Trends Data Analytics in Socso's Survivors' Pension Benefit Claims

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ABSTRACT

This study presents a comprehensive descriptive analysis of the frequency of claims for SOCSO's Survivors' Pension Benefit spanning the years 1985 to 2024. The dataset comprises 40 years of recorded claims, highlighting a substantial growth trend from a mere 432 claims in 1985 to an overwhelming 383,101 claims in 2024. Key statistical measures including the mean (142,874.29), median (117,495.5), standard deviation (116,533.78), skewness (0.6076), and kurtosis (-0.7967) are analyzed to interpret the distribution of claims. The analysis reveals a positively skewed distribution, indicating a rapid increase in claims over time, particularly after the year 2000. The high standard deviation suggests significant variability, reinforcing the substantial fluctuation in claim frequencies. The findings underscore critical socio-economic and demographic shifts, including increased life expectancy, policy amendments, and evolving labor market dynamics that impact survivors' pension claims. These insights hold key implications for policymakers and social security administrators in ensuring the long-term financial sustainability of the SOCSO Survivors' Pension scheme. Future research should consider actuarial adjustments and demographic modeling to project future trends and enhance fund management strategies.

Keywords - SOCSO, Survivors' Pension, Descriptive Analysis, Trend Analysis, Statistical Distribution

INTRODUCTION

The SOCSO Survivors' Pension Benefit is a critical component of Malaysia's social security framework, designed to provide financial assistance to the dependents of insured persons who have passed away. This pension scheme ensures that families who have lost their primary breadwinner receive ongoing financial support to sustain their living standards. The importance of social protection for dependents of deceased insured individuals cannot be overstated, as it serves as a crucial safety net that mitigates the financial vulnerability faced by affected families. By providing a steady income stream, SOCSO's Survivors' Pension Benefit helps alleviate poverty, reduce economic instability, and promote overall social welfare among the affected dependents[1].

To qualify for the Survivors' Pension, the deceased insured person must have met specific eligibility requirements. The scheme covers both work-related and non-work-related deaths, ensuring comprehensive support for dependents regardless of the cause of death. Eligible beneficiaries include spouses, children, and parents of the deceased insured individual, with benefits distributed according to predefined criteria. The pension amount is calculated based on the insured person's average earnings and contributions, ensuring that dependents receive equitable financial assistance relative to their former household income. This structure enables families to maintain a certain standard of living even in the absence of their primary income earner[2].

The primary objective of this study is to analyze the trend and statistical characteristics of the frequency of SOCSO Survivors' Pension Benefit claims over a forty-year period from 1985 to 2024. Through an in-depth

examination of historical data, this research aims to identify patterns in claim distribution and assess variations over time. Understanding these trends will provide valuable insights into demographic, economic, and policy-related factors influencing claim rates. Additionally, this study seeks to evaluate the statistical properties of the claim's dataset, examining central tendencies such as mean, median, and mode, as well as dispersion measures including standard deviation and variance. These metrics will offer a clearer picture of how claims have fluctuated over the years and whether any significant anomalies or outliers exist within the dataset[3].

In conducting this study, several research questions will be addressed. First, the study investigates how the number of claims has evolved over the past four decades, identifying periods of significant increase or stability. This examination will help determine whether external factors such as policy changes, economic shifts, or demographic transitions have influenced claim rates. Second, this study explores the central tendencies of the claims dataset to determine the average and typical claim volumes over time. By analyzing measures of dispersion such as standard deviation and variance, the research will assess the extent of fluctuations in claim numbers and determine whether any noticeable patterns emerge. Lastly, the study evaluates whether the distribution of claims follows a normal pattern or exhibits skewness, which would indicate an imbalance in claim frequencies over time. The results of this research will be instrumental in guiding future policy decisions and financial planning for SOCSO, ensuring the long-term sustainability of the Survivors' Pension Benefit[4].

LITERATURE REVIEW

Overview of Survivors' Pension Systems

Survivors' pension systems exist worldwide to provide financial security to dependents of deceased insured individuals. These pensions ensure a steady stream of income for surviving spouses, children, or other designated dependents. In developed nations, such as the United Kingdom and the United States, social security systems have structured policies that incorporate factors such as age, duration of contributions, and family dependency ratios. In Malaysia, SOCSO's Survivors' Pension is a crucial component of the country's social security framework, safeguarding financial stability for dependents. A comparative analysis of global systems indicates that Malaysia's approach is like other middle-income economies, where contributions are pooled to sustain benefit payouts. However, variations exist in **eligibility criteria, disbursement methods, and pension sustainability strategies** [4]–[6].

