

The Roles of Funding Gaps and Life Expectancy in Retirement Income Adequacy

Saratu Lassa Jim-Suleiman and Joshua Solomon Adeyele, University of Jos
E-mail: adeyelej@unijos.edu.ng

Abstract: *One of the issues leading to retirement income inadequacy under the defined contribution (DC) pension scheme has been attributed to funding gaps. Funding gaps under DC occur when pension contributions as well as investment returns are not regularly credited to employees' retirement saving accounts (RSAs). In order to determine the effect of funding gaps and life expectancy on retirement income security, this study investigated how determinants of funding gaps and life expectancy affect accumulated funds. The findings showed that employer's compliance, role of Pension Fund Administrators (PFAs), and years of remittance defaults have a positive and significant effect on funding gaps. In contrast, the role of Pension Commission (PenCom) has negative effect on funding gaps. Meanwhile, further investigation revealed that both funding gaps and life expectancy significantly accounted for 83.1% of accumulated pension funds. These findings led to the conclusion that the active roles of PenCom have assisted in recovering up to 62.5% of funding gaps back to employees' RSAs in Federal Universities in Nigeria. Following the adverse effect of the role of PFAs on accumulated funds, the study recommends that regulatory body should carefully monitor their activities so as to ensure total compliance that will further narrow the existing funding gaps of DC.*

Keywords: Defined contribution, Funding gap, Retirement income adequacy, Life expectancy.

JEL: J33, H55.

- Introduction and Background

Decision-making about accumulated funds is critical to old age security. With respect to the choice of retirement income option at the payout phase, many academics in Nigerian universities seem not to be aware that

*Corresponding Author

government will not be responsible for paying them pension benefits like the former pay-as-you go (PAYG) basis. Also, many are not aware that they have to make an important decision about the choice of retirement income options at the payout phase of a defined contribution (DC) pension between phased withdrawal and retirees' life annuity. If the wrong choice is taken between the two, that will affect the financial well-being of the decision maker. Some of the factors that will determine to a large extent choice of retirement income security include a general expectation of life at retirement, families' network, health condition, financial status of retirees, and cost of annuity product.

One of the issues leading to delay in pension payments to retirees has been attributed to funding gaps. Information gaps among employees about the former defined benefit (DB) schemes and the current defined contribution can be attributed to loss of returns on investment of funds not remitted as and when due. It has been speculated that more than 90% of defined contribution members will not have access to pension income to support the lifestyle enjoyed prior to retirement. This implies that upon retirement, retirees still need to continue working and earning income if they should maintain the lifestyle they envisaged in their old age. Kruger (2011) listed inadequate contributions towards retirement savings, poor returns on investment, and non-preservation of earnings upon retirement as three key reasons affecting DC pensions in many countries.

In Nigeria, for a couple of months starting from 2019 when the Integrated Payroll and Personal Information System (IPPIS) was introduced as a payment platform for university employees, virtually no members of the Academic Staff Union of the Universities up till today have received any pension contribution from employers to their retirement saving accounts. The non-remittance by the government is one of the major sources of funding gaps as the Pension Fund Administrators (PFAs) will not have access to those unremitted funds for investment purposes. Hence, the number of years in pension defaults about employers' contributions and investment returns remained the funding gaps that must not be allowed to be widened but put in a narrow direction.

It is not clear if the volume of funds leaking out of accumulated funds and the increase in expectation of life at retirement will substantially lead to retirement income adequacy. If the amount in the funding gap is paid at retirement, it will increase the total amount in accumulated funds, and this will eventually increase the retirement income adequacy. Conversely, failure to recover the amount in the funding gap will reduce the financial adequacy for the retirees.

The themes of many studies both in Nigeria and other countries reported inadequate funding and how to increase the accumulated funds as being much more important (Palacios, 2005; James & Vittas, 2013; Stewart, 2007; Rusconi, 2008). Pettinato et al. (2005) revealed that demographic trends that lead to improvements in life expectancy will reduce the level of income adequacy at retirement, while Doyle and Piggot (2003) have advocated for the need for future research to focus on income adequacy as older people look ahead for their retirement years than ever before in world history. It is on this premise that Pettinato et al. (2005) recommended annuity purchase to cope with increasing life expectancy.

