FACTORS AFFECTING PUBLIC PENSION BENEFITS IN MALAYSIA: A SYSTEMATIC REVIEW

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Abstract: In Malaysia, public and private sector employees rely on Defined Benefit (DB) or Defined Contribution (DC) pension plans, with DB plans prevalent in the public sector and DC plans dominating the private sector. However, inadequate pension benefits have raised concerns about the long-term living standards of retirees. In order to address this issue this article systematically reviews 119 studies from reputable databases, including ProQuest, ScienceDirect, Scopus, and ResearchGate to identify the primary factors influencing pension adequacy for Malaysian public sector employees. The findings reveal five significant factors namely life expectancy, crude death rates, inflation, interest rates, and fertility rates. These factors are instrumental in explaining why pension income often fails to meet retirees' needs and provide actionable insights for improving retirement planning and policy making. Furthermore, it emphasises the need for strategies that encourage employees to actively plan for retirement, allowing them to make informed financial decisions that can reduce future income deficits. This strategy not only benefits pensioners, but it also offers the government with insights into how to improve and strengthen the pension system to maintain sustainability of retirees living standards. By addressing these challenges, this study aims to contribute to strengthening Malaysia's pension system and ensure a higher quality of life for future retirees.

Keywords: Pension, public pension benefits, retirement, COLA, systematic review.

Introduction

Every worker in the government sector would eventually reach a retirement stage. This stage typically occurs as a working person reaches the end of their work cycle due to increasing age and a pension benefit will be given to them upon retirement as compensation for the work and years of service. Usually, those who reach a retirement age or decide to retire careerwise of their own accord are 60 or older. However, some individuals may also consider early retirement at the age of 55 due to personal or health reasons that may have influenced their decision. Nowadays, concerns about pension benefit are growing, especially as retirees' spending needs increasingly surpass the sustainable income provided by their pension benefits.

Many articles have been published worldwide discussing the factors affecting pension benefits distribution among retirees. Researchers in previous years have tried to convey and prove that specific factors such as life expectancy rate, total fertility rate, crude death rate, inflation rate, and interest rate are the main elements of how pension benefits have accumulated in recent years. From such research, several authors have identified various factors what have been recognised as significant factors that affect pension benefits. According to the Organisation for Economic Co-operation and Development (OECD) (2021), life expectancy, crude death rate, inflation rate, interest rates, and total fertility rates have been identified as factors affecting pension benefits. Kuitto and Helmdag (2021) mention only life expectancy affects pension benefits. Meanwhile, Gao *et al.* (2021) mentioned that pension benefits are affected by life expectancy, total fertility rate, and crude

death rate. Bongiorno *et al.* (2020) noted that the crude death rate, inflation rate, and interest rate are factors that affect pension benefits, differing from previous authors.

This is crucial, as researchers seek to understand the factors influencing pension benefit practices in their respective countries, impacting both pre- and post-retirees. The factors affecting pension sufficiency vary significantly across regions, shaped by each country's unique geopolitical, socioeconomic, and policy landscape. Although previous studies have identified general factors influencing pension benefits, they often lack detailed simulations to model the actual impact of these factors on pension adequacy. Consequently, pension inadequacies may persist if these critical factors are not fully integrated into the pension accumulation process.

Addressing this gap in research could provide policymakers with more accurate insights, allowing legislators to create pension systems that are better to suited to their countries' specific needs. Due to insufficient pension benefits, the Cost-of-Living-Adjustments (COLA) based pension scheme was introduced. The COLA-based pension scheme has become the norm in the United States (US) to protect retiree savings against inflation, as inflation was high in the 1970s (Kenton, 2023). The COLA-based pension scheme is widely known as an adjustment system that considers any pensioner's monthly retirement benefits due to pricing power after inflation. This means COLA is adjusting the amount of the monthly retirement benefits according to the current year's inflation rate.