Previous Studies on SOCSO Benefits

Existing literature on **SOCSO's Survivors' Pension Benefit** predominantly focuses on its economic impact and role in social security. Studies have highlighted how pension schemes affect household financial resilience, particularly in lower-income groups. Researchers have examined the adequacy of SOCSO benefits in covering daily living expenses of beneficiaries, concluding that while **the scheme provides significant relief, rising costs of living necessitate periodic adjustments to payout structures**. Furthermore, prior analyses indicate that as Malaysia's workforce grows and ages, SOCSO must adapt to sustain pension benefits without straining financial reserves. Notably, **demographic trends, labor market changes, and policy shifts** influence claim rates over time, necessitating a dynamic and well-calibrated funding mechanism [7]–[9].

Statistical Approaches in Social Protection Studies

Quantitative methods are widely used in analyzing **social security and pension data**, enabling researchers to assess trends, and optimize resource allocation. **Descriptive statistical tools**, including **mean, median, standard deviation, and skewness**, are often applied to understand claim frequency distributions. In the case of SOCSO's Survivors' Pension, such methodologies can enhance policymaking by identifying factors that drive claim surges and estimating required financial reserves for future payouts [4], [10], [11].

The literature establishes a foundational understanding of **SOCSO's pension scheme, global comparisons, prior economic assessments, and statistical methodologies**, all of which frame the analytical approach in this study [10].

METHODOLOGY

The methodology employed in this study is designed to ensure a comprehensive analysis of the frequency of SOCSO's Survivors' Pension Benefit claims over the period from 1985 to 2024. A structured approach is taken to collect and analyze the data, applying descriptive statistical methods to derive meaningful insights into the trends and patterns observed.

Data Collection

The dataset for this study was obtained from official SOCSO annual reports and publicly available government data sources to ensure reliability and accuracy. The dataset includes the total number of claims made each year between 1985 and 2024. The historical data provides a foundation for analyzing trends in the frequency of claims, offering insights into how socio-economic and policy changes have influenced claim patterns [10].

Descriptive Statistics

To assess the statistical properties of the dataset, several key descriptive statistical measures were utilized. The **mean**, representing the average number of claims per year, was computed to understand the central tendency of the data. The **median** was included to provide a measure of central location, reducing the influence of extreme values that may distort the analysis. The **standard deviation** and **variance** were calculated to quantify the level of dispersion within the dataset, illustrating how claim numbers fluctuate over time. Furthermore, **skewness** was examined to determine whether the data distribution was symmetrical or inclined toward a specific direction, while **kurtosis** provided insights into the presence of outliers and the nature of the tails of the distribution [12], [13].

Data Visualization Methods

To effectively communicate the trends and patterns in the dataset, graphical methods were applied. A **line graph** was constructed to depict the annual trend of SOCSO Survivors' Pension Benefit claims over the 40-year period, highlighting significant shifts in claim frequency. Additionally, a **graph** was generated to visualize the distribution of claim frequencies across different years, offering a clearer perspective on the spread of values and the presence of any notable peaks or clustering of data points. These visual tools were instrumental in supplementing the statistical analysis and providing an intuitive understanding of the overall trend [6], [10], [14].

Analytical Approach

The study employs **time-series analysis** to evaluate how the number of claims has evolved over the years. By examining historical trends, we identify key inflection points where claim frequency experienced significant increases. Possible explanations for these fluctuations, such as **policy changes**, **economic conditions**, and **demographic shifts**, were also considered to establish potential causative factors. This comprehensive analytical approach ensures that conclusions drawn from the study are backed by empirical evidence and statistical rigor [4], [15].

RESULTS AND DISCUSSION

The results of this study provide an in-depth analysis of the trends in claims for SOCSO's Survivors' Pension Benefit over a span of forty years from 1985 to 2024 (Table 1).