Meanwhile, Kastelein and Romp (2020) have faulted earlier studies in pension literature for considering only a long-term implication but also ended up with recommendations that cannot be easily implemented. The accumulated pension value of funds participants during the financial crisis of 2008 were found to exceed value of invested contributions as the crisis negatively affected pension assets with subsequent low-interest rates (Almeida & Fornia, 2008; Munnell, Aubry & Quinby, 2010; Boivie & Almeida, 2008).

The negative impact of the capital market on pensions has been examined by many studies, but the space of funding gap and increasing life expectancy impact still remain the critical issues in pension literature. Despite the abundance of studies in pension literature, no study has specifically examined the impact of funding gap and life expectancy on retirement income adequacy. Against this backdrop, this study focuses on the impact of these two variables to determine the retirement income adequacy in the public sector in Nigeria.

Hence, the specific objectives of this study are to: determine the effect of employer's compliance, the role of PFAs, PenCom and years of contributions on funding gaps, and investigate the impact of funding gaps and expectation of life on retirement accumulated funds.

The achievement of these objectives will guide the study on how funding gaps and life expectancy influence retirement income adequacy in the country under a defined contribution pension scheme. This study contributes to the existing literature by establishing the link between funding gaps and life expectancy to accumulated pension funds. It will be of great benefit to all stakeholders of defined contribution in globally and in Nigeria as well as regulators and policymakers.

- Literature Review

Traditionally defined benefit scheme has played a significant role in old age income maximization for many years. The scheme guarantees a steady income for retirees, and payment is contingent on their survival but recently has lost its preference for defined contribution pensions in many countries (Chen, Haberman & Thomas, 2017). Under the DC pension scheme, both employers and members contribute a defined portion of employees' monthly salaries towards their personal pension savings and the risks of investment during the accumulation stage and how to spend them down during retirement are purely that of employees (Chen et al., 2017).

- Theoretical Review and Hypotheses Development

Retirement savings well managed have become the mainstay of financial security during retirement. Unlike in the defined benefit schemes, where sponsors make decisions for beneficiaries, the members of defined contribution and retirement saving accounts need to make decisions about investment decisions and how it should be used during retirement (Ippolito, 1986). Understanding the funding status of sponsored pension is akin to ascertaining its health status. To determine the health status of any pension plan, the valuation must be conducted at regular intervals to enable both the sponsors and beneficiaries to determine the scheme funding adequacy (Warshawsky, 1995).

Inadequate funding increases the liabilities to be funded with future cash flow. Hence, the reason for pension regulation. The purpose of pension regulation, according to Kastelein and Romp (2020), is to ensure its funding adequacy so as to do away with the system of transferring the costs to future generation from the current generation. This can be done in many ways, including estimating the pension future costs to fund participants who are closer to retirement. It is no longer news that rates of mortality have followed a downward trend in recent times, signifying improvement in life expectancy.

A study by Antolin (2007) investigated various factors that led to improvement in life expectancy and linked life expectancy to defined benefit pensions. This has been substantiated by Development (2011) reports that older people today live longer and remain in sound health than former generations. The report further noted that people in the old generation hardly lived longer when government pension schemes were first introduced. This means that the impact of living longer on pension funds is not significant, unlike recently, that people live at least 17 to 21 years in retirement from age 65 on average (Development,

2011). While improvement in life expectancy should be celebrated, its impacts on pension

funds have translated to inadequate pension incomes since prolonged living can systematically strain the accumulated funds (Development, 2011). The impact of life expectancy on the former defined benefit pension sponsored by employers has led to huge pension liabilities that compel governments of many countries to adopt contributory pension schemes.

Due to the inability of employers, especially government, to make regular pension payments to retirees regularly, many employees believed that a shift from DB to DC pension would lead to sufficient funds for old age as returns on investment will significantly increase contributed funds (Friedberg & Webb, 2005; Antolin, 2007). However, Development (2011) revealed that the burden of changes in life expectancy implies lower pensions under defined contribution schemes and speculated that it would lead to a lower replacement ratio as people live longer in retirement. Considering the option available to employees at the payout phase, those in favour of annuity will be paid based on projected life expectancy at retirement and the longer this, the less retirement adequacy.

Critical analysis of retirement income adequacy has been recommended to be a continuous process due to the aging population that is changing rapidly (Beedie, 2015). Pension adequacy, according to Redwood et al. (2013), refers to the degree to which retirement income enables retirees to meet basic needs or the general standard of living (Walker, 2005). One of the methods for assessing funding adequacy is the valuation exercise. Valuation is an attempt to show the possibility of employers being able to pay all accruing benefits earned by discounting the affect time value of money (Warshawsky, 1995).