According to the United Nations (2015), Malaysia's elderly population is projected to rise sharply over the coming decade. This increase will see Malaysia transition rapidly to an ageing society, with the population aged 60 and above expected to grow from 6% to 14% in just 25 years— a pace much faster than countries like the United Kingdom (UK) (45 years) and the US (69 years). This shift is primarily driven by declining fertility rates and improvements

in healthcare, which are contributing to longer lifespans. As a result, the demand for pension expenditures is anticipated to rise steadily.

However, the growth in the ageing population presents a significant challenge. The current pension benefits are often insufficient to keep pace with inflation and the rising cost of living, leaving retirees vulnerable to financial instability. The insufficiency of pension benefits can be attributed to several key factors: Increasing life expectancy (Rotschedl, 2015; Hassan & Othman, 2018; Rose *et al.*, 2019; Kowalczyk-Rólczyńska & Rólczyński, 2020), declining fertility rates (Floristeanu, 2013; Rose *et al.*, 2019; Kowalczyk-Rólczyńska & Rólczyński, 2020), changing crude death rates (Hassan & Othman, 2018), and inflationary pressures (Acikgoz *et al.*, 2015; Ofori-Abebrese *et al.*, 2017; Aftharnorhan *et al.*, 2020; Plender, 2022). Understanding these factors is crucial, as they directly impact the sustainability and adequacy of pension benefits.

The significance of identifying these key issues cannot be overstated. With the rapid increase in the elderly population, Malaysia faces a higher dependency ratio, meaning that a smaller working population has to support a larger retiree base. This demographic shift places mounting pressure on both public and private pension systems, raising questions about their long-term sustainability. Furthermore, rising inflation erodes the real value of pension benefits, impacting retirees' purchasing power and diminishing their quality of life. For many, the lack of adequate retirement savings compounds this issue, increasing the risk of financial instability in old age. Malaysia's underdeveloped private pension sector offers retirees limited options for diversifying income sources, leaving many reliant on government pensions or the Employees Provident Fund (EPF) alone.

Addressing these issues is vital for promoting financial security and ensuring that Malaysia's retirees can age with dignity. Identifying the factors behind pension insufficiency can inform policy reforms such

as adjustments to the retirement age, inflation-indexed benefits, or mandatory savings programs. Such measures could enhance the pension system's sustainability, support household financial stability, and reduce the economic strain on government resources. Additionally, by highlighting these issues, Malaysia can work towards fostering a stronger savings culture, promoting financial literacy, and ensuring that individuals are better prepared for retirement. Through these efforts, Malaysia can build a more resilient pension system that meets the needs of its ageing population while safeguarding economic stability for future generations. Therefore, this study aims to identify the key elements influencing pension insufficiency in Malaysia, offering insights that could aid in creating policies to ensure a more stable and sustainable retirement system for future generations.

Methodology

Systematic Review

A systematic review of previous literature related to pension benefits is conducted to identify factors affecting pension benefits. Uman (2011) provided eight step-by-step guidelines in order for the systematic review process to be done correctly and accordingly, which are: (1) formulating the research questions; (2) defining inclusion and exclusion criteria; (3) developing a search strategy and locate studies; (4) detecting studies; (5) extracting data; (6) assessing study quality; (7) analysing and interpreting results; and (8) disseminating findings.

The research questions developed for this study are: (1) what factors affect the pension benefits of public employees in Malaysia? and (2) what are the significant factors that affect the pension benefits? Following the development of research questions, inclusion and exclusion criteria were defined for clear justification when studies are searched. The inclusion criteria considered any open sources explaining and entertaining or including suitable pension benefits themes. The exclusion criteria would do away with sets of sources that lack information

or evidence or are otherwise unsuitable for systematic review such as websites or any open data sources that do not include any open full-text articles to be retrieved. Examples of websites or open data sources mentioned above are The Times, Asia Asset Management, Smart Investor, Danish Insurance Association, Bankrate, and Forbes, which do not provide full-text articles like ScienceDirect, Scopus, and ProQuest Central.