Table 1 Frequency Socso's Survivors' Pension Benefit

Year	Fre	Year	Fre	Year	Fre
1985	432	**1999**	75,189	**2012**	191,006
1986	2,145	**2000**	82,113	**2013**	203,454

1987	4,341	**2001**	88,281	**2014**	216,001
1988	7,990	**2002**	94,890	**2015**	231,279
1989	11,760	**2003**	106,531	**2016**	249,018
1990	17,813	**2004**	114,336	**2017**	268,540
1991	22,820	**2005**	120,655	**2018**	284,885
1992	26,750	**2006**	129,515	**2019**	305,227
1993	32,338	**2007**	138,717	**2020**	320,520
1994	36,005	**2008**	145,178	**2021**	340,957
1995	43,377	**2009**	160,179	**2022**	357,359
1996	51,043	**2010**	175,564	**2023**	366,722
1997	59,194	**2011**	182,713	**2024**	383,101
1998	67,034				

The total number of claims increased substantially over time, showing a steady rise in the early years followed by a rapid escalation after 2000. The statistical analysis highlights significant fluctuations in claim numbers, influenced by socio-economic conditions, policy changes, and demographic shifts [16], [17].

Trends in SOCSO's Survivors' Pension Claims (1985-2024)

The **graph** generated from the dataset illustrates a clear upward trajectory in the number of claims over the four decades.
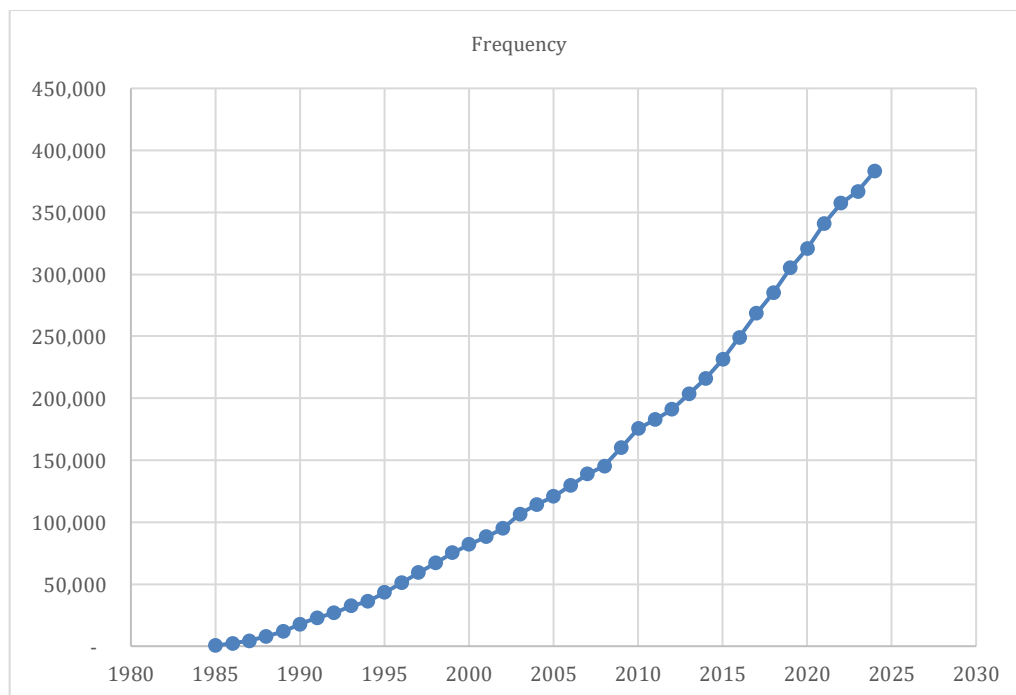

Fig 1 The number of claims over the four decades

The early years, from 1985 to 1995, exhibit a gradual increase, but post-2000, the trend becomes more pronounced with a sharp rise in the number of claims, reaching a peak of **383,101** in 2024. Several factors could have contributed to this trend, including policy amendments that expanded coverage, rising mortality rates among insured workers, and broader socio-economic shifts leading to increased dependency on social security provisions [18].

Statistical Analysis of Claims Distribution

Table 2 shows of claim frequencies demonstrate a right-skewed distribution, indicating that while the number of claims was relatively low in earlier years, there has been a dramatic increase in recent times.

