



# Micro and Macro Determinants of Precarious Employment in Indonesia: An Empirical Study of Paid Workers using Multilevel Binary Logistic Regression

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**Abstract.** Decent work for all is one of the goals stated in the Sustainable Development Goals (SDGs). One indicator that can represent proper work conditions is the precarious employment rate (PER). In recent periods, the precarious employment rate in Indonesia has shown an increasing trend. It indicates a decent work deficit in Indonesia. In addition, the PER among provinces has a different figure. This study aims to analyze the micro and macro factors that influence the status of precarious employees in Indonesia. The analytical method used in this study is multilevel binary logistic regression. The results show that micro factors; namely the worker's characteristics, including age, education level, employment sector, previous work status, and urban-rural area; have a significant effect on the precarious status of employees. In terms of macro factors, it is found that an increase in the output of the industrial and construction sectors can reduce the tendency of a worker to become a precarious employee. Meanwhile, an increase in labour supply increases the likelihood of workers becoming precarious employees. Various parties, including society and government, have to put extra efforts to reduce the precarious employment rate by improving the quality of human capital and domestic products demand.

## 1. Introduction

One of the significant challenges faced by the Indonesians is the jobs-creation for its people. Along with the increase in population, it is necessary to increase sufficient employment opportunities so that the unemployment rate does not soar. Not just an adequate number of jobs, the jobs created should be decent, quality work, and guaranteeing workers to develop themselves, respect human rights, and provide sufficient income for workers to live prosperously.

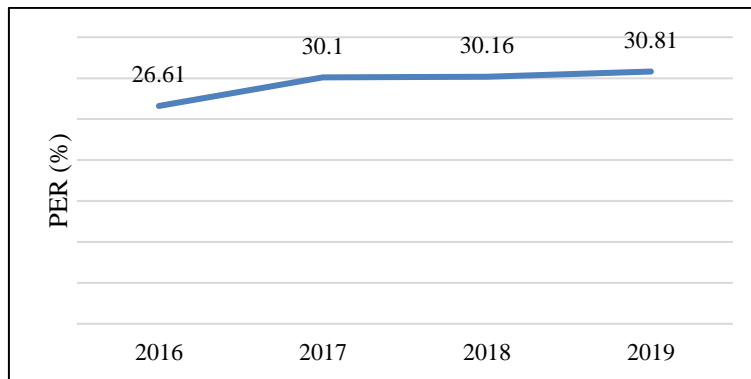
Decent work is one of the goals in sustainable development or the Sustainable Development Goals (SDGs). The 8<sup>th</sup> goal is to promote inclusive and sustainable economic growth, productive employment opportunities and decent work for all. Decent work is also one aspect of poverty alleviation and the achievement of sustainable development [1]. The campaign for the importance of decent work is carried out by the International Labor Organization (ILO) through a decent work plan so that every community can have the opportunity to work in jobs that can ensure their survival [1]. One indicator that can measure decent work is the precarious employment rate (PER) [2]. PER shows the proportion of the working population with precarious jobs, far from having job stability and security.

Precarious work is a source of concern for some workers. If these workers lose their jobs at any time (break up or end their contract), it will impact the economic activities of the workers' households. Precarious work is often associated with poor terms and conditions of work, does not lead to exemplary



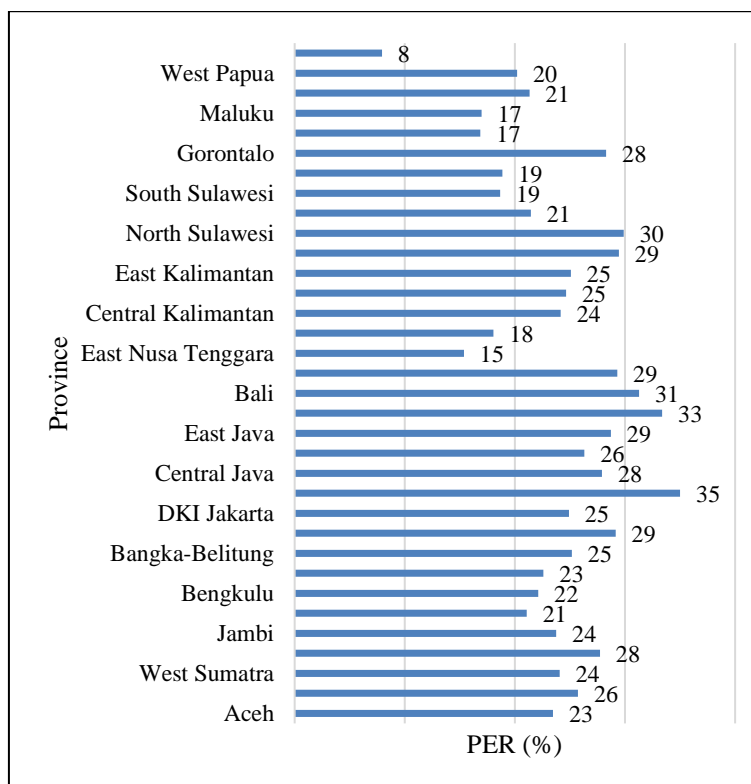
work commitment from workers due to short working periods, has poor wages that can weaken aggregate demand, and impacts macroeconomic losses [3].

The phenomenon of precarious work is increasingly visible today. At the end of the 20<sup>th</sup> century, there was general agreement around the world that the labour market was in a state of transition and becoming less secure [4]. Furthermore, the prevalence of full and secure employment is declining, and alternative forms of work are growing, most of them are temporary and unsecured.



Source: BPS’s publication of *Indikator Pekerjaan Layak di Indonesia*

**Figure 1.** The Precarious Employment Rate (PER) in Indonesia 2016 – 2019.





on its distribution in each province in Indonesia, the precarious employment rate shows varied numbers (figure 2). The uneven distribution of PER indicates an influence of the aggregate variable (region) on the precarious employment phenomenon.