Then, a search strategy is developed by identifying combinations of specific terms: "retirement", "pension", "factors", and "pension benefits". Subsequently, BioMed Central, OECD Library, ProQuest Central, ResearchGate, ScienceDirect, Scopus, SpringerLink, SSRN, and Wiley Online Library databases are used to search for publications. After the databases were finalised for study inquiries, the search proceeded based on the search strategy and the targeted databases mentioned. After searching, strategies were developed and the studies located, the selected studies were separated based on the inclusion and exclusion criteria previously outlined. From those databases, the most appropriate studies were chosen that suit the inclusion and exclusion criteria to be selected for systematic review.

Only studies on pension benefits issues were selected for database collection and data extraction. Once the selection process was completed, the required data was extracted from the collection of studies that made the cut. At this stage, data extraction is helpful for the factor analysis process as the data needed regarding the factors affecting the pension benefits is crucial for the identification of significant factors later. The data extraction was made on each study collected previously and tabulated as a summary of the significant factors.

Following data extraction, the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) (2020) guidelines were used to evaluate the study quality. Authors conducting systematic reviews and meta-analyses can use these procedures as a guide. Assessing the methodological diligence,

dependability, and applicability of the studies that are part of a systematic review or meta-analysis is known as study quality. This evaluation ensures that the review synthesises high-quality evidence by assisting in the determination of how reliable and applicable each study's findings are. The 27 essential reporting elements outlined in PRISMA may be used by authors to ensure the consistency and thoroughness of the review processes. Depending on the specific needs of the study, these elements may be added, modified, or removed to maintain the review's quality and applicability (Page *et al.*, 2021). Writers can use this checklist to align research methods with established benchmarks prior to synthesising the findings from the selected review papers.

Figure 1 below summarises the PRISMA checklist, which can be used to help decide which papers in the systematic reviews should be included and which should be excluded. Following an evaluation of each study's quality, the findings and conclusions are understood and examined appropriately. First and foremost, the results must be thoroughly examined following the completion of the study's quality assessment. In prior assessments, two phases of review were performed: Post-screening removal assessment (on 119 screened records) and exclusion assessment (on 72 retrieved records); both are in the screening phase, as illustrated in Figure 1. Following completion of the analysis, the results were examined considering the two distinct assessments to discover any significant
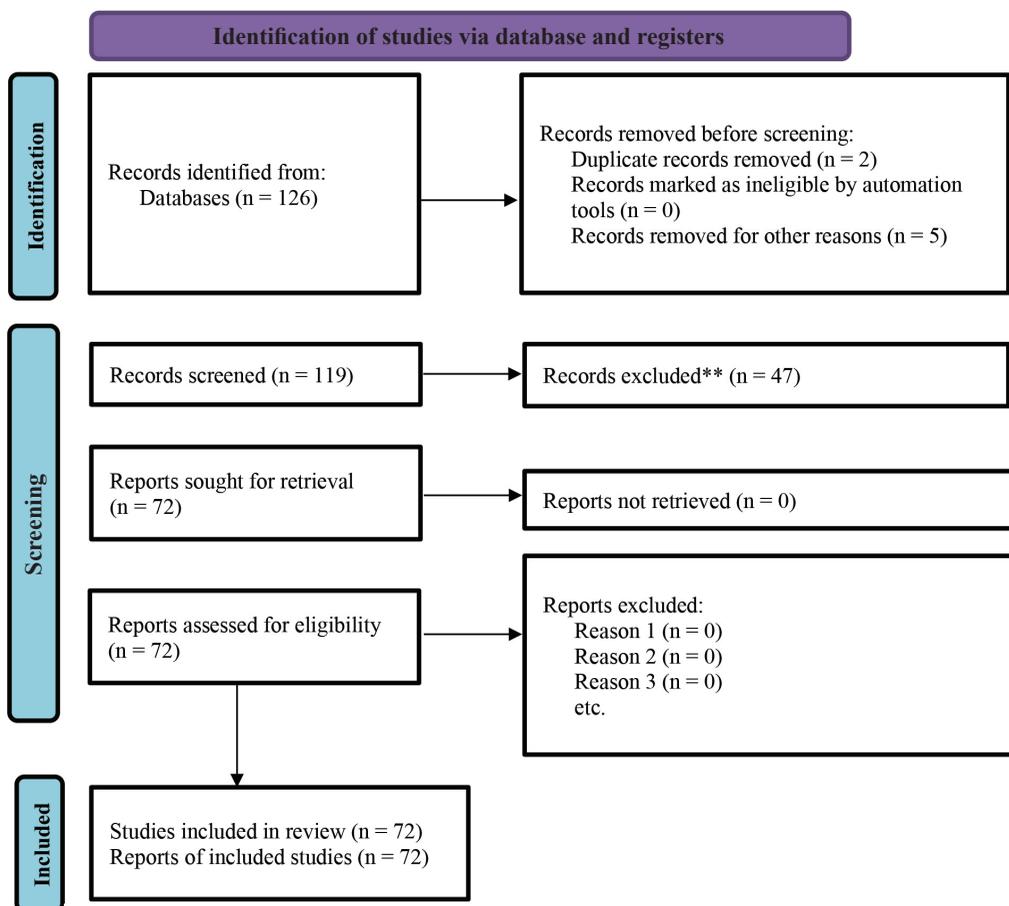