Report (1995) identifies many problems confronting the existing defined benefit pension system, which in turn result to pension income inadequacy. Due to the unsustainability nature of the defined benefit, the Report (1995) proposed a blueprint methodology for the inclusion of funded components to existing pensions, particularly in the public sector, which many countries have responded to with the hope of alleviating the plight of pensioners (Beedie, 2015). This proposal was specifically designed to create awareness of the impact of the aging population on pensions to the attention of policymakers (Draxler & Mortensen, 2009).

- Hypotheses Development

Adeyele and Suleiman (2021) demonstrated in their analysis how funding gaps could delay pension income payment at retirement if regulatory intervention is jettisoned. They developed a funding gap model by investigating how

regulatory control, savings, and returns on investment predict funding gaps (amount leaking out of total saving) impact on accumulated funds. Their study further revealed that effective regulation is designed to remove some issues that systematically create funding gaps that lead to shortfalls in accumulated funds. Similarly, Adeyele and Maiturare (2021), in an attempt to estimate the extent of pension liabilities in public universities, developed mathematical models (rather called recovery model) that systematically enable pension stakeholders to objectively determine pension liabilities. Consequently, this study adopts the life cycle model, often referred to as the life cycle hypothesis, to serve as the basic framework through which economists plan and save for old age income in agreement

with Biggs (2016). This model deals with households' decisions making about saving and spending. On the basis of these issues, the hypotheses of the study are as follows:

Ho1: Employer's compliance, Pension Fund Administrators and regulatory role have no significant effect on funding gaps.

Ho2: Funding gaps have no significant effect on accumulated funds in Nigeria.

Ho3: Life expectancy has no significant effect on accumulated pension funds in Nigeria.

In a model developed by Adeyele and Suleiman (2021), they noted a significant negative constant in accumulated funds while the employer's contribution, PenCom and Funding gap significantly increased accumulated funds. However, the authors noted returns on investment in terms of PFAs' performance inversely affect accumulated funds that were already operating at a constant negative digit. They also discovered that at least 80% of funds being withheld in the funding gap were being remitted back to RSAs with a significant level of compliance among employers, while negative returns by PFAs significantly reduced the volume of financial security of retiring employees.

- Underpinning Theory

This study adopts bondholders' theory to explain underfunding of pension schemes. The theory relates to the possibility of employers breaching the trust of employees who finance their future old age income through low salaries in the present with the other portion of the salaries for retirement benefits held by organisations.

Ippolito (1986) examined the abnormality in underfunded pension plans and discovered that most of the schemes with underfunding were affiliated to trade unions' schemes as the ratio of funding is significantly less than 1.0 of funding ratio. From this discovery, Ippolito (1986) came up with a theory of bondholders which is created from workers' commitment to the organisation long-term through shareholding. The author noted that as workers hold huge

investments in the firm in the form of human capital, they need sufficient risk premiums than those diversified from the capital market. Firms underfund their pension schemes by making employees long-term bondholders. In this case, if workers finance their pension through low salaries or a portion of salaries used as pension but not remitted to appropriate accounts for old age as expected, it implies underfunding of schemes.

The optimality of this contract is enhanced if workers have information about the ability of firms to make repayments than those outside which they do not have information on how the funds are being utilized. Since employees determine the productivity of the firms, they are able to predict firms' performance more than outside firms; they do not have influence or any information on the firms' performance. This theory is more appropriate where there is a strong legal system to protect the parties involved in the contract.