The precarious employment that occurs in Indonesia as a consequence of the Manpower Law, namely Law Number 13 of 2003 [5] (updated with Law No. 11 of 2020 [6]). The law authorises employment with a contract system that allows flexibility in the labour market. Because there is no prohibition on precarious work, a person may be classified as a precarious employee because of the characteristics and qualifications (micro/individual factors). Previous studies show that precarious work can be related to factors at the micro-level. For example, studies [7] and [8] showed that younger workers are more likely to be in temporary jobs. Furthermore, research [3] stated that precarious jobs are more likely to be owned by those with low levels of education. Then, a study [9] revealed that precarious work could also be related to the characteristics of the employment sector. Thus, it is important to include micro (employee) features in analysing the precarious employment phenomenon. In addition, differences in the incidence of precarious employment levels among provinces in Indonesia can signal that the heterogeneity of provincial characteristics also influences the phenomenon of precarious employment in Indonesia.

Based on the description above, the purpose of this study is to analyse the general description of workers in Indonesia based on the characteristics of workers and precarious status and analyse individual (micro) and contextual (macro) factors that influence the precarious situation of workers in Indonesia. The findings obtained from the analysis using regional aggregate variables are also expected to produce suggestions regarding macro policies to improve decent work conditions in Indonesia. So that the involvement of regional aggregate variables becomes essential so that the analysis of the determinants of precarious employment becomes more comprehensive.

## 2. Literature reviews

### 2.1. Precarious employment

Olsthoorn [10] developed a conceptual framework that can be used to conceptualize precarious work. Based on various reviews of academic literature regarding precariousness, Olsthoorn stated the three components of precarious work, (i) insecure jobs, namely jobs that can make work precarious, (ii) vulnerable employees, namely workers who are expected to suffer significantly with conditions offered by insecure jobs because of their circumstances, and (iii) unsupportive entitlements, which are characterized by limited rights that employees derive from their employment relationship, i.e., limited rights to income benefits when not working. The precarious employment can be defined as the intersection of these three components: precarious employment occurs when vulnerable individuals (at employee level) work in insecure jobs (at employment level) with unsupportive rights (at the institutional level) [10].

According to BPS [1], workers who have precarious jobs are workers who have the characteristics of casual workers (both in the agricultural and non-agricultural sectors), workers with work contracts for a certain period, or workers with verbal work contracts. In line with the concept of the ILO [2], workers who have precarious work are workers whose work contracts, both written and verbal, have a short duration or whose work contract can be terminated at any time in a short time. Thus, the formula to obtain the figure of PER is as follows:

$$PER (\%) = \frac{\text{number of workers who have precarious job}}{\text{number of workers}} \times 100\% \quad (1)$$

### 2.2. Individual factors (micro factors) that determine precarious employment

In this study, micro factors refer to factors or characteristics inherent in individual workers, such as sex, education level, age, occupation, and the classification of the area of residence (rural/urban). The rural-urban classification, although related to the area, can be classified as micro factors because each individual can have characteristics as a rural community or an urban community.



In the aspect of roles, three role components can distinguish between genders, namely (i) men are more often associated with income-generating jobs while women are more often associated with childcare and household management; (ii) in terms of work type, men more often work in mechanical, engineer, executive jobs while women more often work for others such as nurses, teachers, or secretaries; (iii) men tend to have higher positions in society than women [11]. A study [12] in Europe found that men had higher precarious rates than women when it comes to precarious work.

Regarding working age, young workers today have a higher level of precarious job involvement than older workers, although precarity varies in national and sectoral contexts [13]. This trend is possible because younger workers tend to have lower experiences than workers from the older generation.

The aspect that has the most prominent role in explaining the quality of human resources is the aspect of education [14]. Furthermore, with education, it is hoped that humans will gain knowledge that can be used to build a better life. The level of education can undoubtedly affect the quality of work owned by a person. The education level positively influences full employment opportunities and contributes to a decrease in the percentage of the population who have temporary jobs [8]. In addition, precarious jobs are more likely to be owned by those with low levels of education [3].

Job characteristics also relate to the aspects of a region. For example, jobs in the agricultural sector are more likely to be found in rural areas. The agricultural industry has an important influence on rural areas in obtaining real income [15]. Precarious work in rural areas is more common than in urban areas, although the difference is insignificant [16]. In addition, research on forms of precarious work in France found that precarious work is the majority of the phenomenon in rural areas [17].

Precarious work can cause workers to have a lot of work experience in various jobs because they tend to have jobs that tend to change (not permanent). There is evidence that working with a fixed-term contract can be a stepping stone for permanent employment [18]. Different arguments in [3] stated that employers do not have the economic incentive to invest in precarious workers because of their short tenure. In the end, they become permanent temporary workers.

According to BPS [19], the business field is the field of work/business/company/office where a resident does his job. In Indonesia, field businesses/jobs classification uses the 2015 Indonesian Standard Business Field Classification (KBLI). The sectors with high precarious jobs are the construction, agriculture, and hospitality sectors (jobs that are seasonality), as well as the food processing sector (fixed-term employment) [9].

### 2.3. Contextual factors (macro) that determine precarious employment

Areas with high production levels in the construction, agriculture, and food processing sectors determine the precarious status [9]. The ILO stated that it is feasible to analyse precarious employment indicators and GDP growth by sector/business sector [2]. A company's decisions regarding its employees can depend on the economy's structure and the demand for goods and services.

Besides being influenced by the demand for sectoral products (approximated by the production level per sector), precarious employment is influenced by the level of labour supply in an economy. The supply of labour can be shown through the indicator of the number of the labour force. The higher the number of labour force indicates that the higher the supply of labour ready to produce goods and services in an economy.

Concerning precarious work, the ILO [2] also stated that one of the factors that can influence a company's decisions regarding employees in the company is the supply of labour and income in the labour market. Therefore, it is crucial to analyse the effect of labour supply, using the number of the labour force, on precarious employment.

