: <http://mpra.ub.uni-muenchen.de/57639/>
29. Levine S, Berg S, D. Measuring the impact of social cash transfers on poverty and inequality in Namibia; 2009. A paper prepared for the Central Bureau of Statistics in Windhoek, Namibia.
30. Barrientos A, Ferreira M, Gorman M, Heslop A, Quigley HL, Sherlock PL, Moller V, Saboia J, Vianna ML. Non-contributory

- pensions and poverty prevention: A comparative study of Brazil and South Africa, Institute of Development and Policy Management and Help Age International, University of Manchester, Harold Hankins Building, Precinct Centre, Oxford Road, Manchester M13 9QH, UK; 2003a.
31. Moller V, Ferreira M Non-Contributory Pensions and Poverty Study (NCPSS), South African Survey Report, Grahams town and Cape Town, July; 2003.
 32. Galiani S, Gertler P, Band R. Non-contributory pensions, inter-American development bank, office of strategic planning and development, Working Paper Series No. IDB-WP-517, June; 2014.
 33. Mohd S, Mansor N, Ahmad SK. Social pension, aging and poverty in Malaysia. *Journal of the Economics of Ageing*. 2012;5(3):136-148.
 34. Kakwani N, Subbarao K. Ageing and poverty in Africa and the role of social pensions; 2005. United Nation Development Programme Working Paper, N0.8, 2005.
 35. Asuquo A, Akpan AU, Tapang AT. Nigerian pension reforms and management: New strategies for rewarding past intellectuals towards sustainable development in the third world. *Global Journal of Management and Business Research*. 2012;12(13):10-18.
 36. Oshio T, Shimizutani S. The impact of public pension benefits on income and poverty of elderly in Japan. *Japanese Journal of Social Security Policy*. 2005;4(2):54-66.
 37. Schwarzer H, Querino AC. Non-contributory pensions in Brazil: The impact on poverty reduction; 2002. Extension of Social Security (ESS) Working Paper Number 11.
 38. Olivera J, Zuluaga B. The ex-ante effects of non-contributory pensions in Colombia and Peru, *Journal of International Development*, John Wiley and Sons Ltd. 2014;26(7):949-973.
 39. Barrientos A, Gorma M, Heslop A. Old age poverty in developing countries: contributions and dependence in later life. *Journal of World Development*. 2003b; 31(3):555-570.
 40. Schatz E, Olive, XG, Ralston M, Menken J, Tollman S. The impact of pensions on health and well-being in rural South Africa: Does gender matter? *Social Sciences Med. Journal*. 2012;75(10):1864-1873.
 41. Tangwe PT, Gutura P. The impact of old age grant in Nkonkobe Municipality in the Eastern Cape Province of South Africa. *Mediterranean Journal of Social Sciences*. 2013;4(13):627-635.
 42. Agbaam C, Dinbabo MF. Social grant and poverty reduction at household level: Empirical evidence from Ghana. *Journal of Social Sciences*. 2014;39(3):293-302.
 43. Edogbanya A. An assessment of the impact of contributory pension scheme to Nigerian economic development. *Global Journal of Management and Business Research*. 2013;13(2):46-59.
 44. Dagauda AT, Adeyinka OP. An analysis of the impact of the 2004 pension policy on the welfare of Nigerian civil servants: A case study of selected Federal Ministries. *Global Journal of Human Resource Management*. 2013;1(4):6-13.
 45. Gujarati D. *Basic Econometrics*, 4th edition, New Delhi: Tata McGraw Hill Publishing Company Limited; 2004.

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