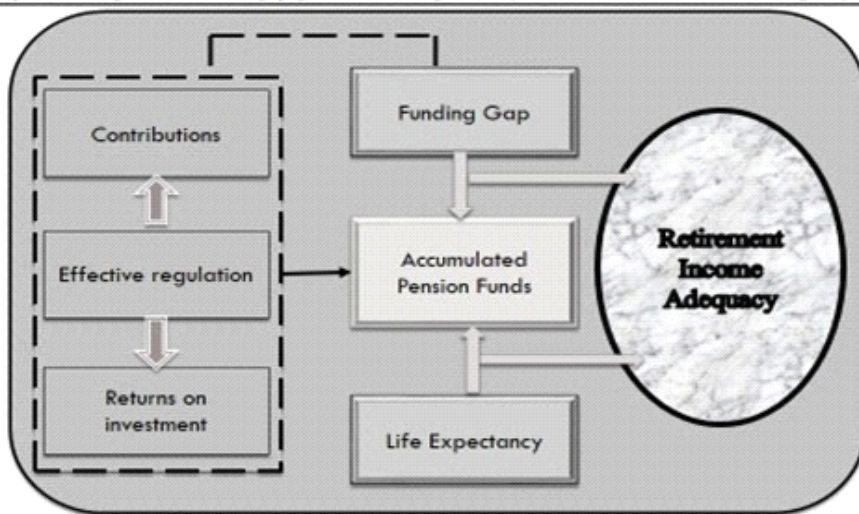
- Conceptual Framework of the Study

The absence of funding gaps in any pension scheme increases the level of security among the DC members, while a significant degree of funding gaps reduces the level of financial insecurity in equal proportion. When funding gaps and life expectancy outcomes on existing funds are positive, it implies there is the presence of a level of financial security for the pensioners while a negative outcome reduces the level of financial security. In other words, negative funding gaps and life expectancy are used as independent variables to demonstrate how accumulated funds (dependent variable) will be reduced.

The funding gaps of defined contribution pensions have been linked to the roles of key players such as employers, Pension Fund Administrators, and the Pension Commission (PenCom) (Adeyele & Jim-Suleiman, 2018). Many studies revealed that irregular remittances or inadequate funding by employers constitute a major threat to the sustainability of the scheme. The component that leads to a funding gap includes contributions default, absence of investment in contributions, and the number of years the default takes place. These three factors depend on the effectiveness of the regulatory body in ensuring compliance.

It has been observed that if PenCom, as one of the key players of DC, ensures that both employers and PFAs comply with the requirement of the pension law, the issue of funding gaps will not exist. The failure of the regulatory body to enforce remittance compliance is seen as detrimental to the fundamental rights of the beneficiaries of DC. Adeyele (2011) noted that the dual role of PenCom as a regulator of the pension system and industry administrator will always lead to a weak regulatory framework as the government that consistently defaults in pension remittances cannot force other private institutions to comply. Figure 1 shows the impact of the funding gap and life expectancy on accumulated funds used as a proxy for retirement income security.

Figure 1: Impact of funding gaps and life expectancy on retirement income adequacy



Source: Authors' Framework

The dotted lines around contributions, effective regulation and returns on investment indicate there are leakages of funds to funding gaps. The funding gap represents the amount of funds that would have entered the accumulated funds but are not yet remitted. These funds include unremitted funds as well as

loss of investment returns. The leakages and investment are associated with time, which signifies a shorter time for contribution and investment will

affect the volume of funds going to accumulated funds. Two major factors being suspected to affect the accumulated funds, therefore, include the amounts going into the funding gaps and the expectation of retirement. The longer the expectation of life in retirement, the less level of financial security, as living longer than projected life expectancy implies that the retirees will continue to

draw funds, thereby creating a burden on existing funds. On the other hands, a moderate to low life expectancy reduces the number of years retirees will be payouts from accumulated funds. The larger and wider the funding gaps and expectations of life at retirement are, the less the old age income. It is expected that employees with a projected negative life expectancy effect on accumulated funds should transfer the risk to life insurance by purchasing a retiree's life annuity.

- Methodology
- Population

The population for this study comprised all the employees under the defined contribution pension scheme in Nigeria. Since the scheme is homogenous in the application be it the affected members are from the private or public sector, we purposefully selected members of the Academic Staff Union of the Universities, estimated to be 100,000. The choice of the ASUU members from defined contribution members is due to the fact that many of them did not initially comply with part of the requirements of the Pension Reform Act 2014 as regards making the retirement saving accounts available to their employers.

- Sample Size, Sampling Technique and Method of Data Collection

A total of 840 copies of the questionnaire were purposively distributed to four branches of ASUU for members in Federal Universities who submitted their retirement saving accounts to their respective employers. This will enable the researchers to find out the level of funding adequacy for the old age income among members.

Data were collected through research assistants. The research instrument for data collection relied only on the questionnaire, which was validated and approved by pension and actuarial experts. The research instrument focuses on issues affecting pension adequacy as regards remittances. The data collected were based on academic staff members only on factors affecting funding gaps and how these with life expectancy affect retirement income adequacy as indicated in model specification.

