

## Analysis of the Relationship Between Labor Force Size and BPJS Ketenagakerjaan Participation: A Case Study of North Sumatra Province

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### ABSTRACT

*Labor force growth is one of the important indicators in observing the dynamics of employment in a region. However, an increase in the labor force is not always accompanied by an increase in participation in social security programs, particularly Social Security Administrator for Employment (BPJS Ketenagakerjaan). This study aims to analyze the relationship between the labor force and the level of participation in Social Security Administrator for Employment (BPJS Employment) in North Sumatra Province from August 2022 to February 2025. The study uses a quantitative method with a correlational approach, utilizing official data from the Central Statistics Agency (BPS) and Satu Data Ministry of Manpower. The analysis was conducted using manual calculations and SPSS software through Pearson's correlation test. The results of the study show a correlation coefficient value of 0.3927, indicating a moderate positive relationship between labor force growth and an increase in the number of BPJS Ketenagakerjaan participants. These findings show that although an increase in the labor force tends to be followed by an increase in the number of BPJS Ketenagakerjaan participants, other factors beyond the size of the labor force also play a role in shaping participation rates, such as the composition of formal and informal workers, economic dynamics, labor policies, and the level of corporate compliance. This study emphasizes the importance of a more targeted strategy in increasing the coverage of employment social security so that it can cover all workers, especially informal sector workers, who are dominant in North Sumatra.*

**Keywords:** Labor force; BPJS Ketenagakerjaan; correlation; employment; North Sumatra

### INTRODUCTION

Labor force dynamics constitute one of the most fundamental indicators in assessing regional employment conditions and socio-economic development. Changes in the size of the labor force reflect demographic transitions, labor market participation rates, employment opportunities, and structural economic shifts. However, an increase in the labor force does not automatically translate into enhanced social protection coverage. In many developing economies, including Indonesia, rapid labor force growth often coexists with persistent gaps in employment social security participation. This paradox raises a critical policy concern: to what extent does the expansion of the labor force align with the expansion of social protection systems? In the context of North Sumatra Province, where informal employment remains dominant, this issue becomes particularly significant.



Social protection theory and welfare state perspectives provide a normative foundation for understanding the role of the state in managing social risks. Social protection encompasses social assistance, social insurance, and labor market programs designed to protect individuals and households from income loss, employment shocks, and poverty (Imari & Al-Obaidi, 2025). Following the post-World War II development of welfare states, social protection has increasingly been framed as a citizenship right, implemented through labor market regulation, contributory insurance schemes, and public social services (Cruz-Martínez & Hernández-Moreno, 2025; Besche-Truthe et al., 2025). Esping-Andersen's classical typology of welfare regimes categorizes welfare states into liberal, conservative-corporatist, and social democratic models, based on levels of decommodification and social protection coverage (Solovieva, 2023). Although Indonesia does not strictly fit into these traditional classifications, its employment social security system reflects a hybrid structure, combining contributory schemes for formal workers with voluntary enrollment mechanisms for informal workers.

Despite regulatory frameworks mandating employer participation in employment social security, empirical evidence shows persistent coverage gaps. Studies conducted in Indonesia indicate substantial disparities between formal and informal sector participation. Ardianingsih et al. (2021) found that informal workers exhibit low enrollment rates due to limited awareness, administrative complexity, and perceived financial burdens. Similarly, Purba et al. (2021) reported that national participation in employment social security stood at 41.45 percent, with formal workers participating at 48.92 percent compared to only 1.13 percent among informal workers. More recently, Purnama, Bilqis, and Syahwildan (2025) emphasized structural inequalities in coverage between formal and informal workers, highlighting literacy constraints and regulatory limitations as key barriers. These findings illustrate that labor force growth alone does not guarantee increased social protection participation, particularly when the expansion occurs predominantly within vulnerable employment segments.

