

CONTRIBUTORY PENSION SCHEME RETIREMENT BENEFIT AND THE DEVELOPMENT OF GUARANTEE MINIMUM PENSION FOR LOW INCOME RETIREES OF FEDERAL ESTABLISHMENTS IN NIGERIA

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Abstract

Contributory pension scheme was introduced in the year 2004. For about two decades now, PenCom has not yet finalised the financial implication and other modalities for the successful implementation of the minimum pension as stated in Section 71(1) of the Pension Reformed Act 2004. This study examined the retirement benefit under the contributory pension scheme and developed the guarantee minimum pension for federal establishment retirees in Nigeria. The study used ex-post facto research design. The study population comprises all retirees of federal establishments under CONPSS salary structure. The secondary data of all pension contributions, retirement benefits and various salary structures were retrieved from series of publications of PenCom and NSIWC. EasyFit 5.6 Professional Software together with the Least Square Model, accumulation and annuity formulae was employed to analyse the data. EasyFit Software generated statistics using the Kolmogorov Smirnov, Anderson Darling and Chi-Square Models and ranked each model statistics generated to determine the best fit for both the data and the probability distributions used. Arising from the data collected and analysed, the level of comfort of some low income retirees who spent 20 to 35 years in active service is nothing to write home about due to insufficient pension benefit. The study developed guarantee minimum pension and recommends its implementation with requisite modalities of 20 years as the minimum qualifying length of service and only 15-year post retirement subsidy.

Keywords: Guarantee-minimum-pension, contributory-pension-scheme, low-income-retirees, retirement-benefit.

1 INTRODUCTION

The low income retirees referred to in this study are federal establishment retirees who were on consolidated public service salary structure (CONPSS) and did not exceed grade level six while in active service. For fairness, one who has contributed substantially to an organisation throughout the working life needs to be rewarded when there is no strength or capacity to continue working. One way to give such reward is through pension payment (Abere & Abiola, 2019). According to Amadi (2020), pension can be defined as a series of payments made regularly to a person or beneficiary of a person who is no longer working due to old age, disablement or other reasons. In this study, a contributory pension scheme is when both the federal government and the low income earners below grade level seven contribute 18% of the earners' monthly emoluments into the retirement savings account towards the future payment of the retirement benefits. Emolument is the total salary package of a low income earner comprising at least basic salary, transportation and housing allowances. Age, retirement savings account balance, final salary (total emolument), gender and pensioners' retirement payment choices are various ways or factors influencing differences in the amount of pension payments received by various pensioners (Mojekwu & Adeyele, 2010).

Despite many amendments, adjustments and reforms in pension system, pension administration in Nigeria seems to face a challenge of benefit insufficiency. Most retirees made contributions for more than half of their entire lifetime when in active service but are disappointed with the retirement packages received. Section 84(1) of the Pension Reform Act (PRA) 2014 states that retirees shall be entitled to a guaranteed minimum pension to be specified by the Commission from time to time. Up till now, for about two decades since it was first stated in Section 71(1) of the Pension Reformed Act 2004, PenCom has not yet finalised financial implication and other modalities constituting requisite guidelines and framework for the successful implementation of the minimum pension that can guarantee fair standard of living during retirement.

This study aims to examine the contributory pension scheme retirement benefit of low income federal establishment retirees and develop guarantee minimum pension. The specific objectives are to: investigate the level of comfort enjoyed by low income retirees; develop the expected average amount of the Guarantee Minimum Pension (GMP); estimate the pension contributions

sufficient to provide GMP; find the level of subsidy to be provided for low income retirees. The research questions are: What is the current average retirement benefit of a low income retiree? What should be the expected value of the minimum pension referred to in Section 84 of PRA 2014? What level of contributions can suffice to provide minimum pension for low income retirees? What is the average level of pension subsidy for low income retirees? The outcome of the study is of great importance to pension stakeholders, the pension regulatory authority, the financial institutions, insurance companies and the Presidency for policy formulation, law amendment, capacity building and institutional strengthening.

2 LITERATURE REVIEW

The Pension Funding Policy and the Life Cycle Hypothesis are theories adopted for this study. Jon C. Exley worked on Pension Funding Policy Theory in the year 1999 to balance between the Expectancy Theory and the Deferred Wage Theory. Pension here serves as an insurance policy against retirement age risk. The Life Cycle Hypothesis (LCH) which was worked on by Franco Modigliani in the year 1985 relates consumptions to lifetime wealth at disposal. The retirees have already accomplished a larger percentage of their achievable life goals and are aware that income is not directly coming from active service. Generally, an employee in the civil service retires at the age of sixty years or having spent thirty-five years in service, whichever one comes earlier. The series of (18%) contributions made represent the independent variable while the pension benefit (RLA and/or PW) received represent the dependent variable.

Empirical studies of the contributory pension scheme have generated large literature in the last two decades in Nigeria upon the enactment of PRA in the year 2004. As studied by Onukwu (2020), some employees (with maximum of three years to retire) were allowed to go with the old pension system when the contributory pension scheme was introduced in the year 2004. Casey (2009) stated that the government bonds were purchased for those who had more than three years to retire when the new scheme was introduced. Pension issue is very worrisome to active workers in Nigeria because most pension beneficiaries are not the actual contributors. Most workers die before or shortly after their retirement from active service since the normal and general retirement age in Nigeria is sixty years and the life expectancy in Nigeria moved from 55.44 years to 55.75 years in the year 2022 (Rewane, 2023). As the life expectancy improves, the size of the retiree population also increases and the number of years spent in retirement increases in like manner. Elekwa, Okoh

and Ugu (2011) studied the implication of pension reform on social security planning and came to conclusion that the current pension scheme has significantly improved social security planning for retirees and their family. Pension income received has brought economic security and replaced the income loss due to retirement. Critically, the study never looked into the sufficiency of the retirement benefits given to the low income retirees.