- Reliability and Validity of Research Instrument

Data collected from respondents were first subjected to reliability and validity tests before they were used to test the hypotheses of the study. The variables of

interest used for this purpose include employer's compliance (i.e., regular contributions to RSAs), roles of PFAs (a proxy for returns on investment), roles of PenCom, and funding gaps. The internal consistency (reliability of data) and validity of research instruments are presented in Tables 1 and 2. The reliability and results are above the minimum acceptable limit of 0.70, thereby indicating a very strong internal consistency.

Table 1: Test of Reliability

Model	Variable	Cronbach's Alpha
1	Employers' compliance	0.758
2	Roles of PFAs	0.896
3	Roles of PenCom	0.758
4	Funding gap	0.758
5	Life expectancy	0.782
6	Accumulated Fund	0.798

Source: Authors' Computation.

Table 2: Test of Validity

Model	Variable	Cronbach's Alpha
1	Employers' compliance	.785
2	Roles of PFAs	.936
3	Roles of PenCom	.799
4	Funding gap	.742
5	Life expectancy	0.842
6	Accumulated Fund	0.759

Source: Authors' Computation.

- Model Specification
- Determinants of Funding Gaps

The models derived in this section are in line with the conceptual framework of the study. Even though the years of contribution appear to be virtual in Figure 1, its effect on funding gaps is reflected in the model (1b). Before investigating how funding gaps affect accumulated pension funds, it is important to understand its determinants. These determinants, to a greater extent, give a guide on the direction of whether there will be guaranteed income in old age. Hence, the function for the funding gap is given as follows:

$$FUNDNGAP = (EMPCOM, RPFAs, RPENCOM, YOC)$$

(1a)

The linearized model is as follows:

$$FUNDNGAP = \beta_0 + \beta_1 \sum_{i=1}^n EMPCOM + \beta_2 \sum_{i=1}^n ROI +$$

i
=
1
 n
 $i=1$
 n

(1b)

$$\beta_3 \sum_{i=1} RPENCOM + \beta_4 \sum_{i=1} YOC + \varepsilon$$

where

FUNDNGAP = Funding gaps;

EMPCOM = Employer's compliance;

RPFA = Role of Pension Fund Administrator;

RPENCOM

= Role of PenCom;

YOC = Years of contribution

- Impact of Life Expectancy and Funding Gaps on Retirement Income

Equation (2) shows direct effect of funding gaps and expectation of life on retirement income security.

$$RTINSEC = (FUNDNGAP, LEXP)$$

n

n

(2a)

(2b)

$$RTINSEC = \beta_0 + \beta_1 \sum FUNDNGAP + \beta_2 \sum LEXP + \varepsilon$$

where

RTINSEC = Retirement income security;

FUNDNGAP = Funding gaps;

LEXP = Expectation of life at retirement

The statistics used for the above equations include Spearman's correlation and multiple regression.

- Results and Interpretation

Retirement income adequacy relationship with its determinants is presented in this section. Table 3a shows the interrelationship of the funding gap's determinants. Table 3b and Table 3c show the relationship and impact of the funding gap and life expectancy with accumulated funds.

Table 3a: Partial Correlations

		EMPCOM	RPFA	RPENCOM	LEXP	APFund
Spearman's rho	EMPCOM	1.000				
	RPFA	.493**	1.000			
	RPENCOM	.844**	.567**	1.000		
	LEXP	.331**	-.240**	.298**	1.000	
	APFund	0.046	.173*	.339**	.211*	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 3a shows the interaction between the listed variables and the level of significance stated under the table. For instance, employer's contribution (EMPCOM) has a significant relationship with the role of pension fund administrator (RPFA), PenCom and life expectancy at 1% level of significance. Tables 3b and 3c show the correction and effect of the independent variables and dependent variables (accumulated funds).

Table 3b: Relationship Factors Affecting Funding Gaps in Defined Contribution Pension

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.284 ^a	0.081	0.075	1.07142	0.081	14.063	1	160	0.000
2	.624 ^b	0.390	0.382	0.87571	0.309	80.507	1	159	0.000
3	.665 ^c	0.442	0.431	0.84032	0.052	14.678	1	158	0.000
4	.791 ^d	0.625	0.616	0.69057	0.184	76.954	1	157	0.000

- Predictors: (Constant), EMPCOM
- Predictors: (Constant), EMPCOM, RPFA
- Predictors: (Constant), EMPCOM, RPFA, RPENCOM
- Predictors: (Constant), EMPCOM, RPFA, RPENCOM, YOC

Source: Authors' Computation.