Figure 1: Flow diagram of new systematic reviews including database searching and registration of details

information or conclusions that may be made from both. This is significant since both analysis and interpretation details can provide useful information for comparing other similarities discovered by various authors.

Once the data has been evaluated and understood, the findings are distributed by identifying which authors have already explored the same outcomes or factors. This is to ensure that there was sufficient data to back up our findings, thereby improving our understanding of the elements on which other authors agreed.

Factor Analysis

This process takes place during the data extraction stage. In this process, the collected studies (in this case, 119 studies after omitting the duplicates and other reasons deemed reasonable for omission) are analysed for any critical factors each author found. The factors were tabulated in the summary table to give an overview of how the authors conducted their research and achieved the results and findings that they did. Only from the tabulated results can the significant factors be identified to provide helpful information on which factors significantly impact pension benefits.

Risk of Bias Assessment

After the factor analysis, the systematic screening of all 119 records must be done before performing risk of bias assessments. For the systematic screening, only open access with full-text papers were considered. Thus, 46 records were excluded during the screening process, with the remaining 72 processed accordingly. Then, the risk of bias assessment was conducted on a complete list of 72 records. A modified Cochrane Collaboration tool was used for risk assessment. Because the details required by the Cochrane Collaboration are quite excessive, each record was assessed as a summary, whether each has a low, high, or unclear risk of bias. In this risk of bias assessment, each study is assessed via seven domains: Random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessments, incomplete outcome data handling, selective output reporting, and other authorities of bias may detect, if any. The risk of bias is calculated as follows:

$$\text{Risk of bias } = \frac{\text{Number of papers with respective bias measured}}{\text{Total number of papers}} \times 100\% \qquad (1)$$

According to the National Health and Medical Research Council (NHMRC) (2019), the risk of bias measurement can provide some information on whether the study will produce misleading results, resulting in wasted resources, mishandling of effective interventions, or even causing harm to consumers. Once completed, it can inform the synthesis of study findings and integrate into the certainty of the body of evidence's overall assessment. The assessment depends on the methodological expertise of the most experienced superior, the guideline development group, and the experience of the researchers.

Results and Discussion

In this section, this study used separate records for each approach. In a systematic review, 119 records from prior databases are used to identify the significant factors influencing pension benefits. Next, in the risk of bias evaluation, this research paper used only records filtered from the preceding 119 records, with only 72 full-text papers were included.

Systematic Review

The common factors from the 119 entries were extracted and evaluated using various databases. According to these publications, the common factors influencing pension benefits include life expectancy, fertility, crude death,

inflation, and interest rates. From these common characteristics, each author may have one or more agreed-upon factors that contributed to the pension benefits, which are listed in Table 1.