### 2.4. The binary logistics regression model

It is a standard method to analyse the relationship between one dependent variable and one or several independent variables when the outcome of the dependent variable is binary or dichotomous [20]. The binary logistic regression models can be classified as Generalized Linear Models (GLMs). They extend the usual regression model to solve problems on response variables that are not normally distributed [21]. GLMs have three components: (1) random component, which shows the response variable (Y) and



its probability distribution, (2) systematic component, which shows explanatory variables in a linear function, and (3) link function, which transforms the dependent variable so that the variable independent and dependent variables can be assumed to be linearly related [21]. The parameter estimation method in logistic regression modelling uses the maximum likelihood method. Predicting the coefficients of the independent variables in the regression model is done by maximizing the likelihood function. Thus, the estimator is the closest to the observation data [20].

### 2.5. Multilevel model

In the analysis using the multilevel model, the structure of the data set in the population is assumed to be hierarchical. For example, there are several groups and individuals, and then individuals are nested in each group [22]. In other words, data is obtained from several levels of observation (more than one level) [23]. The general concept in this multilevel analysis is that individuals interact with the social group to which they belong, individuals are influenced by the social group to which they belong, and conversely, social groups can be affected by the individuals who act as the member of that group [22].

In statistical literature, the multilevel model is also known as a mixed model, or in other literature, it is called a hierarchical model [23]. Furthermore, mixed models can be divided into two: (i) models with random intercepts, namely models with different intercept values between groups; and (ii) models with random slopes, namely models whose regression coefficients (including intercepts) can vary between groups. This study will use a multilevel binary logistic regression model with a random intercept.

### 2.6. Multilevel binary logistic regression model with random intercept

Regression modelling performed on data with a binary dependent variable is usually used with a logistic regression model in which the parameter estimation must use a link function. The same thing is also done in modelling a hierarchically structured data set with a dependent variable in binary form using a multilevel binary logistic regression model. The parameter estimation method in multilevel binary logistic regression modelling is also using the maximum likelihood method. Intercepts that vary between groups can be caused by differences between groups, which explanatory variables can explain at the group level.

## 3. Methodology

### 3.1. The scope of research

This study uses secondary data from the August 2019 National Labour Force Survey (Sakernas) data and macro data tabulation on the Gross Regional Domestic Product (GRDP) of Business Fields from the BPS website for 34 provinces in Indonesia, as well as the number of the labour force by province from BPS website.

This research's dependent variable or response variable is the precarious employee status with (i) precarious employee, the category for non-permanent workers and (ii) non-precarious employee, the category for workers with permanent jobs. In the August 2019 Sakernas questionnaire (SAK19.AK), the categorization of workers based on precarious employee status is carried out using questions in block V.D details R24.a and R31. The categorization rules are as follows:

- Precarious employee if:
  - Workers with work contracts for a certain period or with verbal work contracts (R24.a = 4 and (R31 = 2 or 3)); or
  - Casual workers, either in the agricultural or non-agricultural sectors (R24.a = 5 or 6);
- Non-precarious employee if:
  - Workers with permanent jobs (R24.a = 4 and (R31 = 1 or 4 or 5))

This study's independent or explanatory variables have a hierarchical structure consisting of variables at the individual level (micro) and the contextual level (macro). Variables at the individual level of workers: sex, education level, age group, classification of the area where the worker lives, previous work status, and the sector of the worker's occupation. The macro-level variables are the GRDP of the





agriculture, forestry, & fishery sectors, the GRDP of the industrial & construction sector, and the number of the workforce. The unit of analysis in this study is paid workers.

This study uses labour with the status of workers/employees/employees and casual workers (both in the agricultural and non-agricultural sectors), referred to as paid workers. This limitation occurs because researchers are unable to classify workers with the status of precarious employees on workers with the status of self-employed, trying to be assisted, or family workers due to data availability. The August 2019 Sakernas has limited rules for classifying these labour groups on precarious employee status. At the same time, workers who have independent businesses and family workers are a group of workers that might have vulnerable jobs [24]. Therefore, using the available data of paid employees as the unit analysis provides a more precise analysis of precarious employment using all workers in Indonesia. Furthermore, the number of samples of workers who become the unit analysis is 198,071 paid workers.

The operational variables of the independent variables used in this study are as follows.

Worker's sex variable was divided into two categories, namely male and female.

The age group variable was divided into two categories, namely: (i) young workers (15 – 24 years old) and (ii) adult and old workers (25 years and over).

The urban/rural variable shows the urban/rural classification for the village where the worker lives. This variable was divided into two categories: (i) rural areas; and (ii) urban areas.

The previous work variable indicates whether the worker has previously worked or has never worked. The categories in this variable are: (i) have worked (i.e., those who have previously had a job); and (ii) have never worked (i.e., those who have not previously had a job).

The variable of education level of workers is the last level of education completed by workers and marked by the highest diploma/STTB owned. The categorization of the education level variables in this study are (i) < high school (those who do not have a diploma or with an elementary or junior high school diploma) and (ii)  $\geq$  high school (those with a high school diploma and above).

The variable of the worker's occupation sector is a variable that shows the large group of workers' occupations that are narrowed down from the categories of business fields in the KBLI. The categories in this variable are: (i) agricultural sector (KBLI of Category A); (ii) Industry and construction sector (KBLI of Category B to F); and (iii) the service sector (KBLI of Category G to U).

The variable of GRDP in agriculture, forestry, and fishery sectors is a continuous variable. This variable was obtained from the tabulation of 2010 constant price GRDP data according to Business Fields in 2019 on the BPS website for 34 provinces in Indonesia.

The variable GRDP in the industrial and construction sectors (the cumulative GRDP in the KBLI sector Category B to F) is a continuous variable. This variable was also obtained from the tabulation of 2010 constant price GRDP data according to Business Fields in 2019 on the BPS website for 34 provinces in Indonesia.