Table 3c shows the relationships of factors affecting funding gaps in defined contribution pensions in Federal Universities in Nigeria. As evident in the table, entry of employers' compliance accounted for 8.1% (EMPCOM: $R^2 = 0.081$; $F = 14.063$, $p < 0.05$) and has a significant relationship with funding gaps. This implies employers' compliance with pension remittance accounted for 8.1% of funding gaps in the public sector. Similarly, entries of pension fund administrators' roles (RPFA: $R^2 = 0.309$; $F = 80.507$, $p < 0.05$) and active role of PenCom in the enforcement of compliance (RPENCOM: $R^2 = 0.052$; $F = 14.678$, $p < 0.05$) respectively accounted for 30.9% and 5.2% of funding gaps. Also, the number of years of pension default has a significant relationship with funding gaps (YID: $R^2 = 0.184$; $F = 76.954$, $p < 0.05$). The four inputted variables accounted for 62.5% of funding gaps of defined contribution pension. The impacts of these relationships on funding gaps are shown in Table 3c.

Table 3c: Factors Affecting Funding Gaps of Defined Contribution Pension

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	T	
4 (Constant)	-9.053	1.538		-5.887	0.000
EMPCOM	0.067	0.075	0.068	0.896	0.371
RPFA	0.440	0.099	0.413	4.460	0.000
RPENCOM	-1.344	0.162	-0.536	-8.289	0.000
YID	10.253	1.169	0.686	8.772	0.000

• Dependent Variable: FUNDNGAP

Source: Authors' Computation.

Table 3c shows factors affecting funding gaps of defined contribution pensions. The table reveals that employer's compliance has no significant effect on funding gaps (EMPCOM: Beta = 0.067, $t = 0.896$, $p > 0.05$). Meanwhile, the entries of the role of PFAs (RPFA: Beta = 0.440, $t = 4.460$, $p < 0.05$) and years in remittances defaults (YID: Beta = 10.253, $t = 8.772$, $p < 0.05$) have a positive and significant effect on funding gaps. These results imply that PFAs are not doing enough to generate more returns to counter the increasing cost of living and as a number of years pension remittances remain in defaults, the wider the

funding gaps become. However, the roles of PenCom have a negative and significant effect on funding gaps (RPENCOM: Beta = -0.119, $t = -2.403$, $p < 0.05$). This implies that the active role of PenCom to enforce compliance

among employers and PFAs is yielding positive results as this significantly reduced the rate of funding gaps.

Table 4a: Relationship of Funding Gap and Life Expectancy with Accumulated Funds in Federal Universities in Nigeria

Std. Error

Change Statistics									
Model	R				R Square				
Adjusted R									
Square of									
the Estimate									
R Square Change	F Change	df1	df2	Sig. F Change					
1	.874 ^a	0.764	0.762	0.55272	0.764	516.662	1	160	0.000
2	.912 ^b	0.831	0.829	0.46848	0.068	63.706	1	159	0.000

- Predictors: (Constant), FUNDNGAP
- Predictors: (Constant), FUNDNGAP, LEXP

Source: Authors' Computation.

Table 4a shows the relationship between the funding gap and life expectancy with accumulated funds in Federal Universities in Nigeria. In the table, the funding gap significantly accounted for 76.4% of accumulated funds (FUNDNGAP: R2 = 0.764; F = 516.662, p < 0.05). Also, life expectancy has a significant relationship with accumulated funds (LEXP: R2 = 0.068; F = 63.706, p < 0.05). This indirectly shows that life expectancy will lead to the effective utilization of accumulated funds by 6.8%. Hence, both the funding gap and life expectancy significantly contributed 83.1% to retirement income adequacy.

Table 4b: Effect of Funding Gap and Life Expectancy on Accumulated Funds in Federal Universities in Nigeria

	Unstandardized Coefficients	Standardized Coefficients
--	-----------------------------	---------------------------

Model

	B	Std. Error	Beta			
T				Sig.		
2	(Constant)	-0.693	0.261		-2.653	0.009
	FUNDNGAP	0.937	0.034	0.921	27.816	0.000
	LEXP	0.342	0.043	0.264	7.982	0.000

a. Dependent Variable: APFund

Source: Authors' Computation.