Life Expectancy

Life expectancy is one of the most significant factors that has been identified as affecting public pension benefits in Malaysia. According to the Department of Statistics (2016), the life expectancy for males and females was between 72.6 and 77.2, respectively in 2020. It further increased to 73.2 (males) and 78.3 (females) in 2021 (Department of Statistics, 2021). It can be stated that the health level among Malaysians is increasing and expected to continue rising in the future. As Malaysians' health levels improve, so may their impression of health, which may influence their retirement savings behaviour. According to Nga (2018), perception of health has a positive influence on financial knowledge, which indirectly has a positive impact on retirement savings behaviour as well. However, besides the positive influence on retirement savings behaviour, longer life expectancy tends to pressure the current pension scheme.

Vaghefi *et al.* (2016) stressed that 62% of older individuals potentially face a decline in their retirement income compared to their pre-retirement earnings. This decrease exposes them to increased vulnerability concerning unforeseen events and financial circumstances. In addition to vulnerability issues, it is worth mentioning that the pensions provided to civil servants, the Employees Provident Fund (EPF), and old age assistance may fall short of meeting the additional needs of older people. This challenge is intensified by the extended life expectancy and the rising expenses associated with maintaining a comfortable lifestyle in Malaysia (Ali *et al.*, 2020). The increasing life expectancy not just affects the inclination to save but is also directly impacts pension funds. With the retirement age progressively extending the average period of pension disbursements. Consequently, this increases payouts and puts additional pressure on pension funds (Jordan, 2019). According to Deutsche Bundesbank (2022), those who live longer but with lower incomes will have a lower replacement rate post-retirement and thus, tend to fall below poverty thresholds during the pension-withdrawing period. To resolve this situation, Germany provides guarantees regarding means-tested basic allowance for the elderly, thus, putting more pressure on the pension insurance scheme.

Inflation Rate

The next significant factor is the inflation rate. Inflation's impact on pension benefits remains a significant issue with recent developments globally. The inflation rate has recently become unstable notably in Malaysia. According to the Department of Statistics Malaysia (DOSM), Malaysia's inflation rate peaked at 5.8% in 2008 and fell to -1.14% in 2020 as a result of the COVID-19 pandemic. Then, from 2021 to present, it fluctuates between 2.5% and 3.4%. Due to unstable inflation in recent years, most of the retirement benefits received cannot sustain the purchasing power of the retirees after retirement.

As a result, retirees need to reduce their cost of living according to the benefits they receive. To protect retirees' spending power, the government may implement Cost-of-Living

Table 1: Number of authors involved with respective factors identified

Factors Identified	Number of Authors
Life expectancy rate	59
Inflation rate	49
Interest rate	48
Total fertility rate	34
Crude death rate	27

Adjustments (COLAs) for pension plans to guarantee benefits keep up with inflation. Moreover, governments and organisations can provide subsidies or discounts on essentials such as healthcare, housing, and food, directly reducing the financial strain on retirees. Reducing or exempting taxes on pension income can provide retirees with additional disposable income, which may also help retirees to preserve their purchasing power during retirement.

According to Bernama (2023), Balqais Yusoff, the EPF Head of Strategy Management Department revealed that just 22% of the 6.7 million EPF active contributors aged 54 have savings of RM196,800.00 or more to support retirees' living needs throughout retirement years. Thus, this modest number indicates that the bulk of EPF members would face insufficiency issues. Moreover, data from the EPF shows that about 71% of EPF members aged between 55 and 60 years opt for lump-sum withdrawals of their pension savings upon retirement, and 50% of members exhaust their savings within five years (World Bank, 2018). Along a pensioner's retirement route, pension benefits may fall short of the considerable real value because they are often not inflation-indexed (Macdonald *et al.*, 2016). Due to this inadequacy issue, combining Defined Benefit (DB) and Defined Contribution (DC) schemes can provide a balance of security and growth. DB components provide predictable income, while DC components allow for increase in line with inflation.