The number of labor force is a continuous variable that shows the number of labor force in a certain province. This variable was obtained from the tabulation of macro data on the BPS website.

### 3.2. Analysis methods

The analytical method applied in this research is multilevel binary logistic regression analysis. This research uses the multilevel model with a random intercept because it assumes the effect of each independent variable on the precarious employee status is the same for each group (region). In addition, the researchers also did not aim to conduct regional analysis (by province) so that multilevel binary logistic regression with random intercept is considered more practical than the model with random slope. Researchers use Microsoft Excel 2019 and R software for data processing.

### 3.3. Research model

The multilevel (two-level) binary logistic regression model with random intercept in this study is as follows:



$$\ln \left[ \frac{\hat{\pi}_{ij}}{1 - \hat{\pi}_{ij}} \right] = (\hat{\gamma}_{00} + \hat{u}_{0j}) + \hat{\gamma}_{10}Sex_{ij} + \hat{\gamma}_{20}Age_{ij} + \hat{\gamma}_{30}Educ_{ij} + \hat{\gamma}_{40}Prev_{ij} + \hat{\gamma}_{50}DAgricult + \hat{\gamma}_{60}DIndusCons_{ij} + \hat{\gamma}_{70}Classific_{ij} + \hat{\gamma}_{01} \ln AgricultureGRDP_j + \hat{\gamma}_{02} \ln IndusConsGRDP_j + \hat{\gamma}_{03} \ln LabourForce_j + \hat{e}_{ij} \tag{2}$$

Note:

- Sex* : worker’s sex
- Age* : worker’s age group
- Educ* : worker’s education level
- Prev* : worker’s previous work status
- DAgricult* : dummy variable of worker’s occupation sector (agriculture sector)
- DIndusCons* : dummy variable of worker’s occupation sector (industrial and construction)
- Classific* : urban-rural classification
- AgricultGRDP* : Gross Regional Domestic Product of the agricultural sector at the provincial level (billion rupiahs)
- IndusConsGRDP* : Gross Regional Domestic Product of the industrial and construction sector at the provincial level (billion rupiahs)
- LabourForce* : number of labour force at the provincial level (persons)
- i* : 1,2, ...,  $n_j$ ;  $n_j$  shows the number of individuals at level 1 in group  $j$
- j* : 1,2, ...,  $J$  where  $J$  shows the number of groups at level 2
- $\hat{\gamma}_{00}$  : the average intercept
- $\hat{\gamma}_{0}$  : regression coefficient for the independent variable at level 1
- $\hat{\gamma}_{0.}$  : regression coefficient for the independent variable at level 2
- $\hat{u}_{0j}$  : random effect for group  $j$
- $\hat{e}_{ij}$  : residual for individu  $i$  in group  $j$

### 3.4. Stages of multilevel binary logistic regression analysis

#### 3.4.1. Testing the significance of random effects

The random effect significance test was conducted to test whether there was a difference in the effect of the groups at level 2.

The parameter estimation procedure using the maximum likelihood method produces a deviance value, which indicates how well the model fits the existing data [22]. Deviance value is defined as  $-2 \times \ln(\text{likelihood})$ . The likelihood value is the value of a likelihood function. In general, the model with a small deviance value is better than the model with a larger deviance value. By utilizing the deviance value, researchers can compare several models to determine which one is better. The hypotheses to test the significance of the random effect are as follows:

$H_0: \sigma_{u0}^2 = 0$  (the random effect is not significant)

$H_1: \sigma_{u0}^2 > 0$  (the random effect is significant)

The deviance difference test is known as the likelihood ratio test [22]. The test statistic are as follows.

$$LR = -2 \ln \left[ \frac{L_0}{L_1} \right] \sim \chi^2_{(1)} \tag{3}$$

The  $L_0$  is the likelihood value of logistics regression without random effect. The  $L_1$  is the likelihood value of logistics multilevel regression with random effect. When  $LR > \chi^2_{\alpha(1)}$ , the decision is to reject  $H_0$  at the significance level of  $\alpha$ . Furthermore, it can be concluded that the multilevel logistic regression model is better than the ordinary (one level) logistic regression model.



The significance level set in this study is 10 percent. This figure is still a common one in various studies related to socio-economic phenomena.

### 3.4.2. Parameter estimation

The method used to estimate the multilevel binary logistic regression model parameters is maximum likelihood estimation (MLE). The likelihood function is maximized so that the estimated value for the regression coefficient closest to the actual data is obtained. The maximization of the likelihood function will produce a likelihood equation that is not linear concerning the logistic regression parameters. This research uses an iterative method in R software to find a solution to the likelihood equation.

### 3.4.3. Simultaneous testing of regression coefficient significance

Simultaneous testing is carried out to test the significance of the effect of all independent variables on the dependent variable in the model. The hypothesis used in this test is as follows [20]:

$$H_0: \gamma_{10} = \gamma_{20} = \dots = \gamma_{p0} = \gamma_{01} = \dots = \gamma_{0q} = 0$$

(all independent variables have no effect on the dependent variable)

$$H_1: \text{at least one } \gamma_{p0} \text{ or } \gamma_{0q} \neq 0; p = 1, \dots, P; q = 1, \dots, Q; P = \text{total parameters at level 1; } Q = \text{total parameters at level 2}$$

(at least one independent variable affects the dependent variable)

The test statistic used in the simultaneous test are as follows [20]:

$$G = -2 \ln \left[ \frac{L(\text{null model})}{L(\text{conditional model})} \right] \sim \chi^2_{(P+Q)} \quad (4)$$

The  $L(\text{null model})$  is the likelihood model without independent variables. The  $L(\text{conditional model})$  is the likelihood model with all independent variables.

If  $G > \chi^2_{\alpha(P+Q)}$  the decision is to reject  $H_0$  at  $\alpha$  significant level. The rejection of  $H_0$  can be concluded that at least one or maybe all independent variables significantly affect the dependent variable.