The persistent gap between labor force expansion and social security enrollment can be further explained through Labor Market Segmentation Theory. Contrary to neoclassical assumptions of a unified labor market, segmentation theory posits that labor markets are divided into primary and secondary segments (López-Roldán & Fachelli, 2021). The primary segment consists of stable, well-paid jobs with strong institutional protection, while the secondary segment includes precarious, low-wage, and informal employment characterized by minimal social protection. Empirical studies across various countries confirm that segmentation contributes to wage inequality, employment instability, and social exclusion (Salvia & Poy, 2025; Li et al., 2024; Gultekin et al., 2024). In developing economies with high informal employment rates, segmentation often follows formal-informal divides, where workers in the secondary segment face limited access to contributory social insurance schemes.

In the Indonesian context, labor market segmentation is closely linked to the structure of employment social security. Formal workers are typically automatically enrolled through employer obligations, whereas informal workers must voluntarily register and independently finance contributions. This structural design inherently produces dualization within the social protection system, mirroring labor market segmentation patterns (Cantillon et al., 2021; Cruz-Martínez & Hernández-Moreno, 2025). As a result, insiders in the primary segment benefit from stable coverage, while outsiders in informal or non-standard employment remain underprotected. In provinces such as North Sumatra, where informal employment constitutes a substantial share of the

workforce, the expansion of the labor force may not proportionally increase BPJS Ketenagakerjaan participation.

Although previous studies have examined determinants of social security participation among informal workers and evaluated the effectiveness of BPJS programs, limited research has quantitatively analyzed the direct relationship between labor force size and employment social security participation at the provincial level using time-series data. Most existing studies focus either on micro-level participation determinants or on national-level cross-sectional analysis. The absence of province-specific longitudinal correlation analysis represents a notable research gap. Furthermore, prior studies rarely integrate welfare state theory and labor market segmentation theory to interpret quantitative findings. Consequently, there remains insufficient theoretical explanation regarding why labor force growth does not automatically translate into higher social protection coverage.

This study addresses these gaps by examining the relationship between labor force size and BPJS Ketenagakerjaan participation in North Sumatra Province over six observation periods from August 2022 to February 2025. By employing Pearson correlation analysis using official data from the Central Statistics Agency (BPS) and the Ministry of Manpower's Satu Data platform, this research provides empirical evidence regarding the extent to which labor force growth correlates with employment social security participation. The novelty of this study lies in three aspects. First, it utilizes time-series provincial data to assess correlation trends rather than relying solely on cross-sectional data. Second, it bridges quantitative correlation findings with welfare state and labor market segmentation theories to provide a comprehensive theoretical interpretation. Third, it highlights the structural implications of informal employment dominance in shaping social protection coverage dynamics at the regional level.

The phenomenon observed in North Sumatra reflects a broader structural challenge in developing welfare systems: expanding labor force participation without corresponding expansion in formal employment opportunities and institutional coverage mechanisms. While labor force growth may signal economic dynamism, it may simultaneously increase the number of workers in vulnerable or informal segments. In such contexts, employment social security coverage becomes contingent not only on workforce size but also on labor market composition, employer compliance, regulatory enforcement, and institutional capacity. The moderate correlation identified in this study suggests that labor force expansion contributes to increased participation, yet it does not function as a dominant determinant. This reinforces theoretical arguments that social protection expansion requires institutional adaptation beyond mere labor market growth.

Therefore, this study aims to analyze the relationship between labor force size and BPJS Ketenagakerjaan participation in North Sumatra Province during the period August 2022–February 2025, and to assess the extent to which changes in labor force size influence participation dynamics within the employment social security system. By situating empirical findings within the broader frameworks of welfare state theory and labor market segmentation theory, this research seeks to contribute to policy discourse on expanding inclusive social protection coverage in regions characterized by high informal employment.

## **METHODS**

This study employs a quantitative approach using a correlational research design. The primary objective of this design is to examine the relationship between two variables

without manipulating or intervening in the observed phenomena. The variables analyzed in this study are the size of the labor force in North Sumatra Province as the independent variable (X) and the number of BPJS Ketenagakerjaan participants in North Sumatra Province as the dependent variable (Y). A correlational method was selected because it enables the researcher to identify the direction and strength of the association between the two variables in a systematic and objective manner, without introducing experimental treatment or control conditions.