On the other hand, Kimura *et al.* (2023) said that the rate of inflation has a lower impact on the Reserve-to-Expenditure Ratio (RER) and the Replacement Ratio (RR), which in turn has a lower impact on pension benefits. Even though the impact is minor, early recognition of the importance of introducing inflation protection to the pension system over time is continuously highlighted. Jennings *et al.* (2016) explain this viewpoint by stating that retirees might pursue various retirement goals, including protecting against future medical costs, supporting vacations, and leaving heirs

with a legacy by concentrating on other sources of income. In contrast to the concerning trend of rising inflation, falling inflation and actual interest rates are causing nominal interest rates to decline, which lowers pension funds' prospective returns.

One disadvantage of having a longer life expectancy is that pension payments are made over longer periods of time, requiring more funds to meet these benefits. Consequently, this imbalance disrupts the system. Conversely, concerning the prolonged rate of inflation, if the reduction in interest rates is suitably factored into the previously specified parameters of the pension fund, the reduced return would not by itself represent a severe problems for the pension fund. A lower inflation rate would also impact their invested money (Jordan, 2019).

According to the US Bureau of Labour Statistics, Miller (2022), who reported a 40-year high of 8.5% in the year-to-year increase in the consumer price index (inflation) in 2022, highlights the need to strengthen pension systems against the long-term impact of inflation.

Interest Rate

Interest rates are a significant factor that influences public pension benefits. As inflation may not control its fluctuation, interest rates may also experience the same effect. According to Rosen (2022), President of Diversified, Chartered Financial Planner (CFP) and one of the authors in Forbes stated that the interest rates may rise periodically to counteract the inflation effect, which would cause a significant decline in lump sum pension buyouts. This is also supported by Hollanders and Koster (2012), who stated that high interest rates may interrupt the debt-financing of pension expenditures and affect the growth of retirement benefits at a specific projection rate until retirement age is reached.

Conversely, Bräuninger *et al.* (2014) noted that low interest rates could potentially affect the magnitude of gains and losses arising from actuarial computations. Low interest rates can

affect the necessary discount rate for updating the employee benefit value, resulting in a lower discount rate and a higher present value of the obligation (Danescu & Iordanche, 2019). Further, the lower interest rate also can affect pension funds, which typically possess substantial portfolios of interest-bearing investments. This circumstance naturally translates to reduced investment income. Essentially, the contribution from the "third contributor"– the capital market –has significantly decreased. This challenges the pension funds in fulfilling their current benefit obligations (Jordan, 2019).

Total Fertility Rate

Besides the above factors, fertility rates also may affect the accumulation of pension benefits. As the perception of health increases, the life expectancy of retirees also increases. However, the fertility rate may also have an inversely proportionate effect, which means that the fertility rate will decrease as life expectancy rises. The long-term viability of public pension schemes in many nations may be seriously impacted if increasing life expectancy and decreasing fertility rates continue (Bernel & Vermeulan, 2014). Rotschedl (2015) emphasises this situation by indicating that the pension system's sustainability is currently at risk, particularly when examining the fluctuating years of population strength and weakness, primarily linked to fertility rates. Nevertheless, the simultaneous occurrence of a constant decline in fertility rates and a rise in the proportion of pension beneficiaries living to extended ages leads to diminished financial contributions and escalating costs.

This situation poses a threat to the financial stability of these public pension systems (Pilipiec et al., 2021). Sano et al. (2023) also supports this declining fertility rate. Due to the declining fertility rate and the ageing demographic, pension benefits have been constrained instead of continually increasing premiums for the working-age population, especially in Japan. This constrained pension benefit would also be a problem, referring to the Finnish pension system,

which has been implemented in its revised pension reform. It reveals that while it is not an immediate concern, the present modifications to life expectancy need to be revised to guarantee prolonged financial viability. This inadequacy is attributed, in part, to a consistently low fertility rate (Anderson, 2021).

Crude Death Rate

The crude death rate is the least significant factor in public pension benefits. Since the lack of newborns is evidence of a low fertility rate, most lives will be lost, significantly impacting retirees' contributions to the pension system and their ability to receive retirement benefits. Cairns et al. (2022) mentioned that from their findings, higher pensions predicted a lower crude death rate but at a minimal rate. It would give the same meaning as the high death rate, which contributes towards lower pension contributions to be received by future generations.

