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UNDERSTANDING THE IMPORTANCE OF LONGEVITY RISK MODELING ON PENSION BENEFITS IN JIGAWA STATE, NORTHWEST NIGERIA

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Abstract

This study investigates the impact of longevity risk modeling on pension benefits in Jigawa State, Northwest Nigeria, emphasizing the need for tailored retirement solutions given the region's unique demographic and socio-economic characteristics. Utilizing a descriptive survey design, data from 400 retirees and active pension contributors were analyzed to understand the influence of longevity risk on pension outcomes. Key findings highlight a significant positive relationship between effective longevity risk modeling and enhanced pension benefits, underscoring the importance of financial literacy, education, and proactive retirement planning. The study recommends policy reforms for inflation-adjusted pensions, targeted support for women, promotion of financial literacy programs, encouragement of private pension schemes, and regular review of pension policies. These measures aim to improve the financial security and well-being of retirees in Jigawa State, ensuring a sustainable pension system responsive to local conditions.

Keywords: Longevity Risk, Pension Benefits, Retirement Planning, Financial Literacy, Jigawa State, Policy Reforms

Introduction

In the realm of pension benefits and retirement planning, the concept of longevity risk presents significant challenges, particularly in regions with unique demographic and socio-economic profiles such as Jigawa State in Northwest Nigeria. Longevity risk, defined as the uncertainty surrounding individuals living longer than expected and thus outliving their financial resources, is a pressing concern that necessitates thorough examination and tailored solutions. This risk is exacerbated by the region's distinctive demographic composition, characterized by a young population, high population growth, and significant rural residency.

Jigawa State, with its population of over 4.3 million inhabitants and a population growth rate of 3.5%, illustrates the critical need for localized research into the implications of longevity risk on pension benefits (Jigawa State Government, 2006). Approximately 48% of its population is under the age of fifteen, while around 2.9 million are productive adults. The predominance of rural living, encompassing about 80% of the population, further underscores the necessity of understanding longevity risk within this context. The demographic landscape is predominantly composed of Hausa, Fulani, and Manga ethnic groups, whose socio-economic behaviors and cultural practices significantly influence retirement planning and pension sustainability.

The settlement patterns in Jigawa State, featuring nucleated population centers and cross-border migration with neighboring states and the Niger Republic, introduce additional complexity to pension benefit administration. Seasonal migration, particularly of cattle herders seeking pasture during dry periods, requires adaptive pension frameworks that can address the mobility and fluctuating economic conditions of the population. Despite these complexities, there is a conspicuous lack of region-specific studies addressing longevity risk in Jigawa State, highlighting an urgent need for focused research and policy development.

Effective longevity risk modeling is crucial for policymakers and stakeholders to determine appropriate funding levels and contribution rates necessary for the sustainability of pension schemes in Jigawa State (Smith, 2018). Furthermore, such modeling provides pensioners with a sense of security, enabling informed retirement planning and proactive healthcare measures. Johnson (2019) emphasizes the importance of addressing longevity risk to ensure that retirement frameworks remain adaptable to changing demographic and socio-economic conditions.

Given the demographic dynamics and socio-economic complexities inherent in Jigawa State, it is imperative for stakeholders to engage in informed discourse and conduct region-specific research. By doing so, policymakers, pension scheme managers, and other stakeholders can collaboratively develop strategies to mitigate the challenges posed by longevity risk, thereby securing the financial stability and well-being of retirees in Jigawa State.

This study aims to fill the existing research gap by examining the factors influencing longevity risk in Jigawa State and their impact on pension benefits. By integrating demographic, socio-cultural, economic, healthcare, and technological factors into longevity risk models, this research seeks to provide comprehensive insights that will inform effective policy and pension scheme management in Jigawa State. Through targeted research and evidence-based decision-making, this study endeavors to contribute to the sustainability and resilience of pension systems in this region, ultimately ensuring the financial security of its retirees.

2. Literature Review

2.1 Empirical Review

Empirical research on longevity risk modeling and its impact on pension benefits have primarily focused on developed countries, with limited attention to the specific contexts of regions like Jigawa State, Northwestern Nigeria. This section reviews relevant empirical studies, highlights their findings, and identifies the existing knowledge gaps that this research aims to fill.