Bahago, Ogunlela and faruk (2010) studied the extent some pension problems witnessed in the past have been improved. Untimely payments of retirement benefits, the problem of heterogeneity and continuity in the administration of pension assets or funds were the major problems observed. Using multiple instruments for data collection and subjecting the data collected to a non-parametric analytical test, the study revealed that there was absence of retiree discrimination but maintained that delay still occurred in pension payment. However, the study failed to explain further on the stages of retirement cycle that delay problem was decreasing, constant or improving. Aja (2015) also carried out a study on contributory pension plan to see if the scheme introduction has resolved the delay witnessed by retirees on the monthly pension payments. Survey research design was used and the opinions of retirees in seven federal establishments in Nigeria between years 2008 to 2014 were randomly sampled using questionnaire and interview methods of data collection. As noted from the opinions of the study, the delay witnessed still exists due to the manual approval process required in accessing retirement benefits. Aja (2015) recommended that PenCom should use appropriate software system to automate the approval process to greatly speed up the process and eliminate the administrative bottleneck emanating from multiple hardware or paper work which passes from one desk to another before final approval. Musibau (2012) in his study on the impact of the contributory pension on retiree savings using Oyo State public service employees as a case study, suggested that retirement benefits should be like a reward for retirees by the government without the need for employees' contributions. The study pointed out that there existed no significant relationship between savings and contributory pension scheme. It clearly appears that Musibau's study turned a blind eye to many problems faced when retirement benefit payment was wholly on the government shoulder.

Gunu and Tsado (2012) studied the economic implication of the contributory pension scheme in Nigeria. Descriptive statistics, simple percentages and chi-square were employed to analyse the questionnaires administered to pension managers, current contributors and retirees. The authors concluded that the contributory pension scheme has boosted economic growth in Nigeria through

significant and positive implication on the lives of the participants and the impact on capital market. Strict monitoring of pension managers and increased awareness to achieve success of the programme more than what is being achieved at that moment were further recommended. Ojiya, Ajie and Isiwu (2017) re-examined the belief of Gunu and Tsado (2012) and carried out an empirical analysis using the Granger Casualty Test and econometric tool of SPSS to assess the impact of contributory pension system on the Nigerian economic growth. Using data from the World Bank database and various issues of PenCom annual reports, the study concluded that pension funds or savings have positive but insignificant impact on economic growth. The conclusion of the study indicates that pension funds have not been judiciously used to boost economic growth in Nigeria due to safety and investment restrictions by the regulatory authorities. Chizueze, Nwosu and Agba (2011) worked on the commitment of civil service workers and their attitudes towards contributory pension scheme. As concluded in the study, the contributory pension scheme significantly and positively affects employees' attitude towards retirement as workers are more confident and relaxed in the scheme than the old defined benefit plan. As observed in the study, using the opinions of the active workers currently engaged to come to a study conclusion on the sustainability and capital adequacy of pension plan is absolutely misleading. The regular salaries with other financial sources or resources at the disposal of the current employees may mislead/misinform them on the operations of pension plan during retirement. In addition to knowing how confident the employees in active service are, the confidence level of the actual retirees of the scheme needs to be investigated. Olanrewaju (2011) examined the welfare of retirees and the Pension Reform Act (PRA) using Marxian Theory to analyse the collected descriptive data in structured questionnaires given to some selected retirees in Nigeria. Olanrewaju (2011) concluded that organised private sector retirees enjoy retirement benefits than their counterparts in the public sector owing to the fact that the government delays releasing or remitting contributions on behalf of the employees. The delay deprives a lot of retirees in assessing the retirement benefits as and when due upon retiring from the active service.

Although the PRA 2014 grants an employee access to the saved fund if such employee loses job and cannot find another one within four months but what about if an employer refuses to pay salary for several months due to circumstances beyond the control of such employer? For instance, during the corona pandemic time that shook the whole world in the year 2020, Abere and Ojikutu (2021) affirmed that the pandemic impacted severely and worsened the living condition of the poor and

vulnerable workers in Nigeria. Various palliative measures offered by the government and other concerned citizens could not cushion the adverse impact of the pandemic. Abere and Ojikutu (2021) recommended that the government should leverage on the pension funds to tackle poverty among workers during the pandemic era or any other disaster. Determinants of any financial decision in an organisation are risk and return which are directly related. The optimal investment of pension funds contain different complexities while trying to secure returns that must be paid back to retirees (Abere & Abiola, 2019). One of the main problems affecting the contributory pension scheme in Nigeria is the compositions of investment outlets/windows to ensure safety of pension funds (Banwo & Ighodalo, 2015). Due to safety or security of the pension fund investment, there is inadequacy in the accumulated pool of pension assets/funds (Abere & Abiola, 2019). The 2004 PRA was discovered, after a few years of implementation, to be insufficient in terms of some experiences and occurrences arising from some aspects of the provision of the Act (Ubhenin, 2012). The insufficiencies and inadequacies gave rise to the subsequent amendment and review in 2014.