### 3.4.4. Partial testing of regression coefficient significance

Partial testing was conducted to test the significance of the independent variables on the dependent variable individually. This test is carried out using the Wald test, namely by ratifying the estimated value of the regression coefficient,  $\hat{\gamma}$ , with its standard error,  $\widehat{SE}(\hat{\gamma})$  [20]. Furthermore, the hypotheses used in this test are as follows:

$$H_0: \gamma = 0 \text{ (the independent variable has no effect on the dependent variable)}$$

$$H_1: \gamma \neq 0 \text{ (independent variables affect the dependent variable)}$$

The test statistic is [20]:

$$W = \frac{\hat{\gamma}}{\widehat{SE}(\hat{\gamma})} \sim N(0,1) \quad (5)$$

If the empirical value of  $|W| > \left| Z_{\frac{\alpha}{2}} \right|$  or  $p\text{-value} < \alpha$  then the decision taken at the level of significance  $\alpha$  is to reject  $H_0$ . The rejection of  $H_0$  concluded that the independent variable (partially) had a significant effect on the dependent variable.

### 3.4.5. Interpretation of regression coefficient with an odds ratio (OR)

The interpretation of the coefficients in the logistic regression model is carried out using the value of odds ratio ( $e^{\beta_j}$ ). The odds ratio shows the tendency of the unit of observation to have the status of  $Y = 1$  (compared to  $Y = 0$ ) when the independent variable (X) increases at one unit) (ILOSTAT)



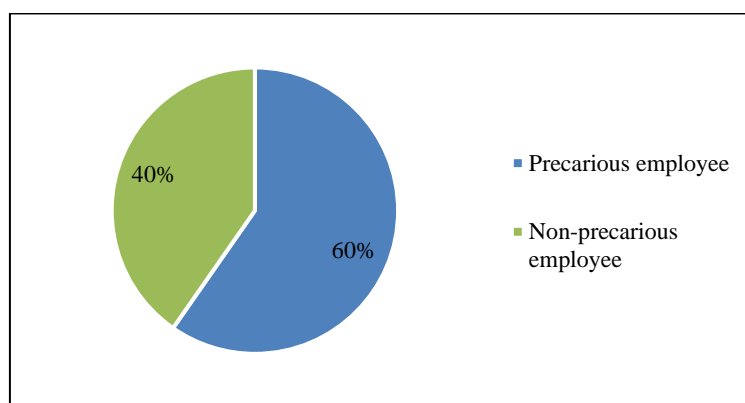


[25]. One unit increase in the value of the independent variable will lead to a rise of  $e^{\beta_j}$  times for status  $Y=1$  (success event). Specifically, on the independent variable with categorical scale, OR shows a tendency for observations to succeed when  $X = 1$  is  $e^{\beta_j}$  times compared to  $X=0$  (reference category).

## 4. Results and Discussions

### 4.1. The precarious employee among paid workers in Indonesia

Currently, the ownership of precarious work is a phenomenon that exists in every country, including in Indonesia. Workers who have precarious jobs are distributed in every region and even in every characteristic possessed by workers. This precarious employment phenomenon occurs among male and female workers, workers with low and high education, workers in every work sector, rural and urban areas, and young, adult, and old workers.



Source: BPS's Sakernas of August of 2019 (processed).

**Figure 3.** Workers based on precarious status in Indonesia, 2019.

Based on figure 3, the majority or about 60 percent of workers in Indonesia are workers with the status of precarious employees. The remaining 40 percent are workers who have permanent jobs with various stability and job guarantees in them. From the whole workforce perspective, the percentage of precarious employees can be represented through the Precarious Employment Rate (PER) indicator. PER in Indonesia in 2019 was 30.81 percent, which means that of the 100-working population, there are around 31 workers who work in temporary jobs [1].

### 4.2. Overview of workers in Indonesia based on individual characteristics and precarious status

Table 1 presents the percentage of the sample of workers in Indonesia based on precarious status and individual characteristics of workers. For each group of workers in each category of all variables, it is found that most of them are precarious employees.

**Table 1.** The precarious status of workers in Indonesia based on worker characteristics.

Variable	Category	Precarious status (%)		Total (%)
		<i>Precarious</i>	<i>Non-precarious</i>	
Sex	Male	61	39	100
	Female*	57	43	100
Education	<High school	66	34	100
	≥High school*	54	46	100
Age group	Young (15-24 years)	64	36	100
	Adult+old (25+ years)*	59	41	100



Variable	Category	Precarious status (%)		Total (%)
		<i>Precarious</i>	<i>Non-precarious</i>	
Urban-rural classification	Rural	64	36	100
	Urban*	56	44	100
Occupation sector	Agriculture	73	27	100
	Industry and Construction	64	36	100
	Service*	53	47	100
Previous work status	Yes	63	37	100
	Never*	57	43	100

Source: BPS's Sakernas of August of 2019 (processed)

Note: \*) reference categories used in logistic regression analysis

Precarious employees in male workers are 61 percent and 57 percent in female workers. It means that in each group of workers by sex, more than half of workers are with precarious jobs. The higher percentage is in the male workers. These results align with the ILO publication [26] those male workers are more likely to work in precarious jobs with a percentage in the male and female groups of 7.3 percent and 5.6 percent, respectively, in 2001. The figures increased to 12.1 percent and 6.9 percent in 2010. The researcher's findings are also in line with research [12] on precarious work in Europe, which found that the percentage of precarious jobs (for high and medium levels) was higher in the male group.

The work skills possessed by a worker might depend on the level of education. The percentage of precarious employees in the group of workers shows a decreasing pattern when viewed based on education from the lowest level to the highest level. The rate of precarious employees in workers with education below high school is 66 percent, while high school and above is 54 percent, respectively. The decrease in the percentage of precarious employees and the increase in workers' level of education indicates that the level of education might affect the ownership status of workers' precarious work. It is in line with research [8], which stated that education positively influences full employment opportunities and can reduce the percentage of temporary workers.