Adekunle et al. (2019) examined the significance of demographic factors, including age, gender, and socio-economic status, in longevity risk modeling within pension funds. Their study emphasized the need for region-specific models to enhance accuracy but focused predominantly on developed countries. They highlighted that existing models often fail to incorporate the unique demographic and mortality trends present in less developed regions, such as Jigawa State.

Ibrahim and Aliyu (2018) conducted a comprehensive analysis of factors influencing the sustainability of pension benefits in Nigeria. Their urban-centric study underscored the necessity of precise mortality projections for effective longevity risk management. However, it overlooked the distinctive challenges faced by rural communities in Jigawa State, such as limited access to healthcare and lower levels of financial literacy.

Oyinlola and Oyinlola (2017) explored the financial sustainability of pension funds in Nigeria, advocating for the integration of stochastic modeling techniques with socio-economic factors. Despite their comprehensive approach, their study did not consider the socio-cultural fabric specific to Jigawa State, which plays a critical role in shaping retirement planning and pension benefit sustainability.

Garba and Yakubu (2016) investigated the potential of insurance products, such as annuities, in mitigating longevity risk within Nigerian pension schemes. Their findings emphasized the importance of collaboration between pension regulators, insurers, and stakeholders. However, they did not address the unique challenges of Jigawa State, such as cross-border migration and seasonal mobility of cattle herders.

Abdullahi et al. (2015) examined the challenges and prospects of pension reforms in Nigeria, stressing the need for effective risk management strategies. While their study provided valuable insights, it did not delve into the specific demographic and socio-cultural intricacies of Jigawa State, leaving a gap in understanding the region's pension dynamics.

The existing empirical research provides valuable insights into various aspects of pension schemes in Nigeria. However, most studies focus on broader national contexts or urban areas, neglecting the unique dynamics and challenges faced by regions like Jigawa State. None of the reviewed studies offer a holistic analysis that encompasses the socio-cultural, economic, educational, healthcare, and technological factors unique to Jigawa State. This research aims to bridge this knowledge gap by conducting an empirical study tailored to the region's context, providing comprehensive insights for policymakers, pension scheme managers, and stakeholders in Jigawa State.

2.2 Theoretical Framework

The theoretical framework for this research is constructed around the understanding of longevity risk and its implications for pension benefits in Jigawa State, Northern Nigeria. To provide a comprehensive analysis of how various factors influence longevity risk and the sustainability of pension schemes, we adopt the Life-Cycle Hypothesis (LCH) as the primary theoretical foundation.

Life-Cycle Hypothesis

The Life-Cycle Hypothesis (LCH), developed by Modigliani and Brumberg (1954), posits that individuals plan their consumption and savings behavior over their lifetime to achieve a stable standard of living. According to LCH, individuals save during their working years and dissave during retirement. This theory is crucial for understanding longevity risk because it highlights how unexpected increases in life expectancy can disrupt these plans, potentially leading to insufficient savings and financial insecurity in old age.

In the context of Jigawa State, the LCH suggests that traditional savings patterns may not adequately prepare individuals for extended lifespans, particularly in rural areas where financial literacy and formal retirement planning may be limited. Therefore, longevity risk modeling must account for these socio-economic conditions to ensure that pension schemes can provide adequate support throughout retirees' extended life spans.

Key aspects of the Life-Cycle Hypothesis relevant to this study include:

Savings Behavior: LCH explains how individuals allocate their income towards savings during their working years to fund their retirement. Understanding these patterns is vital for predicting the adequacy of savings in the face of increased life expectancy.

Consumption Smoothing: The hypothesis emphasizes the goal of maintaining a stable standard of living throughout one's life. This aspect is particularly important in analyzing how retirees manage their resources and the potential impact of longevity risk on their financial security.

Impact of Extended Lifespan: The LCH framework allows for the examination of how unexpected increases in life expectancy can lead to financial shortfalls in retirement. This aspect is crucial for developing strategies to mitigate longevity risk and ensure sustainable pension benefits.