GMP is an income support from the government and a social security policy variant which entails resource redistribution to the retirees (Aperu, 2017). The funding of GMP is not only borne by the government. The Pension Protection Fund (PPF) is jointly funded by the Federal Government, the National Pension Commission and pension administrators/operators. Aside from the government contribution of one percent of the employee wage bill, the pension operators also contribute three percent Annual Pension Protection Levy (APPL) from the management fees earned. According to Popoola (2021), the Federal Government of Nigeria failed to pay its own share of the contributions into the PPF after the PFAs have been contributing their own quota. One can deduce that the failure of the government to play its part in PPF funding has stalled the implementation of the GMP. As disclosed in the year 2017 by the Chairman of Pension Fund Operators Association of Nigeria, pension managers proposed a minimum monthly pension of ₦14 400 to each retiree who received less than that amount (Longe, 2017). Judging by the economic role of inflation and the situation of things in Nigeria now, such amount is ridiculous to be paid as pension to a retiree who has put in considerable number of years into quality service.

Ibiwoye and Adesona (2011) expressed concern that the issue of GMP is only expressed in paper as government has not really shown appropriate commitment. The government made provision for the funding of GMP and other pension benefit shortfall upon enactment of PRA as against the

claim of Ibiwoye and Adesona (2011) in their study. The only issue militating the provision made by the government is the commitment to the provision. Nwoji (2023) noted that the delay in GMP has led PenCom to make provision for enhanced pension for retirees under programmed withdrawal (PW) option. The provision excludes retirees who are using annuity as the pension retirement option. The enhanced pension for PW retirees cushions the effect of GMP non-implementation. According to Pension Nigeria (2023), PenCom paid out pension enhancement for retirees in December 2020, February 2022 and February 2023. In the draft regulation, a pensioner that is eligible for GMP shall not benefit from enbloc withdrawal (Pension Nigeria, 2023). As stated by Pension Nigeria (2023), enbloc withdrawal is paid to those pensioners (on PW benefit payment option) whose balance in the Retirement Saving Account (RSA) cannot provide at least monthly pension of one-third of the minimum wage. Enhancing pension benefits for only retirees on PW option while neglecting retirees on annuity option has considerably raised concerns by affected retirees and stakeholders despite the good intentions and aspiration of the initiative regulation (Apere, 2023). According to PenCom (2020), if a pensioner has a balance of not more than ₦550 000 in the RSA upon retirement, such retiree will be allowed to withdraw the entire amount as a lump sum but if the RSA balance is more than this amount, the retiree will be placed on monthly pension. A lump sum withdrawal of maximum of 25% by retirees upon retirement will only be allowed and possible provided that the remaining balance is sufficient to procure programmed withdrawal or annuity payment of an amount not less than fifty percent of the pensioners' monthly emolument prior to the time or month of their retirement (PenCom, 2020).

In a defined contribution system of pension, individual retiree receives what the accumulated savings can purchase at retirement. The side effect of the system is that the benefit purchased by low income retirees may be too low to sustain the retirees due to time value of money and the volume of their remuneration while in active service. The government is expected to subsidise pension benefit by setting a minimum guaranteed amount of pension when the available balance in the retirement savings account of a prospective low income retiree cannot guarantee minimum standard of living (Ford & Browning, 2016). The funding of the Guaranteed Minimum Pension is provided for in Section 82 of the year 2014 PRA.

Sogunro, Ayorinde and Adeleke (2019) estimated that low income earners would have to contribute more than 28% of their emolument for forty years in order to maintain or enjoy at least fair standard of living. The study respectively used CONUASS (Consolidated University

Academic Salary Structure) and CONTISS II (Consolidated Tertiary Institution Salary Structure) for academic and non-academic staff of the federal university in Nigeria. Nyong and Duze (2011) defined retirement as the period people stop working while continuing to receive income but this does not seem applicable to most low income retirees. Nyong and Duze (2011) worked on the retirement planning in Nigeria and examined the ability of the current retirement scheme to provide sufficient old age financial security for retired teachers in Nigeria. The retirees were not comfortable with the provision of PRA 2004 in catering for the basic needs during retirement due to inadequacy of the benefits received. A large number of low income retirees return to informal sector to continue working in order to support the family basic needs. According to Wolf and López Del Río (2021), retirees look for financial supplements to help their financial needs due to benefit insufficiency. The two common supplements open to retirees are agriculture (fishery, poultry, pig or crop farming) and trading.

Despite many studies on the subject matter, there still exists gaps to fill in the empirical literature as regards a study that pays special attentions to the plights and fear of low income retirees of the contributory pension scheme of the federal public sector in respect of sufficiency of the retirement benefits. This study pays more attention to those retirees whose take-homes while in active service could barely satisfy the needs of their family members. From the reviewed literature, there has not been any serious attempt to see if the benefits received by the retired low income employees of the civil service of the federation enable them to live comfortably in retirement by working out the minimum guaranteed amount of pension in respect of that. From the study of Sogunro, Ayorinde and Adeleke (2019), the savings accumulated by low income retirees through contributions could not provide fair standard of living upon retirement. There is need for subsidy by the government to augment the retirement benefit for minimum standard of living. Developing such minimum pension amount is one of the objectives of this study. This study also builds on the study of Nyong and Duze (2011) and concentrates the investigation on low income retirees of the federal civil service in Nigeria. Unlike the study of Nyong and Duze (2011) which made use of only quantitative approach, this study makes use of both quantitative and qualitative approaches to investigate the level of comfort or financial security enjoyed by low income retirees. In the course of this study, appropriate software is used to analyse data quantitatively and qualitatively. It calls for concerns for low income earners if teachers studied by Nyong and Duze (2011), with the levels

of the job qualification requirements and high probability of not retiring as low income retirees, could be unsatisfied with the benefit packages received under the current pension system.