Based on age group, the percentage of precarious employees in the group of young workers is the highest percentage, which is 64 percent, while in the adult and old age groups, it is 59 percent. The percentage figures obtained also tend to show a decrease with increasing age of workers. It indicates that workers who are precarious employees are generally younger. In line with [27], that older workers have more work experience than younger workers.

Young workers can be categorized as new entrants to the labour market. These newcomers can come from those who have just completed their studies (fresh graduates), so it can be said that they do not have enough work experience. It is one of the considerations for employers to place these young workers in temporary or internship-based jobs.

The issue related to the young population is their transition from education to the world of work [28]. The ILO [29] stated that a successful transition from education to the labour market could be characterized by young people finding decent work. In addition, the change to decent work can make the period of youth maturity more productive. The results obtained, which are more than half of young workers are precarious employees, may indicate that the transition period of young people has not been successful from education to the labour market.

The categories of residence of workers (rural and urban) also have different statistics on decent work. The majority of workers living in urban and rural areas are precarious employees, with a higher percentage in rural areas at 64 percent, while the rate in urban areas is 56 percent. This condition occurs because precarious work is more common in rural areas, although not by a large difference compared to urban areas [16].

In terms of the employment sector, more than half of the workers in all occupational sector groups are precarious employees. The agricultural sector is the sector with the highest percentage of precarious employees, which is 73 percent. It is followed by the industrial and construction sectors, with a precarious employee percentage of 64 percent. The high contribution of precarious employees in the



agricultural sector is in line with [16]. It showed that during the period 2007 – 2017 (except 2009, because the data was omitted), the agriculture, forestry, and fishery sector and the construction sector were the two sectors with the highest share of precarious workers compared to the other sectors in Egypt. In addition, research [9] stated that the construction, agriculture, and hospitality sectors (seasonal work) and food processing sectors have a high level of precarious work.

Furthermore, precarious work drives the workers to have various work experiences (had the work before), regardless of how long he is in the previous job. About 63 percent of workers with previous work and 57 percent of workers with no previous works are precarious employees. It indicates that workers who have previous jobs are a group that is more likely to have the status of precarious employees. In addition, these results suggest that the previous work of precarious workers has not been fully able to become a stepping stone to be in a decent job. However, these jobs are expected to bring workers to better jobs gradually. It is a reasonable expectation because 37 percent of workers who had previously worked now are permanent workers. It is in line with [18], which stated that work with a fixed-term contract might be a gate to getting permanent work.

#### 4.3. Micro and macro factors that affect precarious employee status

Micro (individual) and macro (contextual/provincial) factors that affect precarious employee status in Indonesia are analysed using binary multilevel logistic regression (random intercept) with two levels. The first level is the individual level measured by workers, and the second level is the provincial level.

The analysis stage begins with forming a null regression model without random effects and a null regression model with random effects to test the significance of the random impact through the likelihood ratio test. If the random effect is significant, the next stage is to form a multilevel binary logistic regression model with explanatory variables (conditional model). Then, the significance of the logistic regression parameters was tested simultaneously and partially. Furthermore, the regression model coefficients are interpreted by using the exponential value (odds ratio).

##### 4.3.1. Random effect significance test

Based on the log-likelihood value in Appendix A and Appendix B, the test statistic values (equation (3)) are as follows:

$$LR = -2[-133525.7 - (-131758.2)] = 3535 \quad (6)$$

The LR is 3535 with  $\chi^2_{0.1;1} = 2.705$ . Because the value of  $LR > \chi^2_{0.1;1}$ , the decision at the 10 percent significance level is to reject  $H_0$ . Based on these results, it can be concluded that the random effect is significant so that the multilevel binary logistic regression model is better used to model the precarious status of workers in Indonesia than the ordinary binary logistic regression model (one level).

##### 4.3.2. Testing the significance of the multilevel binary logistic regression coefficient

After the conditional model is formed, the regression coefficients in the model need to be tested either simultaneously or partially so that they can be continued for further interpretation and analysis. Simultaneous parameter testing is carried out by calculating the statistical value of the G test obtained by utilizing the log-likelihood value from the null model (Appendix B) and the log-likelihood value from the conditional model (Appendix C).

$$G = -2[(-131758.2) - (-128487.9)] = 6540.6 \quad (7)$$

The value of G is 6540.6 and the value of  $\chi^2_{0.1;10}$  is 15.99. Because  $G > \chi^2_{0.1;10}$  the decision is to reject  $H_0$  at a significance level of 10 percent. Based on this test, it can be concluded that at least one explanatory variable has a significant effect on the precarious status of workers in Indonesia. Subsequently, a partial parameter test was conducted using the Wald test to find out what variables had a significant effect on the precarious status of workers in Indonesia. The results of partial parameter testing and the estimation results of the logistic regression model parameters are presented in table 2 below.

**Table 2.** The results of partially testing the logistic regression coefficient parameters.

Variables	Coefficient	Standard Error	Z-value	P-value	Odds Ratio
<b>Intercept</b>	-1.429502	0.389478	-3.670	0.000242*	0.239
<b>Micro factors/Individual</b>					
<b>Sex</b>					
Male	-0.009203	0.010455	-0.880	0.378725	0.991
Female ( <i>ref</i> )					
<b>Age group</b>					
Young (15-24 years)	0.343283	0.013049	26.308	0.000*	1.410
Adult (25+ years) ( <i>ref</i> )					
<b>Education</b>					
<high school	0.227677	0.010875	20.936	0.000*	1.256
≥High school ( <i>ref</i> )					
<b>Previous work status</b>					
Yes	0.195824	0.009844	19.893	0.000*	1.216
Never ( <i>ref</i> )					
<b>Occupation sectors</b>					
Agriculture	0.720044	0.016050	44.861	0.000*	2.055
Industry and construction	0.295053	0.011814	24.974	0.000*	1.343
Service( <i>ref</i> )					
<b>Urban-rural classification</b>					
Rural	0.203044	0.010304	19.706	0.000*	1.225
Urban ( <i>ref</i> )					
<b>Macro factors/Contextual</b>					
<b>Ln Agricultural GRDP</b>	0.010350	0.057108	0.181	0.856186	1.010
<b>Ln Industry and Construction GRDP</b>	-0.083409	0.047837	-1.744	0.081224*	0.920
<b>Ln Labour force</b>	0.140486	0.062341	2.254	0.024226*	1.151