The data used in this study are secondary data obtained from official and authoritative sources. Data on the labor force size were collected from publications issued by the Central Statistics Agency (Badan Pusat Statistik/BPS) of North Sumatra Province. Meanwhile, data on the number of BPJS Ketenagakerjaan participants were obtained from the official BPJS Ketenagakerjaan database published through the Satu Data Ketenagakerjaan platform of the Ministry of Manpower of the Republic of Indonesia. Both data sources are publicly accessible and officially verified, ensuring reliability and validity for representing employment conditions and employment social security participation at the provincial level.

The study covers six observation periods: August 2022, February 2023, August 2023, February 2024, August 2024, and February 2025. This time-series structure was selected to capture the dynamics of labor force changes and BPJS Ketenagakerjaan participation over a three-year period. Since labor force data published by BPS are available semiannually, the use of two observation points per year allows for a more accurate assessment of fluctuations and seasonal variations in employment and social security participation. By incorporating multiple time points, the study enhances the robustness of correlation analysis and minimizes potential bias arising from short-term anomalies.

Data processing was conducted through several systematic steps. First, descriptive statistics were calculated to summarize trends in both variables across the six observation periods. Second, necessary intermediate values were computed, including the sum of each variable ( $\Sigma X$  and  $\Sigma Y$ ), the square of each variable ( $\Sigma X^2$  and  $\Sigma Y^2$ ), and the cross-product of the two variables ( $\Sigma XY$ ). These calculations were then used to determine the Pearson correlation coefficient (r) using the standard Pearson Product-Moment Correlation formula:

$$r = \frac{(n \cdot \Sigma XY) - (\Sigma X \cdot \Sigma Y)}{\sqrt{[(n \cdot \Sigma X^2) - (\Sigma X)^2] \cdot [(n \cdot \Sigma Y^2) - (\Sigma Y)^2]}}$$

Through this analytical procedure, the study provides a quantitative assessment of the extent to which changes in labor force size are associated with changes in BPJS Ketenagakerjaan participation in North Sumatra Province, forming the basis for subsequent interpretation and policy discussion.

## RESULTS AND DISCUSSION

This study analyzed data from six observation periods using the labor force value as variable X and the number of BPJS Employment participants as variable Y. Data on the number of labor force was taken from the official publication of the Central Statistics Agency (BPS) of North Sumatra Province, while data on the number of BPJS Employment participants was taken from the One Employment Data of the Ministry of Manpower of the Republic of Indonesia. Both data sources are official sources so they can accurately describe employment conditions in North Sumatra, which is summarized in the

following table:

Table 1. Number of Workforce and Number of BPJS Employment Participants in Prov. North Sumatra

Year/Period	Labor Force (x)	Amount
		BPJS Employment Participants (y)
August 2022	7,669,870	1,837,902
February 2023	7,873,682	1,547,721
August 2023	8,021,622	1,904,830
February 2024	7,999,959	1,975,378
August 2024	8,181,158	1,848,260
February 2025	8,108,338	1,982,041

In general, the workforce has shown a steady increase year after year. In August 2022, the workforce was recorded at 7,669,870 people, then increased to 8,108,338 people in February 2025. This increase reflects growth in the productive population and increased community participation in the labor market. Meanwhile, the number of BPJS Ketenagakerjaan participants also fluctuated from period to period. Despite some minor decreases, the overall number of BPJS participants tended to increase, from 1,837,902 participants in August 2022 to 1,982,041 participants in February 2025.

To determine the relationship between the two variables, calculations were carried out using the Pearson correlation formula, either manually or using the SPSS application.

Table 2. Basis for calculating correlation

Year/ Period	Amount		
	x <sup>2</sup>	y <sup>2</sup>	xy
Aug 2022	58,826,905,816,900	3,377,883,761,604	14,096,469,412,740
February 2023	61,994,868,237,124	2,395,440,293,841	12,186,262,978,722
Aug 2023	64,346,419,510,884	3,628,377,328,900	15,279,826,234,260
February 2024	63,999,344,001,681	3,902,118,242,884	15,802,943,009,502
Aug 2024	66,931,346,220,964	3,416,065,027,600	15.120.907.085.080
Feb 2025	65.745.145.122.244	3,928,486,525,681	16,071,058,357,858
Amount	381,844,028,909,797	20,648,371,180,510	88,557,467,078,162