Table 2 Frequency Table

Frequency	
Mean	142874.2943
Standard Error	18425.60864
Median	117495.5
Standard Deviation	116533.7811
Sample Variance	13580122148
Kurtosis	-0.79679151
Skewness	0.607619266
Range	382669
Minimum	432
Maximum	383101
Sum	5714971.77
Count	40
Largest(1)	383101
Smallest(1)	432

The **mean** of **142,874.29** suggests that claims have steadily increased over time, while the **median** of **117,495.5** confirms that the distribution is skewed towards higher values in later years. The **standard deviation of 116,533.78** indicates substantial variation, reinforcing the significant fluctuations in claim volumes over time. The skewness value of **0.6076** further confirms that the distribution is positively skewed, meaning the majority of years had lower claim numbers but recent years exhibit a steep rise. Additionally, the kurtosis value of **-0.7967** suggests a light-tailed distribution, indicating fewer extreme outliers compared to a normal distribution [19].

Data Interpretation and Policy Implications

The upward trend in claims has important implications for **SOCSO's financial sustainability**. The increasing burden on the fund necessitates strategic financial planning and possible adjustments in contribution rates or eligibility criteria. The trend suggests that as the Malaysian workforce continues to grow and age, a higher proportion of dependents will rely on **Survivors' Pension Benefits**. Policymakers must evaluate whether existing reserves are sufficient to accommodate this growth and whether adjustments in funding mechanisms are required to ensure long-term solvency [16], [20].

The increasing number of claims also underscores the necessity for **actuarial adjustments** in pension fund management. As claims continue to rise, a data-driven approach involving **predictive modeling and actuarial science** will be crucial in forecasting future demands on the pension system. Policymakers should explore **demographic forecasting models** to anticipate future claims and proactively implement financial strategies to

sustain the fund. Furthermore, comparative analyses with global pension schemes may provide valuable insights into best practices for enhancing sustainability [21].

Visualization of Trends and Statistical Patterns

Two key visualizations were employed to analyze the dataset: a **line graph** representing the trend in **annual pension claims** of claim frequencies. The line graph provides a **clear visual depiction** of how claims have evolved over time, emphasizing the rapid increase in recent years. Thid visual tool aid in identifying patterns, validating statistical measures, and offering a clearer perspective on the implications of increasing claims [16], [22].

CONCLUSION AND RECOMMENDATIONS

The findings of this study highlight a significant and continuous increase in the number of claims for SOCSO's Survivors' Pension Benefit over the 40-year period. The frequency of claims has risen exponentially, particularly in the past two decades, due to multiple factors including demographic changes, policy amendments, and economic influences [1].

The statistical analysis confirms that the data distribution is right-skewed, meaning that many claims were lower in the earlier years and increased sharply in recent times. The high standard deviation and variance suggest significant year-to-year fluctuations, emphasizing the dynamic nature of claim trends [23].

These findings underline the necessity for SOCSO to implement effective strategies to ensure the long-term sustainability of the Survivors' Pension Benefit. It is recommended that SOCSO conducts periodic actuarial evaluations to assess the financial viability of the fund in light of increasing claims The growing demand for survivors' pensions calls for enhanced financial forecasting methods that incorporate predictive analytics and demographic modeling [5].

SOCSO should explore policy adjustments that ensure continued fund sustainability, such as reviewing contribution rates and eligibility requirements. Policymakers should consider implementing measures that balance fund sustainability with the continued provision of adequate support to beneficiaries. There is a need for a dynamic policy framework that adapts to the changing social and economic landscape. SOCSO should collaborate with relevant stakeholders, including government agencies and financial experts, to develop strategies that ensure a robust and resilient pension fund [4].

Future research should focus on comparative studies between SOCSO and similar pension schemes globally to identify best practices that can be integrated into Malaysia's social security framework. Additionally, further studies should investigate the socio-economic factors that contribute to claim frequency, such as employment trends, income levels, and mortality rates, to gain a more comprehensive understanding of the factors driving pension claims [6].

Overall, this study provides crucial insights into the trajectory of SOCSO's Survivors' Pension Benefit claims. The results emphasize the need for proactive financial planning and policy interventions to maintain fund stability while continuing to support beneficiaries. By incorporating advanced statistical modeling and strategic policy adjustments, SOCSO can ensure that the Survivors' Pension Benefit remains a reliable and sustainable support mechanism for future generations [4].

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