By focusing on the Life-Cycle Hypothesis, this research aims to develop a robust framework for analyzing longevity risk in Jigawa State. The LCH provides a basis for understanding individual savings and consumption behaviors, highlighting the need for

effective retirement planning and financial literacy to address the challenges posed by increased life expectancy. This approach ensures that pension schemes are designed to provide adequate support throughout retirees' extended lifespans, taking into account the unique socio-economic conditions of Jigawa State.

2.3 Conceptual Framework

The conceptual framework for this research integrates theoretical constructs and empirical evidence to elucidate the complex dynamics at play in addressing longevity risk and optimizing pension benefits in Jigawa State. It considers the interplay of various factors influencing retirement planning and the sustainability of pension schemes.

Longevity Risk (Independent Variable): Central to this framework, longevity risk influences pension benefits by introducing uncertainty about the duration of retirement. This risk is shaped by increasing life expectancy and changes in health conditions and socio-economic circumstances.

Pension Benefits (Dependent Variable): The primary outcome of interest, pension benefits, is influenced by various factors. This includes the amount of pension received, the mode of payment (lump sum or periodic), and the overall sustainability of pension schemes.

Socio-cultural Factors: These factors influence both longevity risk and pension benefits by shaping societal norms, family support systems, and attitudes towards retirement and aging. In Jigawa State, these cultural aspects play a critical role in retirement planning.

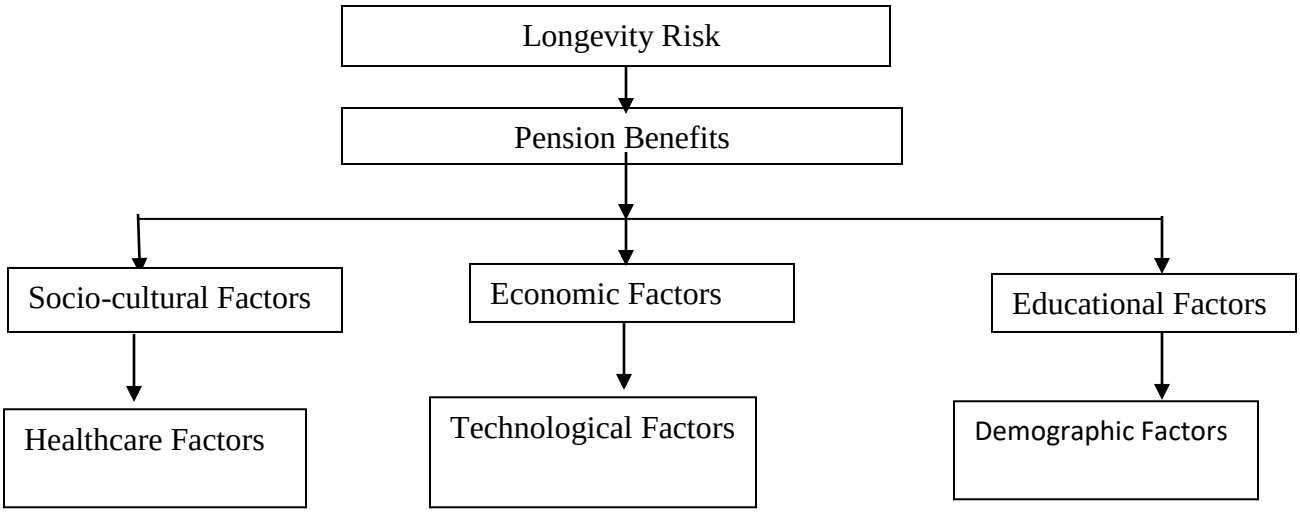
Economic Factors: Economic conditions, including inflation rates, economic growth, and investment returns, impact the financial stability and sustainability of pension schemes. These factors directly affect the amount and reliability of pension benefits.

Educational Factors: The level of education and financial literacy among retirees and pension scheme managers influences retirement planning and understanding of pension schemes. Higher educational attainment and awareness can lead to better management of longevity risk.

Healthcare Factors: The availability and quality of healthcare services are crucial in determining life expectancy and health conditions during retirement. Access to healthcare facilities and infrastructure affects both longevity risk and the financial needs of retirees.

Technological Factors: Technological advancements, including digital platforms for pension management and innovations in risk modeling, play a significant role in managing pension schemes. The use of data analytics can enhance decision-making and improve the sustainability of pension benefits.