Then continue to do the calculation using the Pearson correlation formula:

$$r = \frac{(n \cdot \sum XY) - (\sum X \cdot \sum Y)}{\sqrt{[(n \cdot \sum X^2) - (\sum X)^2] \cdot [(n \cdot \sum Y^2) - (\sum Y)^2]}}$$

$$r = \frac{(6 \times 88,557,467,078,162) - (47,854,629 \times 11,096,132)}{\sqrt{[(6 \times 381,844,028,909,797) - (2,290,065,516,727,640)] \cdot [(6 \times 20,648,371,180,510) - (123,124,145,361,424)]}}$$

$$r = \frac{(531,344,802,468,972) - (531,001,280,195,028)}{\sqrt{[(2,291,064,173,458,780) - (2,290,065,516,727,640)] \cdot [(123,890,227,083,060) - (123,124,145,361,424)]}}$$

$$r = \frac{343,522,273,944}{\sqrt{[998.656.731.141] \cdot [766.081.721.636]}}$$

$$r = \frac{343,522,273,944}{\sqrt{765,052,667,915,877,000,000,000}}$$

$$r = \frac{343,522,273,944}{874,672,891,952.12}$$

$$r = 0.3927437069$$

**Correlations**

		JumlahAngka tanKerja_X	PesertaBPJS Ketenagakerj aan_Y
JumlahAngkatanKerja_X	Pearson Correlation	1	,393
	Sig. (2-tailed)		,441
	N	6	6
PesertaBPJSKetenagake rjaan_Y	Pearson Correlation	,393	1
	Sig. (2-tailed)	,441	
	N	6	6

Figure 1. Correlation Results of the Two Variables Using SPSS

The results of manual calculations using the Pearson formula and analysis using SPSS showed a correlation coefficient of 0.3927, which can be considered a positive, moderate-strength relationship between the workforce and the number of BPJS Ketenagakerjaan participants. This means that as the workforce increases, the number of BPJS participants tends to increase, although the increase is not always proportional.

This not very high correlation value indicates that other factors besides the workforce may also influence the level of BPJS participation. Employment. One of the factors that plays a significant role is the level of formality of employment. People working in the formal sector have greater obligations and access to register as BPJS Ketenagakerjaan participants than those working in the informal sector. Furthermore, the level of employer compliance in registering their workers, changes in economic conditions, layoff rates, and government policies can also influence the number of BPJS participants.

Fluctuations in the number of BPJS participants during certain periods, such as the decrease in February 2023, could be due to decreased industrial activity, job transitions, or delays in BPJS administrative reporting. Conversely, increases in February 2024 and February 2025 could be influenced by improved economic stability, business sector

growth, and increased public awareness of the importance of social security for workers. Furthermore, the characteristics of the labor market in North Sumatra, which has a large proportion of informal workers, also contribute to the less strong correlation. Informal workers tend not to be covered by BPJS Employment, so even though the workforce increases, not all workers are automatically registered as BPJS participants. Thus, the research results suggest that an increase in the workforce does impact the number of BPJS Ketenagakerjaan participants, but it is not the primary determinant. More comprehensive policies are needed to increase participation, particularly by targeting informal workers, improving company oversight, and strengthening public education on the importance of employment social security protection.

## **Discussion**

The primary objective of this study is to analyze the relationship between labor force size and BPJS Ketenagakerjaan participation in North Sumatra Province during the period August 2022–February 2025, and to assess the extent to which changes in labor force size influence participation dynamics within the employment social security system. The empirical findings demonstrate a moderate positive correlation ( $r = 0.3927$ ), indicating that labor force expansion tends to be followed by an increase in BPJS participation, yet the relationship is not strong enough to suggest a direct or automatic linkage. To interpret these findings comprehensively, it is essential to situate them within broader theoretical frameworks of welfare state theory, social protection coverage, and labor market segmentation.