Table 4b shows the impact of the expectation of lives on accumulated funds in the public sector. The entry of the funding gap has a positive and significant effect on accumulated funds (FUNDNGAP: Beta = 0.937, $t = 27.816$, $p < 0.05$). The positive outcome means two things: there is the hope of recovering unremitted funds to accumulated funds and the narrower the funding gap, the better the accumulated funds. Also, the entry of life expectancy has a positive and significant effect on the accumulated fund (LEXP: Beta = 0.342, $t = 7.982$, $p < 0.05$). By implication, respondents' expectation of lives is likely to be shorter than expected and this means fewer years to be spent in retirement. Hence, both the funding gap and expectation of life has positive and significant effects on accumulated pension funds in the public sector.

- Conclusion and Implications

Retirement income adequacy in old age is a paramount issue for employees' consideration during active years of service. The adequacy of retirement income from DC pension plans depends, in general, on contributions and returns on investment. In the pension context, people make financial decisions based on future longevity risk. Those who perceive they will live longer than what the general expectation of lives suggests try as much as possible to ensure they are not exposed to the risk of inadequate funds for old age protection.

In terms of DC pension, if the impact of life expectancy on accumulated funds turns out to be positive, it means it will be safer for decision-makers to consider the phased withdrawal option of retirement, while a negative outcome will be to go for retiree's life annuity. A retiree's life annuity is one of the options of retirement income to protect retirees from inflation erosion and shortage of funds due to living longer than the calculated expectation of lives at retirement indicated. However, the converse holds for funding gaps as a negative outcome implies there are other funds being drained away from accumulated funds which will make the retiree's life annuity purchase very

expensive to afford due to shortfalls the employers omitted to remit while employees were on active service.

In this study, we examined the determinants of the funding gap and combined it with life expectancy to determine their outcome on retirement income adequacy so as to provide guidelines on how employees' perception about future life expectancy will affect choice of retirement income security while they are actively engaged in work.

One of our findings showed that employers in Federal Universities would be able to refund unremitted funds to employees' retirement saving accounts before they attained retirement status. Similarly, PenCom, as a regulatory body, has played a significant role by ensuring funds are remitted as and when due. As PenCom intensifies its effort towards fulfilling the statutory role and the employers comply, the level of funding gaps will significantly decrease.

Meanwhile, the positive outcome of the role of PFAs and years in service on funding gaps are courses for concerns. For instance, the positive result associated with PFAs indicates that the returns on contributed funds are not encouraging and as such, there is a need for PenCom to come up with a benchmark in respect of funds invested by the PFAs. Otherwise, inflation erosion will continue to

reduce the accumulated funds, thereby widening the funding gaps of defined contributions. Similarly, the years of service showed a positive outcome which indicates that the affected employees have fewer years in service to make up for pension contribution shortfalls. This means that as the number of years of service becomes shorter, the wider the funding gaps and vice versa.

On the basis of the findings in this study, the following results and implications are evident:

- Employers' contributions compliance has nothing to do with the existing funding gap.
- Funding gaps leading to delays in pension payment at retirement have been significantly reduced through the role of PenCom. Also, the study technically shows that the participants of the DC members have few years to accumulate sufficient funds for retirement.
- Similarly, the investment returns through PFAs are inadequate and

there may be a need to benchmark the rates of returns for investment managers of DC.

- PFAs are not doing enough to generate more returns to counter the increasing cost of living and as the number of years in pension remittances remain in defaults, the wider the funding gaps become.
- The active role of PenCom to enforce compliance among employers and PFAs is yielding positive results as this significantly reduced the rate of funding gaps.
- If the huge percentage of funds in the funding gap is not timely remitted, there will be a retirement income crisis as about 76.4% of accumulated funds comes from pension arrears, while the people's shorter life expectancy perceptions will account for 6.7% effective utilization of accumulated funds.
- By implication, employees' expectation of lives is likely to be shorter than expected and this means fewer years to be spent in retirement. Hence, both the funding gap and expectation of life have positive and significant effects on accumulated pension funds in the public sector.
- The study recommends that PFAs should be held accountable in all their dealings with regard to employees' contributed funds and that employers, as well as PenCom, should be committed to ensuring the fulfilment of pension obligations vested on them by the Pension Reform Act 2014 law.