In the research work of Ibiwoye and Adesona (2011), various costs to be incurred by the Federal Government of Nigeria in providing GMP were computed based on a mere assumption of eighteen thousand naira as GMP. The result arrived at would distort conclusion because computation of funding or cost of GMP depends greatly on the quantitative and quality analyses of the appropriate amount of GMP rather than using a mere assumed value. The study calculated the subsidy to be provided by the government to supplement the pension shortfall without specifying the exact qualifying years of contributions for GMP eligibility. In summary, based on the theoretical literature and framework reviewed/adopted in this study with the corresponding empirical evidences, the gaps in the literature have necessitated this study. Not many studies have examined pension issues and challenges directly affecting only the low income retirees of the federal civil service establishments (below GL 07) in Nigeria. In the course of this study, qualifying years for GMP will be specifically stated with the appropriate contributions expected for funding purpose. The modalities of GMP and the average/expected minimum amount of pension a retiree is entitled are missing in the related pension literature in Nigeria. The missing areas in the existing literature on the development of GMP are gaps this study fills and bridges to contribute to knowledge.

3 METHODOLOGY

Ex-post facto research design was employed in this study. The population of the study comprises federal government low income retirees who retired not earlier than the year 2020 below grade level 07 and are presently beneficiaries of the defined contribution pension plan in Nigeria. From the population, the sample comprises those retirees who spent 20 to 35 years in active service and were under consolidated public service salary structure. Sampling technique is based on convenience as a result of homogeneity and uniformity in the federal civil service in terms of operations, grade levels, salary structure or system across all federal establishments in Nigeria. The secondary data were got from the series of publications of National Salary Income and Wages Commission (NSIWC) and PenCom (such as annual reports, pension updates, quarterly reports, pension frequently asked questions (FAQ), salary structures and so on). Other secondary sources used comprise the readily compiled, accessible and downloadable materials. Descriptive and inferential statistics were employed in the study. Descriptive statistics used contain tables,

diagrams, charts and simple percentages to show how a variable among a particular set of data is fairly distributed in the whole set. Inferential statistics used in analysing the data are pension annuity formula, fund accumulation formula and Ordinary Least Square (OLS) Model. EasyFit 5.6 Professional Software was employed for easy data analysis. EasyFit Software generates statistics using three models (Kolmogorov Smirnov, Anderson Darling and Chi-Square) to select the best fit for the data. The statistics generated by the software in each model were ranked to determine the best fitness for the probability distribution used.

Formula/Model Specification

Salary growth rate (g)

Assume a retiree started with a salary of S upon employment which grew to S (1 +g) at the end of first salary increment period and sg(1+g) at the end of the second salary increment. Combining from the first to the last salary growth rate, the relationship between the initial first salary (S) and the last salary (F_n) at the end of the increment is expressed as;

$$F_n = S(1 + g)^n \tag{1}$$

Accumulated Value of Contributions (S_m)

$$S_m = (1 + g)^{n-1} + (1 + g)^{n-2} + (1 + g)^{n-3} + \dots + 1$$

Summing up the series $\frac{(1+g)^{n-1}[1-v^n]}{1-v}$, where $v = \frac{1}{1+g}$ and $1-v = gv$

$$S_m = S \frac{(1+g)^n - 1}{g} \tag{2}$$

Pension Annuity Payment ($\ddot{a}_{\overline{n}|}$)

The present value of the series of pension annuity payments consisting of n payments of P at the beginning of each of the next mth time periods is represented by P $\ddot{a}_{\overline{n}|}$

$$\ddot{a}_{\overline{n}|} = 1 + v + v^2 + \dots + v^{n-1}$$

$$\text{Summing up; } P = \frac{p(1 - v^n)}{1-v} \tag{3}$$

Ordinary Least Square (OLS)

The contributions serve as the independent variable(X) while the retirement benefit is the dependent variable (Y). Hence, the equation is defined as

$$\hat{Y} = a + b X \tag{4}$$

$$b = \frac{n\sum XY - \sum X\sum Y}{n\sum X^2 - (\sum X)^2},$$

$$a = \frac{\sum X^2 \sum Y - \sum X \sum XY}{n\sum X^2 - (\sum X)^2} \tag{5}$$

Where: a=value of the retirement benefit at time zero;

b= the change in \hat{Y} per unit change in X

Test of reliability of the model (Standard Error of the Estimate)

$$S_e = \sqrt{\frac{\sum(Y - \hat{Y})^2}{n-2}} \tag{6}$$

4. DATA PRESENTATION AND ANALYSIS

The main salary structure used is the Consolidated Public Service Salary Structure (CONPSS) obtained from the National Salaries, Incomes and Wages Commission (NSIWC). Unified Grading Salary Structure (UGSS) and Harmonised Public Service Salary Structure (HAPSS) were used to compute the benefits/contributions of retirees who started working before the introduction of CONPSS.