Additionally, in a population with a high death rate, whether the deceased was older or younger, the number of lives left will be reduced to the point where the total amount of pension contributions is affected to such an extent that future retirees may receive a much smaller pension than initially anticipated. The same conclusions were made by Sika (2022), who reported that the cost of pension benefits has tripled over the past 15 years due to an increase in elderly pensioners. This has a domino effect, meaning that it raises the possibility of a high death rate in the future, strains relationships between generations, and potentially explodes if left unchecked. There are many studies indicating that the crude death rate erases over 25% of the redistribution effects in the French pension system, nearly completely negates redistribution in the old-age Social Security system and renders the German and Italian systems regressive (Bommier et al., 2005; Mazzaferro et al., 2012; Haan et al., 2020; Sanchez-Romero et al., 2020). These studies emphasise the varying impact of mortality in pension systems across different countries.

Risk of Bias Assessment

Table 2 shows some record samples used for the risk of bias assessment. All the references listed below are from the paper collection made during the study selection in the systematic review (4th step). For the risk of bias assessment, we have retrieved the studies from multiple sources such as the Centre for Retirement Research at Boston College, International Journal of Advanced Research and Publications, Social Security Bulletin, ResearchGate, SpringerLink, Scopus, and ScienceDirect.

For publication years, this research paper decided to set the range from 1987 to 2022 because specific themes used in this research are lacking, so, this study may need to expand the range of publication years for this matter.

To generate the risk of bias assessment, we must determine how many papers contain the relevant bias item and divide it by the total number of documents collected to obtain the percentage of each risk of bias item, as shown in Figure 2. Table 3 displays the risk of bias in percentages, but Figure 2 depicts the same outcome graphically. Table 3 shows that the highest significant percentage of high risk of bias is 4.17% for random sequence creation.

Table 2: Sample of records used for risk of bias assessment

Author	Title	Database
Munnell *et al.* (2014)	COLA Cuts in State/Local Pensions	Google Search
Amirul and Hasniyanti (2017)	Factors Affecting Retirement Planning of Gen-Y Workers in Klang Valley Private Sectors	Google Search
Andrew and Glenn (2008)	Alternate Measures of Replacement Rates for Social Security Benefits and Retirement Income	Google Search
Afthanorhan *et al.* (2020)	Framing the Retirement Planning Behaviour Model Towards Sustainable Wellbeing among Youth: The Moderating Effect of Public Profiles	Google Search
Bernal and Vermeulen (2014)	The Impact of an Increase in the Legal Retirement Age on the Effective Retirement Age	IDEAS
Mac Donald *et al.* (2016)	How Accurately Does 70% Final Employment Earnings Replacement Measure Retirement Income (In) Adequacy? Introducing the Living Standards Replacement Rate (LSRR)	ResearchGate
Boskin and Shoven (1987)	Concepts and Measures of Earnings Replacement During Retirement	Google Search
Bozio (2008)	Impact Evaluation of the 1993 French Pension Reform on Retirement Age	Springer Link
Cairns *et al.* (2022)	A General Framework for Analysing the Mortality Experience of an Extensive Portfolio of Lives: With an Application to the UK Universities Superannuation Scheme	Google Search
Whittaker and Liou (2016)	Social Security: Cost of Living Adjustments	Congressional Research Service
Autor and Duggan (2003)	The Rise in Disability Rolls and Decline in Unemployment	Scopus
Florişteanu (2013)	Repercussions of Economic and Social Factors on Pension Systems	ScienceDirect

In comparison, the lowest rate is 0.00% for selective reporting and blinding participants and personnel. In particular, the given figures elucidate that the studies in question have a 4.17% likelihood of exhibiting a high risk of bias. This is attributed to authors needing to generate a randomised sequence more adequately, leading to potential selection bias. However, these same studies demonstrate minimal or no likelihood of experiencing a high risk of bias for the mentioned biases, referring to selective reporting and blinding of participants and personnel biases.