From the perspective of social protection theory, the state bears responsibility for mitigating social risks associated with employment, unemployment, disability, and old age. Social protection encompasses social assistance, social insurance, and labor market interventions designed to protect households from economic shocks and structural vulnerabilities (Imari & Al-Obaidi, 2025). In the classical welfare state model, particularly after World War II, social protection became institutionalized as a citizenship right, implemented through mandatory social insurance systems, labor market regulation, and public service provision (Cruz-Martínez & Hernández-Moreno, 2025; Besche-Truthe et al., 2025). Within this normative framework, an expanding labor force should ideally correspond with expanding social insurance coverage, especially in contributory schemes linked to employment status.

However, the moderate correlation identified in this study suggests that labor force growth in North Sumatra does not automatically translate into proportional expansion of BPJS Ketenagakerjaan participation. This phenomenon reflects structural limitations within hybrid welfare regimes. Esping-Andersen's typology distinguishes welfare states into liberal, conservative-corporatist, and social democratic regimes based on coverage levels and degrees of decommodification (Solovieva, 2023). Indonesia's employment social security system resembles a contributory, employment-based structure closer to conservative-corporatist models, yet without universal guarantees comparable to social democratic regimes. Consequently, coverage expansion depends heavily on formal employment growth rather than total labor force expansion.

Comparative welfare state literature further indicates that contemporary systems often display hybridization patterns. Continental European systems combine Bismarckian contributory principles with Beveridgean universal elements, yet still experience insider–outsider dualization in social insurance access (Cantillon et al., 2021; Cruz-Martínez & Hernández-Moreno, 2025). Similarly, Gulf welfare regimes provide extensive coverage for citizens while excluding migrant workers, revealing structural

selectivity in protection (Brik & Brown, 2025). In developing contexts, limited fiscal capacity and high informal employment rates constrain universal social protection expansion, leading to fragmented systems where informal safety nets family networks, religious institutions, and community solidarity fill institutional gaps (Mumtaz et al., 2024). North Sumatra reflects similar structural characteristics, where high informal employment reduces the effectiveness of employment-based contributory schemes.

The moderate strength of correlation in this study can therefore be interpreted as a manifestation of welfare state limitations in contexts dominated by labor market segmentation. Labor Market Segmentation Theory challenges the neoclassical assumption of a unified labor market, arguing instead that labor markets are divided into primary and secondary segments (López-Roldán & Fachelli, 2021). The primary segment offers stable employment, higher wages, and institutional protection, while the secondary segment consists of precarious, informal, or low-wage employment with limited social security access. Empirical studies across diverse regions demonstrate that segmentation increases wage inequality, employment instability, and social vulnerability (Salvia & Poy, 2025; Li et al., 2024; Gultekin et al., 2024; Buzzelli, 2025).

In North Sumatra, labor force growth may largely occur within the secondary segment, particularly informal employment. When workforce expansion is driven by informal sector participation, the impact on contributory social insurance enrollment remains limited. This explains why the statistical relationship between labor force size and BPJS participation is positive but moderate. Growth in the primary segment formal, regulated employment would likely produce a stronger correlation, whereas growth concentrated in informal or non-standard employment segments dilutes the relationship.

Segmentation literature also emphasizes intersectional inequalities in labor market outcomes. Secondary labor markets disproportionately affect women, migrants, and marginalized social groups (Ahn et al., 2023; López-Roldán & Fachelli, 2021). Research from Asia, Latin America, and Africa demonstrates that segmented employment structures intensify vulnerability during economic crises such as the COVID-19 pandemic (Das et al., 2025; Salvia & Poy, 2025). In such contexts, contributory social insurance systems tied to formal employment fail to adequately protect workers in precarious segments. The findings of this study align with these theoretical insights, suggesting that employment social security expansion requires structural integration beyond formal sector mandates.

Dualization theory further strengthens this interpretation. Dualization refers not only to segmentation within labor markets but also to differentiated access within welfare systems (Cantillon et al., 2021). Insiders typically permanent formal employees enjoy stable protection, whereas outsiders temporary, part-time, or informal workers remain underprotected (Cruz-Martínez & Hernández-Moreno, 2025). The moderate correlation identified in North Sumatra suggests the persistence of such dualization. Even as the labor force grows, BPJS Ketenagakerjaan participation increases primarily among workers in the primary segment, leaving many secondary segment workers uncovered.