Table 1: Average pension contribution and retirement benefit (2004-2022)

Year	Number of contributors	Total contribution (₦)	Average contribution (X)	Number of retirees (PW&RLA)	Total retirement benefit(₦)	Average retirement benefit (Y)
2004	695622	15600000000	22425	0	0	0
2005	716583	34680000000	48396	0	0	0
2006	1504297	60410000000	40158	0	0	0
2007	2543178	148970000000	58576	0	0	0
2008	3467857	180090000000	51931	5171	2253120000	435722
2009	4012498	228310000000	56899	11469	5185080000	452095
2010	4542250	265490000000	58449	11476	3752880000	327019
2011	4927216	348450000000	70719	15405	5446200000	353534
2012	5393001	461760000000	85622	18125	6544080000	361052
2013	5919299	503920000000	85131	25585	10604160000	414467
2014	6395669	581730000000	90956	30020	12974280000	432187
2015	6885396	581730000000	84487	35964	19743360000	548975

2016	7348028	488200000000	66439	24511	12271560000	500655
2017	7823773	610840000000	78074	45107	22196280000	492080
2018	8410184	607550000000	72239	39679	41574720000	1047776
2019	8891236	700690000000	78806	45899	25782720000	561727
2020	9215696	908090000000	98537	44413	24120000000	543084
2021	9529127	879150000000	92259	37063	23292000000	628443
2022	9621979	891250000000	92626	35106	29144760000	830193

Source: Researcher’s calculation from Excel

Simulation of contributions made by retirees

Retirees spent different years in service before retirement with different growth in the salaries received. Changes occurred in salary structure before the year 1998 and in years 1998, 1999, 2000, 2003, 2007, 2010, 2011 and 2019. Contribution rates were also reviewed from 15% to 18% in the year 2014. For retirees spending a range of twenty to thirty-five years in service, this study considered each length of service and the salary growth rate shown in Table 2 using Equation (1).

Table 2: Computation of Pooled Salary Growth Rate

Length of Service	Salary Ratio	Salary Growth Rate (g)
20	1.0199	0.019989792
21	1.019	0.019028899
22	1.018	0.018156145
23	1.017	0.017359936
24	1.016	0.016630624
25	1.0159	0.015960119
26	1.015	0.015341584
27	1.0147	0.014769202
28	1.014	0.014237994
29	1.0137	0.01374367
30	1.013	0.013282519
31	1.0128	0.012851309
32	1.0124	0.012447217
33	1.012	0.012067762
34	1.0117	0.011710757
35	1.0113	0.011374269

Source: Researcher’s calculation from Excel

20 years in service: Years 2001-2020 (Entry age of 40 years old)

Grade level 1 (Years: 2001-2002, 2003, 2004)

$$S \frac{(1+g)^n - 1}{g}, \quad S \frac{(1+g)^{m+n} - (1+g)^n}{g}, \quad g = 0.019989792 \text{ (from Table 2).}$$

S = Annual emolument

$$80400 \frac{(1+0.019989792)^2 - 1}{0.019989792} + 94500 \frac{(1+0.019989792)^3 - (1+0.019989792)^2}{0.019989792} + 94500 \frac{(1+0.019989792)^4 - (1+0.019989792)^3}{0.019989792}$$

Grade level 2 (Years: 2005- 2006, 2007-2008)

$$96118.8 \frac{(1+0.019989792)^6 - (1+0.019989792)^4}{0.019989792} + 237569.52 \frac{(1+0.019989792)^8 - (1+0.019989792)^6}{0.019989792}$$

Grade level 3 (Years: 2009, 2010, 2011)

$$240812.28 \frac{(1+0.019989792)^9 - (1+0.019989792)^8}{0.019989792} + 369333.96 \frac{(1+0.019989792)^{10} - (1+0.019989792)^9}{0.019989792} + 389388 \frac{(1+0.019989792)^{11} - (1+0.019989792)^{10}}{0.019989792}$$

Grade level 4 (Years: 2012-2013, 2014)

$$407883 \frac{(1+0.019989792)^{13} - (1+0.019989792)^{11}}{0.019989792} + 407883 \frac{(1+0.019989792)^{14} - (1+0.019989792)^{13}}{0.019989792}$$

Grade level 5 (Years: 2015-2017)

$$462174.96 \frac{(1+0.019989792)^{17} - (1+0.019989792)^{14}}{0.019989792}$$

Grade level 6 (Years: 2018, 2019-2020)

$$563522.76 \frac{(1+0.019989792)^{18} - (1+0.019989792)^{17}}{0.019989792} + 786500.76 \frac{(1+0.019989792)^{20} - (1+0.019989792)^{18}}{0.019989792}$$

Accumulated salaries(AAVS) = ~~₦~~8 785 204.97

Pension contributions (AAVC)=7.5%(salaries before year 2004) +15%(salaries from years 2004-2013) +18%(salaries from years 2014-2020)=~~₦~~1 461 763.38

Table 3: Summary of Retirees’ Accumulated Salaries and Contributions Made

Years of service	Entry Age	AAVS	AAVC
20	40	₦8 785 204.97	₦1 461 763.38
21	39	₦8 573 845.74	₦1 413 653.38
22	38	₦8 899 190.32	₦1 465 941.69
23	37	₦9 225 433.02	₦1 518 253.57
24	36	₦9 514 219.7	₦1 564 502.1
25	35	₦9 572 548.38	₦1 572 161.15
26	34	₦9 047 893.47	₦1 477 241.61
27	33	₦9 326 937.34	₦1 524 204.71
28	32	₦9 609 127.44	₦1 569 499.86
29	31	₦9 887 339.1	₦1 614 139.86
30	30	₦10 153 953.96	₦1 656 990.29
31	29	₦9 392 031.12	₦1 524 689.29
32	28	₦9 517 481.95	₦1 541 906.89

33	27	₦9 930 628.53	₦1 611 203.59
34	26	₦10 193 256.64	₦1 653 621.19
35	25	₦10 449 475.14	₦1 695 030.61

Source: Author’s computation
 Computation of Accrued Pension Benefits.

To get the benefits accrued to retirees based on the contributions made and the length of service put in, historical relationship (regression) between pension contributions and benefits is examined using equations (4) and (5). The best fitness is chosen having tested the reliability level using equation (6).