For the low risk of bias, other bias achieves the highest percentage of 97.22% while selective reporting achieves the lowest rate of 9.72%. This indicates that a 97.22% chance that overall studies collected have minimal or no other bias can be detected other than those biases above disclosed in Figure 2. In comparison, there is a 9.72% chance that those studies detected no selective reporting bias. Meanwhile, selective reporting has the highest percentage of 90.28% for unclear risk of bias while other bias has the lowest rate at 1.39%. This would provide the exact picture that there is a 90.28% chance that those studies have insufficient information to permit judgments on whether those studies have selective reporting bias. In comparison, there is a 1.39% chance that those studies have inadequate information for assessing any existing risk of bias or any problems that may produce any significant risk.

The risk of bias assessment included in this paper is to provide helpful information on the previous papers collected from databases and whether each author made any intentional bias on their outcomes at the end of their research, thus, omitting any unnecessary bias from the author's findings with complete transparency during systematic review has been done.

Table 3: Percentage of risk of bias measured according to risk of bias items and risk of bias levels

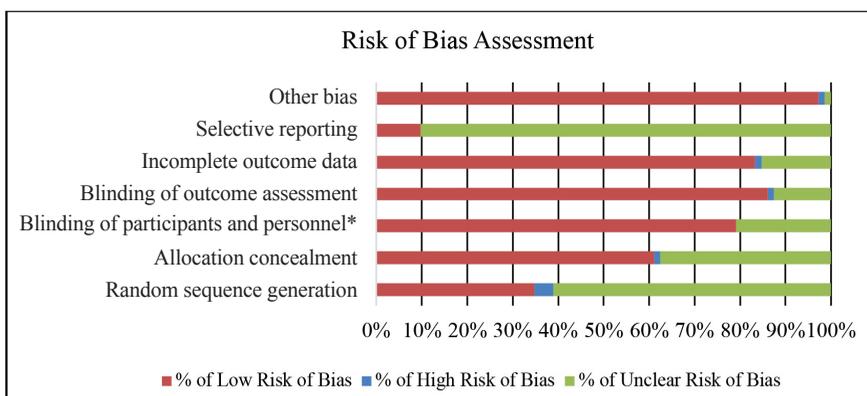| Risk of Bias Items	High	Low	Unclear
Random sequence generation	4.17%	34.72%	61.11%
Allocation concealment	1.39%	61.11%	37.50%
Blinding of participants and personnel	0.00%	79.17%	20.83%
Blinding of outcome assessment	1.39%	86.11%	12.50%
Incomplete outcome data	1.39%	83.33%	15.28%
Selective reporting	0.00%	9.72%	90.28%
Other bias	1.39%	97.22%	1.39%

Figure 2: Risk of bias assessment percentage

Conclusions

This research identifies life expectancy, inflation rate, interest rates, total fertility rate, and crude death rate as significant factors influencing public pension benefits, with crude death rate having the least impact. These findings provide critical insights into the dynamics shaping pension systems, particularly in the Malaysian context.

By understanding these variables, policymakers and stakeholders can better anticipate challenges and opportunities in designing sustainable pension schemes. While this study focuses on the key factors affecting pension benefits, it opens the door for future exploration into broader systemic improvements. Specifically, this research raises three important questions for further investigation:

(i) Alternative Pension Models: How can the identified significant factors be leveraged to develop a more effective and equitable pension model that outperforms Malaysia's current system?

(ii) Inflation-adjusted Purchasing Power: How can such a model enhance retirees' purchasing power, even after accounting for the erosion of benefits due to inflation?

(iii) Improved Replacement Rates: To what extent can the alternative model offer retirees a higher quality of life, as reflected in an improved replacement rate? These questions highlight the potential for this research to influence the design of adaptive pension systems that address current inefficiencies while ensuring financial security for retirees.

Future scholars are encouraged to build upon this work, particularly by applying the findings in this study to create and validate alternative pension frameworks. Such efforts could contribute to a more resilient and inclusive retirement system, ultimately enhancing the well-being of future retirees.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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