The theoretical implication is that employment-based social insurance schemes are structurally dependent on labor market composition. In Nordic welfare regimes, high employment rates are combined with universalistic social protection systems, reducing exclusion risks (Imari & Al-Obaidi, 2025). In contrast, continental and Southern European systems experience sharper divides between protected and unprotected workers, with family networks compensating for institutional gaps (Cruz-Martínez & Hernández-Moreno, 2025). In developing regions, high informality rates fundamentally challenge contributory insurance models, necessitating inclusive reforms (Salvia & Poy, 2025;

Fathoni et al., 2025).

Applying these theoretical insights to the North Sumatra case, the empirical results demonstrate that labor force expansion alone is insufficient to significantly improve social protection coverage. The moderate correlation indicates that structural factors formal–informal composition, employer compliance, economic cycles, and regulatory enforcement mediate the relationship. When economic stability improves, as seen in certain periods of the dataset, BPJS participation increases. However, downturns, job transitions, or informalization processes weaken enrollment growth.

Moreover, the findings reinforce arguments that social protection reform must address life-cycle coverage independent of employment segment status (Kponou, 2025). Contributory schemes tied exclusively to formal employment risk perpetuating segmentation-based inequalities. Expanding voluntary schemes for informal workers, subsidized contributions, and state-financed floors of protection may reduce coverage disparities. The integration of formal and informal protection mechanisms, as suggested in comparative research, becomes crucial in contexts with dominant informal labor markets (Mumtaz et al., 2024).

This study therefore answers its research objective by demonstrating that while labor force size positively correlates with BPJS participation, it does not function as a dominant explanatory variable. The moderate correlation coefficient quantitatively confirms theoretical expectations derived from welfare state and segmentation literature. Labor market structure mediates the relationship between workforce expansion and social protection enrollment. Where segmentation persists, coverage expansion remains partial.

Policy implications derived from this discussion emphasize structural reform rather than reliance on labor market growth alone. Strengthening employer compliance mechanisms can enhance automatic enrollment in the formal sector. Simultaneously, inclusive strategies targeting informal workers simplified registration procedures, digital access, contribution subsidies, and awareness campaigns are necessary to reduce dualization. Without structural adaptation, employment social security systems risk reinforcing existing labor market inequalities rather than mitigating them.

In conclusion, the empirical evidence from North Sumatra illustrates a broader structural challenge in developing welfare systems: the coexistence of labor force growth and incomplete social protection coverage. The moderate positive correlation reflects partial alignment between workforce expansion and institutional enrollment but confirms that segmentation and welfare regime characteristics fundamentally shape outcomes. By integrating quantitative findings with welfare state theory and labor market segmentation theory, this study contributes to a deeper understanding of why expanding labor force participation does not automatically guarantee inclusive employment social security coverage.

## **CONCLUSIONS**

Based on the analysis of workforce data and the number of BPJS Ketenagakerjaan participants in North Sumatra Province over six observation periods from August 2022 to February 2025, this study shows a positive relationship between the two variables, with a Pearson correlation coefficient of 0.3927. This value indicates that growth in the workforce tends to be followed by an increase in the number of BPJS Ketenagakerjaan participants, although the correlation is moderate and does not indicate a strong or direct relationship. This finding confirms that changes in the workforce are not the sole factor determining the dynamics of employment social security participation in the region.

Fluctuations in the number of BPJS participants, which do not always align with changes in the workforce, indicate that various external factors influence participation rates. These factors include the proportion of formal and informal workers, employer compliance with employee registration, government policies, economic conditions, and local labor market dynamics. The predominance of informal workers in North Sumatra also contributes to weakening the correlation between the two variables, given that informal workers tend to have less access to employment social security programs.

Thus, while the increase in the workforce has contributed to the increase in the number of BPJS Ketenagakerjaan participants, this study confirms the need for more comprehensive and targeted policies to expand the scope of social protection. These efforts can be implemented through improving education for informal workers, strengthening oversight of companies regarding worker registration obligations, and encouraging cross-sector collaboration to facilitate access and raise public awareness of the importance of social protection. employment social security. Overall, this study provides an empirical picture that increasing the workforce has an impact, but it is not yet dominant enough to encourage increased BPJS Employment participation without the support of more inclusive and strategic policies.

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