Source: BPS's Sakernas of August of 2019 (processed)

Note: \*significant at  $\alpha = 10\%$

Based on the results, the micro variables, including the age group, education level, previous work status, occupation sector, and the classification of the area where the worker lived, had a p-value <0.10. It can be concluded at a significance level of 10 percent that these micro variables partially have a significant effect on the precarious status of workers in Indonesia. The macro variables, including the GRDP of the industrial and construction sectors and the labour force, have a p-value <0.10. It shows that macro variables partially have a significant effect on the status of precarious employees. The variables of sex and GRDP in the agricultural sector have not been statistically proven to have a significant impact. It could be possible by the coverage of the unit of analysis that is not comprehensive yet and/or variations of the insignificant variables have not shown any difference (given other independent variables). For example, in conditions of workers with a high school education level and above, the percentage of precarious employees in the group of male workers tends to be the same as the percentage of precarious employees in the group of female workers.

Based on the stages of the multilevel binary logistic regression analysis (with random intercept) performed, the estimation results of the regression model are as follows.



$$\ln\left(\frac{\hat{\pi}_{ij}}{1 - \hat{\pi}_{ij}}\right) = (-1.429^* + \hat{u}_{0j}^*) - 0.009 Sex_{ij} + 0.343 Age_{ij}^* + 0.228 Educ_{ij}^* + 0.196 Prev_{ij}^* + 0.720 DAgricult_{ij}^* + 0.295 DIndusCons_{ij}^* + 0.203 Classific_{ij}^* + 0.01 \ln AgricultGRDP_j - 0.083 \ln IndusConsGRDP_j^* + 0.14 \ln LabourForce_j^* \quad (8)$$

Note: \*) significant at  $\alpha = 10\%$

#### 4.3.3. The Interpretation of regression model parameters and odds ratio

The partial test results show that the age group variable significantly affects precarious employee status with an odds ratio of 1.41. It means that young workers tend to be precarious employees by 1.41 times greater than older workers, assuming that other independent variables are constant. This finding is in line with the research by Sapkal and Sundar [3], which stated that precarious employment is more likely to occur in the younger age group. In addition, a study by Baranowska and Gebel [7] also found that the level of temporary employment in Europe tends to be higher among young workers.

The partial test results on education show that this variable significantly affects precarious employee status with an odds ratio of 1.256. These results mean that workers with a below high school education level tend to have the status of a precarious employee by 1.256 times greater than workers with a high school education level and above, assuming the other independent variables are constant. It also means that the higher the level of education of workers, the less likely they are to become temporary workers. This result is in line with what Kalleberg et al. [27] stated that higher education could reduce the tendency of workers to be in bad jobs, namely jobs with low wages, without health insurance, and without pension benefits. Sapkal and Sundar [3] also found that precarious jobs are more likely to be owned by people with low educational status. In addition, Oesch and Menes [30] state that expanding education can increase the number of people with good jobs.

The partial test results of the previous work status show a significant effect on the precarious status of workers in Indonesia, with an odds ratio of 1.216. The workers that have ever worked before tend to be precarious employees by 1.216 times greater than workers who have never worked, assuming the other independent variables are constant. This result indicates that workers who have previously worked are still likely to get new jobs that are still classified as precarious. In addition, it also demonstrates that the workers' previous jobs have not been fully able to become a stepping stone to other decent jobs.

Our findings are aligning with the arguments [3], which stated that those who work in precarious jobs potentially continue to be in temporary jobs, even though they have worked for many years and acquire skills from the job. It is because the employer does not have the economic impetus to invest in them. In addition, Wahyuni and Monika [31] stated that low-paid work is not a stepping stone, and it is still a normal phenomenon in Indonesia. However, the previous job owned by the worker is expected to gradually bring the worker to a more decent job, as empirical findings in table 1.

The existence of precarious work today is natural in Indonesia, considering that entrepreneurs or business people who handle certain projects for short periods also exist in Indonesia. Suppose these employers employ workers permanently on temporary jobs. In that case, it will potentially cause losses because they have to continue to provide wages to their workers even though the work has been completed. It might cause those who run out of work contracts to look for other jobs that are not necessarily permanent ones.

The partial test results show that the employment sector variable significantly affects the precarious status of workers in Indonesia, with an odds ratio of 1.343 (for the industrial and construction sector categories) and 2.055 (for the agricultural sector category). Workers who work in the industrial and construction sectors tend to have precarious employee status by 1.343 times greater than workers in the service sector, assuming that the other independent variables are constant. Likewise, agricultural sector workers tend to be more precarious than workers in the service sector, which is 2.055 times.

The results obtained are in line with research [17] that the share of labour in the primary sector (agriculture) and the share of labour in the secondary sector (processing and construction industry) on





the total working-age population are the two sectors with the most positive and significant influence for temporary work. In other research, [9] stated that the most likely sector to be associated with precarious job is construction sector. However, it does not mean that no precarious employees in the service sector. In the service sector, the shift towards non-standard work is no longer exclusive [32].

The partial test results show that the urban-rural classification significantly affects precarious employee status with an odds ratio of 1.225. Workers who live in rural areas tend to have precarious employees by 1.225 times greater than those living in urban areas assuming other independent variables are constant. The results obtained are in line with research [17] which found that precarious work is primarily a phenomenon in rural areas in France. In addition, the ILO report [32] in its publication on working in rural areas also states that employment in these areas continues to be precarious in both the agricultural and non-agricultural sectors. The ILO [32] also noted difficulties and obstacles in obtaining decent work in rural areas.