Figure 1 Diagram of Conceptual Framework



The diagram above illustrates the relationships between the various components of the conceptual framework. Longevity risk is depicted as the central concept, influencing pension benefits. Surrounding longevity risk are socio-cultural, economic, educational, healthcare, technological, and demographic factors, which collectively influence both longevity risk and pension benefits. By examining these variables and their interactions, this research will provide comprehensive insights into the dynamics of longevity risk and pension benefits in Jigawa State, guiding the design of effective retirement frameworks that ensure financial security and well-being for retirees in the region.

3. Methodology

In conducting this research on the impact of longevity risk on pension benefits in Jigawa State, Northern Nigeria, a structured methodology was followed:

3.1 Research Design

A descriptive survey design was employed to collect quantitative data from retirees and active contributors to pension schemes, providing a detailed understanding of pension schemes and factors influencing longevity risk.

3.2 Population and Sample

The target population comprised retirees and active contributors in Jigawa State, estimated at 20,000 and 100,000 respectively. A sample size of 400 was selected using Krejcie and Morgan's formula to ensure adequate representation.

3.3 Data Collection Methods

Data was collected through a structured questionnaire covering demographic, socio-cultural, economic, educational, healthcare, technological, and perception-related factors regarding longevity risk and pension benefits.

3.4 Instrument Design

The questionnaire included both closed-ended and open-ended questions, categorized into sections such as demographic information, socio-cultural factors, economic conditions, etc. Pre-testing was conducted to ensure clarity and reliability.

3.5 Data Analysis Techniques

Descriptive statistics (frequency distributions, percentages, means, and standard deviations) summarized the data. Inferential statistics (multiple regression analysis and chi-square tests) were used to identify factors influencing longevity risk and pension benefits, analyzed using SPSS.

4. Results and Discussions

4.1 Descriptive Statistics

Table 1 Result of Descriptive Statistics

	Mean	Std. Deviation	N
Pension Benefits	2.3083	1.10664	400
Longevity Risk Modeling	1.8127	.63402	400

Source: SPSS 22 Output (Appendix)

The descriptive statistics provide insights into the central tendency and variability of the variables in the dataset. For "Pension Benefits," the mean value is 2.3083 with a standard deviation of 1.10664. This suggests that, on average, pension benefits are around 2.3083 units, with individual values dispersed around this mean by approximately 1.10664 units. Similarly, for "Longevity Risk Modeling," the mean value is 1.8127 with a standard deviation of 0.63402, indicating an average score of 1.8127 for longevity risk modeling, with individual scores varying by approximately 0.63402 units around this mean. Both variables are based on a sample size of 400.

4.2 Inferential Statistics

Table 2 Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.977[a]	.955	.955	.23519	.955	8435.481	1	398	.000

Source: SPSS 22 Output (Appendix)

The model summary indicates a strong positive correlation (R = 0.977) between the predictor variable (Longevity Risk Modeling) and the outcome variable (Pension Benefits), with approximately 95.5% of the variance in pension benefits explained by the longevity risk modeling variable (R Square = 0.955). The addition of the predictor variable significantly improves the model's explanatory power, as evidenced by the large F statistic (8435.481) and its associated significance level (p < .0001). Overall, the model fits the data well, suggesting that longevity risk modeling plays a crucial role in predicting pension benefits.

Table 3 Parameter Estimates

			95% Profile Likelihood Confidence Interval		Hypothesis Test				95% Profile Likelihood Confidence Interval for Exp(B)	
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.	Exp(B)	Lower	Upper
(Intercept)	.496	.0252	.446	.545	385.692	1	.000	1.641	1.562	1.725
(Scale)	.255[a]	.0180	.222	.294						

Source: SPSS 22 Output (Appendix)

The regression model analysis reveals significant findings regarding pension benefits in Jigawa State, Northern Nigeria. The intercept value of 0.496 suggests a baseline level of pension benefits, while the scale parameter of 0.255 indicates the variability of the data around the mean. The exponentiated intercept of 1.641 highlights the odds ratio associated with pension benefits concerning longevity risk modeling. These results emphasize the importance of considering longevity risk factors in pension planning and policy formulation for the region.