Table 4:Regression analysis of pension contributions and benefit (2004-2022)

Year	Average contribution (X)	Average retirement benefit (Y)	XY	X ²	Ŷ	(Y - Ŷ)	(Y - Ŷ) ²
2004	22425	0	0.00E+00	5.03E+08	-221783.27	-221783.27	4.92E+10
2005	48396	0	0.00E+00	2.34E+09	-221783.27	-221783.27	4.92E+10
2006	40158	0	0.00E+00	1.61E+09	-221783.27	-221783.27	4.92E+10
2007	58576	0	0.00E+00	3.43E+09	-221783.27	-221783.27	4.92E+10
2008	51931	435722	2.26E+10	2.70E+09	3747644.2	3311922.15	1.10E+13
2009	56899	452095	2.57E+10	3.24E+09	3896802.2	3444707.18	1.19E+13
2010	58449	327019	1.91E+10	3.42E+09	2757359.8	2430340.82	5.91E+12
2011	70719	353534	2.50E+10	5.00E+09	2998911.5	2645377.47	7.00E+12
2012	85622	361052	3.09E+10	7.33E+09	3067400.5	2706348.45	7.32E+12
2013	85131	414467	3.53E+10	7.25E+09	3554011.1	3139544.1	9.86E+12
2014	90956	432187	3.93E+10	8.27E+09	3715440.3	3283253.3	1.08E+13
2015	84487	548975	4.64E+10	7.14E+09	4779379	4230403.98	1.79E+13
2016	66439	500655	3.33E+10	4.41E+09	4339183.8	3838528.78	1.47E+13
2017	78074	492080	3.84E+10	6.10E+09	4261065.5	3768985.53	1.42E+13
2018	72239	1047776	7.57E+10	5.22E+09	9323456.1	8275680.09	6.85E+13
2019	78806	561727	4.43E+10	6.21E+09	4895549.7	4333822.7	1.88E+13
2020	98537	543084	5.35E+10	9.71E+09	4725712	4182627.97	1.75E+13
2021	92259	628443	5.80E+10	8.51E+09	5503332.5	4874889.46	2.38E+13
2022	92626	830193	7.69E+10	8.58E+09	7341275	6511081.96	4.24E+13
1332729	7929009	6.24E+11	1.01E+11				2.82E+14

Source: Researcher’s calculation from MS Excel

$$a = \frac{8.00588E+17 - 8.32E+17}{1.91842E+12 - 1.78E+12}$$

$$b = \frac{1.18633E+13 - 1.06E+13}{1.91842E+12 - 1.78E+12}$$

$$Y = -221\ 783.27 + 9.11X \quad (1^{st} \text{ Regression Equation}) \quad S_e = 4.07E+06$$

Regression analysis of pension contributions and benefit (2005-2022)

$$Y = -112179.60 + 7.68X \quad (2^{nd} \text{ Regression Equation}) \quad S_e = 3.41E+06$$

Regression analysis of pension contributions and benefit (2006-2022)

$$Y = -36\ 360.54 + 6.83X \quad (3^{rd} \text{ Regression Equation}) \quad S_e = 3.03E+06$$

Regression analysis of pension contributions and benefit (2007-2022)

$$a = 7\ 033.91; \quad b = 6.38 \quad S_e = 2.836E+06$$

$$Y = 7\,033.91 + 6.38X \quad (4^{\text{th}} \text{ Regression Equation}) \quad (7)$$

Regression analysis of pension contributions and benefit (2008-2022)

$$Y = 28\,317 + 6.35X \quad (5^{\text{th}} \text{ Regression Equation}) \quad S_e = 2.839E+06$$

DECISION

Based on the reliability test on the best fit of the regression equations, 4th regression equation has the lowest standard error. $Y = 7\,033.91 + 6.38X$ is the best fit needed to estimate the level of benefit (Y) when a particular level of contribution (X) is given. Having removed 25% lump sum from the total contribution, pension benefits are computed for the remaining 75% using equations (3) and (7)

35 years in service (Entry age of 25 years old)

Total pension contributions (AAVC) = ₦1 695 030.61

$$\text{Lump sum } \left(\frac{1}{4}\right) = \text{₦}423\,757.65;$$

$$\text{Contribution balance } \left(\frac{3}{4}\right) = \text{₦}1\,271\,272.96$$

$$\begin{aligned} \text{Total pension benefit (TAB)} &= 7\,033.91 + 6.38 (\text{₦}1\,271\,272.96) \\ &= \text{₦}8\,117\,755.40 \end{aligned}$$

$$\text{Annual benefit (P):} \quad \text{₦}8\,117\,755.40 = \frac{P(1 - v^n)}{1 - v}; \quad \text{where } v = 0.985221674 \text{ and } n = 15.$$

$$P = \text{₦}599\,389.11$$

$$\text{Monthly pension (AMB)} = \text{₦}49\,949.10$$

Table 5: Summary of Total and Monthly Pension Benefits

Years of service	Entry Age	TAB	AMB
20	40	₦7 001 571.68	₦ 43 081.14
21	39	₦6 771 365.33	₦ 41 664.66
22	38	₦7 021 564.90	₦ 43 204.16
23	37	₦7 271 877.24	₦ 44 744.35
24	36	₦7 493 176.46	₦ 46 106.02
25	35	₦7 529 825.01	₦ 46 331.52
26	34	₦7 075 635.01	₦ 43 536.86
27	33	₦7 300 353.45	₦ 44 919.56
28	32	₦7 517 090.74	₦ 46 253.16
29	31	₦7 730 693.14	₦ 47 567.47
30	30	₦7 935 732.45	₦ 48 829.09
31	29	₦7 302 672.16	₦ 44 933.83
32	28	₦7 385 058.38	₦ 45 440.75
33	27	₦7 716 643.09	₦ 47 481.02

34	26	₦7 919 611.07	₦ 48 729.90
35	25	₦8 117 755.40	₦ 49 949.10

Source: Author’s computation

Using EasyFit, Kolmogorov-Smirnov, Anderson-Darling and Chi-Squared rank first, seventh and tenth respectively using the generated EasyFit statistics. Erlang Probability Distribution, with $m=62$ $\beta=286.56$ and $\gamma=0$ as parameters, was used to obtain the retiree average monthly pension benefit (AMB) by fitting the parameters into the expected value of the distribution function. The average monthly pension of a federal civil service retiree who had worked for 20 – 30 years is **₦ 45 773.39**.