References

- Adeyele, J. S. & Jim-Suleiman, S. L. (2018). Impact of service delivery in pension industry on fraud reduction and employees' motivation for quality service. *Ife Psychologia Journal*, 26(2), 52-61.
- Adeyele, J. S. (2011). Pension Reform Act 2004 and its controversies: Repeating or learning from past mistakes? *Journal of Research in National Development*. 9(1), 216-221
- Adeyele, J. S. & Jim-Suleiman, S. L. (2021). Determinants of accumulated pension funds under defined contribution in Nigeria. *Daffodil International University Journal of Business and Entrepreneurship*, 14(1), 39-54.
- Adeyele, J. S. & Maiturare, M. N. (2021). Pension shortfall recovery techniques in Federal Universities in Nigeria. *Daffodil International University Journal of Business and Entrepreneurship* , 14(2), 92-107
- Antolin, P. (2007). Longevity risk and private pensions. *OECD Working Papers on Insurance and Private Pensions*, No. 3, OECD Publishing.

- Almeida, B. & Forna, W. (2008). *A better bang for the buck: The economic efficiencies of DB Plans*. Washington, DC: National Institute on Retirement Security.
- Biggs, A. G. (2016). The life cycle model, replacement rates, and retirement income adequacy. *AEI Economics Working Paper 2016-11*,
- Boivie, I., & Almeida, B. (2008). *Look before you leap: The unintended consequences of pension freezes*. Washington, DC: National Institute on Retirement Security.
- Beedie, E. (2015) Adequacy of pension income in Nigeria: The case of retired women civil servants. PhD thesis, Birkbeck, University of London.
- Chen, A., Haberman, S. & Thomas, S. (2017). Why the deferred annuity makes sense.
- Doyle, S. & Piggott, J. (2003). Mandatory annuity design in developing economies. Centre for Applied Economic Research Working Paper (2000/03).
- Draxler, J. & Mortensen, J. (2009). *Towards sustainable but still adequate pension in the EU: Adequacy of old-age income maintenance in the EU (AIM) Project*. Brussels: ENEPRI
- Development, O. E. C. (2011). Linking pensions to life expectancy, in pensions at a glance 2011: Retirement-income systems in OECD and G20 countries. *OECD Publishing*, Paris.
- Friedberg, L. & Webb, A. (2005). Life is cheap: Using mortality bonds to hedge aggregate mortality risk. *Center for Retirement Research Working Paper 2005-13*.

- Ippolito, R. (1986). *Pensions, economics and public policy*. Homewood, Illinois: Dow Jones-Irwin.
- James, E., & Vittas, D. (1999). *The decumulation (payout) phase of Defined Contribution Pillars*. Development Research Group: The World Bank.
- Kastelein, P. B. & Romp, W. E. (2020). Pension fund restoration policy in general equilibrium. *Macroeconomic Dynamics*, 24, 1785–1814.
- Kruger, A. (2011). Do members know their net replacement ratio? *BAOBAB Bulletin*.

- Munnell, A.H., Aubry, J. & Quinby, L. (2010). *The funding of state and local pensions: 2009-2013*. Chestnut Hill, MA: The Center for Retirement Research at Boston College.

- Pettinato, S., Sowers, K. & Masci, P. (2005). Annuities and pension reform: Main issues in developing countries. In P. Bruton, & P. Bruton (Ed.), *Workable Pension System: Reform in the Caribbean* (269-323). Washington, DC: Inter-American Development Bank and Caribbean Development Bank.
- Palacios, R. (2005). Systemic pension reform in Latin America: Designs and early experiences. In P. Bruton, & P. Bruton (Ed.), *Workable Pension System: Reform in the Caribbean* (127-176). Washington, DC Inter-American: Development Bank and Caribbean Development Bank.
- Redwood, D., Carrera, L. N., Armstrong, J. & Pennanen, T. (2013). *What level of pension contribution is needed to obtain an adequate retirement income?* Pensions Policy Institute. London.
- Report, W. B. A. (1995). The World Bank annual report. 1, 14992.
- Rusconi, R. (2008), National annuity markets: Features and implications, *OECD Working Papers on Insurance and Private Pensions*, No. 24.
- Stewart, F. (2007). Policy issues for developing annuities markets. *OECD Working Papers on Insurance and Private Pensions*, No. 2, OECD Publishing.
- Walker, R. (2005). *Social security and welfare: concepts and comparisons*. McGraw-Hill International.
- Warshawsky, M. J. (1995). Funding of Defined Benefit Pension Plans. *Wharton Pension Research Council Working Papers*. 577.