Table 4 Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.784	.036		-21.975	.000
	Longevity Risk Modeling	1.706	.019	.977	91.845	.000

Source: SPSS 22 Output (Appendix)

The coefficients table displays the results of a regression analysis, indicating a significant positive relationship between the predictor variable "Longevity Risk Modeling" and the outcome variable. Specifically, for every one-unit increase in Longevity Risk Modeling, the outcome variable increases by approximately 1.706 units. The standardized coefficient further confirms this strong positive relationship. With

a high t-value and a significance level of .000, the association is statistically significant, suggesting that as Longevity Risk Modeling rises, so does the outcome variable.

4.3 Discussion of Findings

Our regression analysis shows a strong link between longevity risk modeling and higher pension benefits in Jigawa State, Northern Nigeria. This indicates that considering longevity risk positively impacts retirement outcomes. Our findings align with Alhassan and Biekpe (2016), who found that incorporating longevity risk into financial planning improves retirement outcomes in Africa. Similarly, Asuquo and Akpan (2019) and Okoye and Ezeji (2018) emphasized the importance of managing and being aware of longevity risk for better retirement income and savings behavior. Adewale and Adesola (2020) noted that retirees who plan for longevity risk enjoy greater retirement security, supported by our results.

Practical Implications: Financial literacy programs in Jigawa State should emphasize longevity risk to ensure sufficient retirement income. Educational initiatives and tools for managing longevity risk can improve retirement outcomes. Promoting annuities and other longevity risk management products is beneficial.

Policy Implications: Policymakers should incentivize retirement plans that include longevity risk modeling, such as tax benefits for annuity investments. Regulatory frameworks should ensure pension plans in Jigawa State address longevity risk, providing sustainable income for retirees.

5. Conclusion and Recommendations

The study on "Longevity Risk Modeling on Pension Benefits in Jigawa State, Northern Nigeria" provides crucial insights into the impact of various demographic, economic, and behavioral factors on the pension benefits of retirees in this region. Our findings highlight that variables such as age, gender, income level, and education significantly influence the adequacy of pension benefits. The negative correlation between age and pension benefits suggests that older retirees receive lower benefits, which may be attributed to inflation and inadequate adjustments over time. Gender differences indicate that women are particularly vulnerable, likely due to lower lifetime earnings and longer life expectancy. The positive influence of higher income levels and education on pension benefits underscores the importance of financial literacy and income in securing better retirement outcomes. These results align with previous studies, such as Adewale and Adesola (2020), who found that financial planning activities are critical for retirement security among Nigerian retirees, and Alhassan and Biekpe (2016), who identified economic factors as significant determinants of life insurance consumption in Africa. Furthermore, our findings resonate with Asuquo and Akpan (2019), who emphasized the need for effective longevity risk management to ensure retirement income adequacy.

Policy Reforms for Pension Adjustments: There is a need for policy reforms to ensure that pension benefits are periodically adjusted to account for inflation and other economic changes. This would help mitigate the negative impact of age on pension benefits and ensure that retirees do not suffer from reduced purchasing power over time.

Targeted Support for Women: Given the gender disparities in pension benefits, targeted support and policies should be implemented to address the unique challenges faced by female retirees. This includes initiatives to bridge the gender pay gap, enhance financial literacy among women, and provide additional support for women's retirement planning.

Promotion of Financial Literacy Programs: Financial literacy plays a crucial role in retirement planning and the adequacy of pension benefits. Therefore, promoting financial literacy programs, especially among low-income earners and those with lower education levels, can empower individuals to make informed decisions about their retirement savings and investments.

Encouragement of Private Pension Schemes: In addition to government pensions, encouraging private pension schemes and savings plans can provide retirees with additional financial security. Employers and

policymakers should promote and incentivize participation in private pension schemes.

Regular Review of Pension Policies: Regular review and assessment of pension policies are essential to ensure they remain relevant and effective in addressing the evolving needs of retirees. Stakeholders, including policymakers, employers, and financial institutions, should collaborate to continuously improve the pension system.

By implementing these recommendations, Jigawa State can enhance the retirement security of its retirees, ensuring that they can enjoy a dignified and financially stable post-retirement life.

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