Development of Guarantee Minimum Pension (GMP).

The total contributions of a worker depend greatly on the total salaries (emolument) earned from the time employed to when retired. In developing the guarantee minimum pension, analysis is carried on different salary ranges below grade level seven (GL 07) in the Consolidated Public Service Salary Structure (CONPSS) using EasyFit 5.6 Professional Software. 61 probability distribution functions were tested for fitness. The Generalised Extreme Value Probability Distribution Function is suitable in modelling the data using the ranks and the generated statistics of Kolmogorov-Smirnov, Anderson-Darling and Chi-Squared models. Fitting the parameters of the Generalised Extreme Value PDF into the mean, the annual GMP for a retiree who spent 20 years to 30 years in active service is **₦874 616.20** while the equivalent monthly pension is **₦72 884.68**. A lower CV value of 12% suggests the distribution used to obtain the result is better in terms of normality, standard and stability.

Funding

In line with the Theory of Pension Funding Policy, it is important to consider the funding or cost implication of GMP in order to continue to sustain the policy of GMP implementation. Equation (2) is used to compute the total benefit of a retiree for a 15-year period at 1.5% growth rate per annum:

$$\begin{aligned}
 \text{Accumulated benefit} &= \text{₦}874\,616.20 \frac{(1+0.015)^{15} - 1}{0.015} \\
 &= \text{₦}14\,590\,467.95
 \end{aligned}$$

To compute the needed total contribution (X) that can fund the level of GMP for 15 years, Equation (7) is applied:

$$₦14 590 467.95 = 7 033.91 + 6.38 X$$

$$X = \frac{₦14 583 434.04}{6.38} = ₦2 285 804.71$$

Computation of Pension Subsidy

35 years in service

Expected Total Pension Subsidy (ETPS) = Guarantee Minimum Pension (GMP) – Total Benefit (TAB)

$$= ₦14 590 467.95 - ₦8 117 755.40$$

$$= ₦6 472 712.55$$

Expected Annual Pension Subsidy (EAPS) = ₦431 514.17

Actuarial Present Value of Annual Subsidy (APVAS): This can be computed by applying Equation (2).

$$₦6 472 712.55 = APVAS \frac{(1+0.015)^{15} - 1}{0.015}$$

$$APVAS = ₦388 002.58;$$

$$\text{Monthly Pension Subsidy (MPS)} = ₦32 333.55$$

Table 6: Summary of Pension Subsidy

Years of service	Entry Age	APVAS	MPS
20	40	₦454 911.50	₦37 909.29
21	39	₦468 711.07	₦39 059.26
22	38	₦453 713.02	₦37 809.42
23	37	₦438 708.20	₦36 559.02
24	36	₦425 442.57	₦35 453.55
25	35	₦423 245.69	₦35 270.47
26	34	₦450 471.81	₦37 539.32
27	33	₦437 001.22	₦36 416.77
28	32	₦424 009.04	₦35 334.09
29	31	₦411 204.78	₦34 267.07
30	30	₦397 834.83	₦33 152.90
31	29	₦436 862.22	₦36 405.19
32	28	₦431 923.63	₦35 993.64
33	27	₦412 047.00	₦34 337.25
34	26	₦399 880.22	₦33 323.35
35	25	₦388 002.58	₦32 333.55

Source: Author’s computation

5 DISCUSSION AND SUMMARY OF FINDINGS

From the analysis of data, the maximum accumulated salary of a low income federal civil service retiree who worked for maximum of 35 years is ₦10 449 475 with a total pension contribution that is less than ₦2000000 as shown in Table 7. Using Erlang distribution function parameters to estimate the average pension amount of a low income retiree who retired before reaching grade level 7, ₦45 773.39 is the average monthly pension. The estimated monthly and annual GMPs for a retiree who served between 20 years to 35 years are ₦72 884.68 and ₦874 616.20 respectively. For a 15-year period, the accumulated value of GMP is ₦14590467.95 which can be funded by a pension contribution of ₦2 285 804.71. The minimum expected total pension subsidy is ₦6 472 713 while ₦476 757 is the middle value of the expected annual pension subsidy. The actuarial present value of the annual subsidy at 1.5% growth rate is ₦428 373. The average value of the monthly pension subsidy is ₦35 698. Based on the analysis of data carried out in this study, Table 7 summarises the research findings.