Based on the partial test conducted on the GRDP variable in the industrial and construction sectors, it was found that this variable had a significant effect on precarious employee status with an odds ratio of 0.920. When the GRDP in the industrial and construction sectors increases by 1 percent, the tendency of workers to become precarious employees becomes 0.920 times the initial condition assuming the other independent variables are constant. These results mean that the higher the increase in GRDP in industrial and construction sectors, the smaller the tendency of workers in that area to be classified as precarious employees. Although it is partially observed that workers who work in the industrial sector have a higher tendency (compared to the service sector) to work in precarious jobs, it turns out that when viewed on a macro basis, the conclusions are quite different. It is possible because the increased production of the industrial sector makes workers in that sector remain employed. In other words, an increase in demand for industrial sector products can encourage employers to keep their workers, as a factor of production, in producing industrial goods.

Based on the partial test conducted on the variable number of the labour force, it was found that this variable had a significant effect on precarious employee status with an odds ratio of 1.151. These results mean that an increase in the labour force by 1 percent will cause workers to become precarious employees to be 1.151 times greater than the previous level of the number of labour force assuming the other independent variables are constant. In other words, an increase in labour supply can also increase the tendency of workers to become precarious employees. It happens because if the higher the number of the labour force is not accompanied by an increase in the number of adequate jobs, it will cause some of the labour force to become unemployed or forced to work in improvised employment, which may still not be permanent.

## 5. Conclusions and suggestions

### 5.1. Conclusions

Of all paid employees, most are workers with the status of precarious employees. Based on the worker's characteristics, the relatively higher percentage of precarious employees is found in male workers, education level below high school, young workers, in rural areas, with previous work, and the agricultural sector.

The micro and macro factors that consist of age, education level, urban-rural classification, previous work status, employment sector of workers, GRDP of the industrial and construction sectors, and the number of the labour force have a significant influence on the precarious status in Indonesia.

### 5.2. Suggestions

Based on the findings in this study, we recommend several suggestions. First, the government should put more effort to increase the demand for domestic industrial products so that workers who work in the industrial sector can have a higher chance of becoming permanent workers. For example, by providing subsidies to industrial goods or training workers in the industrial sector to produce higher quality and attractive products. In addition, the government may open up more labour-intensive jobs so that the workforce can be absorbed in positions that potentially become decent jobs. By encouraging the creation



of decent work, it is hoped that other development efforts can be achieved, such as alleviating poverty and increasing welfare.

Second, the government should provide more accessible and cheaper access to education for the community. Therefore, education in Indonesia can be better, for example, by building schools in remote areas and giving universities educational subsidies so that universities' tuition fees are more accessible to the community, especially people in the lower middle class.

Third, job seekers who want to enter the labour market should pay more attention to their human capital investment, for example, through formal education. So that when entering the labour market, job seekers have a greater opportunity to get a decent job. If it turns out that what is obtained is still an unworthy job, it is hoped that the work you have can be used as a stepping stone to a better career.

Fourth, For the wider community, it is hoped that they will prefer domestic industrial products to foreign products for consumption so that the demand for domestic goods has the potential to increase. Fifth, future research may use a broader unit of analysis, for example, by including the entrepreneur component and consider the use of other contextual/macro variables so that the study of precarious employment can be more comprehensive.

## Appendix

**Appendix A.** The output of the binary logistic regression model without random effects and without explanatory variables.

```
> summary(model0)
Call:
glm(formula = precarious ~ 1, family = binomial(link = "logit"),
    data = prec)
AIC: 267053
Number of Fisher Scoring iterations: 4
> logLik(model0)
'log Lik.' -133525.7 (df=1)
```

**Appendix B.** The output of the binary logistic regression model with random effects and without explanatory variables (null model).

```
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) ['glmerMod']

Family: binomial ( logit )
Formula: precarious ~ 1 + (1 | prov_id)
Data: prec

      AIC      BIC    logLik deviance df.resid
263520.4 263540.8 -131758.2 263516.4   198069
Scaled residuals:
   Min     1Q   Median     3Q      Max
-1.7899 -1.1338  0.7063  0.8310  1.1023
Random effects:
 Groups   Name      Variance Std.Dev.
 prov_id  (Intercept) 0.08215  0.2866
```

**Appendix C.** Multilevel binary logistic regression output with random intercept and with explanatory variables (conditional model).

```
> summary(model9)
Generalized linear mixed model fit by maximum likelihood (Laplace
Approximation) ['glmerMod']
Family: binomial ( logit )
Formula: precarious ~ sex + age + highschool + prevwork +
    occupation + classific + ln_agricult + ln_indconst + ln_labourforce +
(1 | prov_id)
```



```

Data: prec
      AIC      BIC    logLik  deviance  df.resid
256999.7 257122.1 -128487.9 256975.7   198059
Scaled residuals:
      Min       1Q   Median       3Q      Max
-3.1689 -1.0504  0.6000  0.8324  1.4590
Random effects:
 Groups      Name      Variance Std.Dev.
kode_prov (Intercept) 0.06786  0.2605
Number of obs: 198071, groups: kode_prov, 34
Fixed effects:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)   -1.429502   0.389478  -3.670 0.000242 ***
sex1           -0.009203   0.010455  -0.880 0.378725
age1           0.343283    0.013049  26.308 < 2e-16 ***
highschool1    0.227677    0.010875  20.936 < 2e-16 ***
prevwork1     0.195824    0.009844  19.893 < 2e-16 ***
occupation1    0.295053    0.011814  24.974 < 2e-16 ***
occupation2    0.720044    0.016050  44.861 < 2e-16 ***
classific1    0.203044    0.010304  19.706 < 2e-16 ***
ln_agricult    0.010350    0.057108   0.181 0.856186
ln_indconst   -0.083409    0.047837  -1.744 0.081224 .
ln_labourforce 0.140486    0.062341   2.254 0.024226 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

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