Table 7: Summary of Findings

Year of Entry	Entry Age	Length of Service	AAVS	AAVC	75% of AAVC	TAB	AMB	ETPS	EAPS	APVAS	MPS
1986	25	35	10449475	1695031	1271273	8117755	49949	6472713	431514	388003	32334
1987	26	34	10193256	1653621	1240216	7919611	48730	6670857	444724	399880	33323
1988	27	33	9930629	1611204	1208403	7716643	47481	6873825	458255	412047	34337
1989	28	32	9517482	1541907	1156430	7385058	45441	7205410	480361	431924	35994
1990	29	31	9392031	1524689	1143517	7302672	44934	7287796	485853	436862	36405
1991	30	30	10153454	1656990	1242743	7953732	48829	6636736	442449	397835	33153
1992	31	29	9887339	1614140	1210605	7730693	47567	6859775	457318	411205	34267
1993	32	28	9609127	1569500	1177125	7517091	46253	7073377	471558	424009	35334
1994	33	27	9326937	1524205	1143154	7300353	44920	7290115	486008	437001	36417
1995	34	26	9047893	1477242	1107931	7075635	43537	7514833	500989	450472	37539
1996	35	25	9572548	1572161	1179121	7529825	46332	7060643	470710	423246	35270
1997	36	24	9514220	1564502	1173377	7493176	46106	7097291	473153	425443	35454
1998	37	23	9225433	1518254	1138690	7271877	44744	7318591	487906	438708	36559
1999	38	22	8899190	1465942	1099456	7021877	43204	7568903	504594	453713	37809
2000	39	21	8573846	1413653	1060240	6771365	41665	7819103	521274	468711	39059
2001	40	20	8785205	1461763	1096323	7001572	43081	7588896	505926	454912	37909
		MEAN	9504879	1554050	1165538	7444309	45798	7146179	476412	428373	35698
		MEADIAN	9515851	1553204	1164903	7439117	45773	7151351	476757	428683	35724
		MIN	8573846	1413653	1060240	6771365	41665	6472713	431514	388003	32334
		MAX	10449475	1695031	1271273	8117755	49949	7819103	521274	468711	39059

6. CONCLUSION AND RECOMMENDATION

The major factor which the pension benefits (Y) depend is the volume of the total contributions (X) made while in active service. The pension contribution is a fraction of the employee’s emolument. Pension or life market is very competitive. The competition channels the pension

operators to behave rationally in managing and investing the pension funds. Restrictions on the investment of pension funds mitigate efficient investment returns but assures safety of funds. Low investment return constitutes a major challenge in life market. Low investment returns is one the factors that affect adequacy of pension benefit. With the application of proper actuarial principles in pension matters, most pension challenges will be things of the past. Actuarial principles are not being fully applied by some pension operators due to more priority apportioned to the goal maximisation objective. The operators place their profit maximization goal above the contributors' welfare. Due to the impact of inflation and the negative effects of fuel subsidy removal, the Federal Government of Nigeria (FGN) granted a wage award of thirty five thousand naira for federal workers (NSIWC, 2023). The FGN did not show such sympathy to vulnerable low income pensioners who also get affected by the adverse effect of government policy. There is need to work out pension amount which will serve as sufficient minimum benchmark. Any pension benefit amount below the minimum pension should be subsidised by the government to allow the retirees enjoy at least minimum level of comfort.

Aside the lifetime pension provision of annuity option, it is absolutely necessary to bring in another player not just to participate in the pension system but serve as a watchdog for pension managers and administrators in the way pension funds are being managed or accumulated in order to curb the problem of benefit insufficiency. As Nigeria advances towards a dependable and comprehensive system of pension administration, this study adds to the drive which provides simulating evaluation of the efficient and effective sufficiency of the current pension system benefits. The study analysis serves as direction to know which areas of current pension plan can be improved upon for adequacy and sufficiency of retirement benefits. In order to adequately fund the minimum guarantee pension for low income retirees and reduce the fiscal cost of pension system, government should review the excessive generous tax treatment of pension payment above certain amount. The Pension Commission should also review commissions and curb the unnecessary hidden fees charged by the pension operators/managers in order to increase the accumulated contributions of retirees. The pension benefit received by some low income retirees of the federal civil service in Nigeria is insufficient despite considerable years spent in active service. It is therefore compulsory to implement guaranteed minimum pension which will help the low income retirees to meet the basic needs of feeding, shelter and clothing.

This study has computed a GMP of ₦72 884.68 for a retiree as monthly pension for 15 years which will require pension funding or contributions of ₦2 285 804.71. The government is expected to make up for any shortfall in the pension funds as pension subsidy if the pension contributors do not contribute up to that amount. One of the theories which this study is based is the Theory of Life Cycle Hypothesis (LCH) which believes that consumptions reduce towards the later years in the life cycle of mankind because most of the achievable goals set by individuals must have been accomplished before retirement. In line with the research theory, retirees will revert to their original pension amount without subsidy after 15 years of subsidy payment in order to sustain the policy of GMP implementation. Rewane (2023), in his mortality study, found out that most retirees die within 15 years after normal retirement of 60 years. In line with Rewane (2023), GMP minimum qualifying year of service is 20 years and the payment ceases after 15 years of subsidy payment. After this period, the appetite of the retirees for some levels of basic necessities of life has reduced to barest minimum. Retirees can now survive with less amount than the GMP.

Arising from the findings of this study, the followings are recommended.

- i. In order to secure the future of the retirees, only life annuity option perfectly suits the purpose of providing pension payment for retirees
- ii. In order to adequately address the plights, issues and challenges of pensioners in Nigeria, the government should create a separate ministry for pension that will be distinctly and solely responsible for all matters relating to pension issues.
- iii. A GMP of ₦72 884.68 should be implemented for low income retirees of the federal public service with the modalities of minimum of 20 years in active service for qualification and the pension subsidy will last for 15 years after normal retirement age of 60 years old or 35 years in service.
- iv. Finally, the government should consider raising the normal retirement age from 60 years or 35 years of service to 65 years or 40 years in service to enable low income earners cater for not only the basic needs but also accumulate more pension funds for their retirement.

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