J-naker
Jurnal Ketenagakerjaan

Jurnal Ketenagakerjaan
Volume 20 No. 1, 2025
Online ISSN: 2722-8770
Print ISSN: 1907-6096

Variables Affecting the Overeducation Status of Educated Workers in West Java

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Abstract

The inability of the labor market in West Java to absorb educated workers has led to the phenomenon of overeducation. Overeducation occurs when the educational level of the workers is higher than the level required for the job. This issue needs to be addressed so that educated workers can secure better jobs and increase productivity. This study aims to provide an overview of the overeducation status, the influence of individual and regional variables, and their tendencies on the overeducation status of educated workers in West Java Province. The data used comes from the raw data of the National Labor Force Survey (Sakernas) August 2022, the publication on the Worker's Situation in West Java Province, and the website of the DPMPTSP West Java Province. The statistical method used is multilevel binary logistic regression analysis with a random intercept. The results showed that 40.22 percent of educated workers in West Java experience overeducation. The tendencies of overeducated educated workers in West Java in 2022 include being male, university graduates, lacking ICT skills, having no employment contract, residing in rural areas, and living in regencies/cities with low employment rates in the industrial and service sectors. Several policy recommendations are provided to the government to address the issue of overeducation among educated workers in West Java.

Keywords: educated workers, overeducation, west java, multilevel.

DOI: 10.47198/naker.v20i1.454 Received: 1-16-2025 Revised: 5-8-2025 Accepted: 6-30-2025

1. Introduction

Indonesia is experiencing a demographic bonus indicated by a higher proportion of the productive age population (15–64 years) compared to the non-productive age population (0–14 years and 65 years and above). According to the 2020 population census by the Central Statistics Agency (BPS), the productive age population constitutes 70.72% of the total population (BPS, 2023). This demographic shift presents an economic advantage by providing a large workforce which drives economic growth through the effective utilization of human capital. The 2022

National Labor Force Survey (Sakernas) reported that the labor force in Indonesia reached 143.72 million people, up from 128.06 million in 2017 (BPS, 2022a). Without sufficient job opportunity, raising employment led to high unemployment rates, potentially causing economic strain (Jati, 2015). One effort to avoid unemployment problems is the development of human resources through investment in education. As an investment activity, Education aims to enhance skills so that individuals can be more productive in producing goods and services (Becker, 1994). Education serves as a means of transforming and improving the quality and competence of human resources in the labor market (BPS, 2007).

West Java had the highest labor force in Indonesia, with 25.58 million people (BPS, 2022a). The development of education by the government, such as the 12-year compulsory education program, had a good impact on changes in the structure of the labor force in West Java. This program had caused the number of labor force members with at least a senior high school education to increase significantly. BPS (2022b) reported that from 2012 to 2022, the proportion of the labor force with a high school education and above increased from 31.62 percent to 45.02 percent of the total labor force in West Java. Despite this, the absorption of the labor force into employment remained suboptimal, with West Java's open unemployment rate (TPT) at 8.31%, equating to 2.13 million unemployed individuals, the highest in Indonesia. A notable characteristic of the unemployment in West Java was the high rate of educated unemployment. According to BPS (2007), educated unemployment is the ratio of the number of job seekers with a high school education and above (as an educated group) to the size of the labor force in that group. In 2022, 61.47 percent of unemployed people in West Java were high school graduates and above. As shown in Figure 1, the unemployment rate of high school graduates and above (≥ senior high school) was always higher than that of graduates below high school (< senior high school).

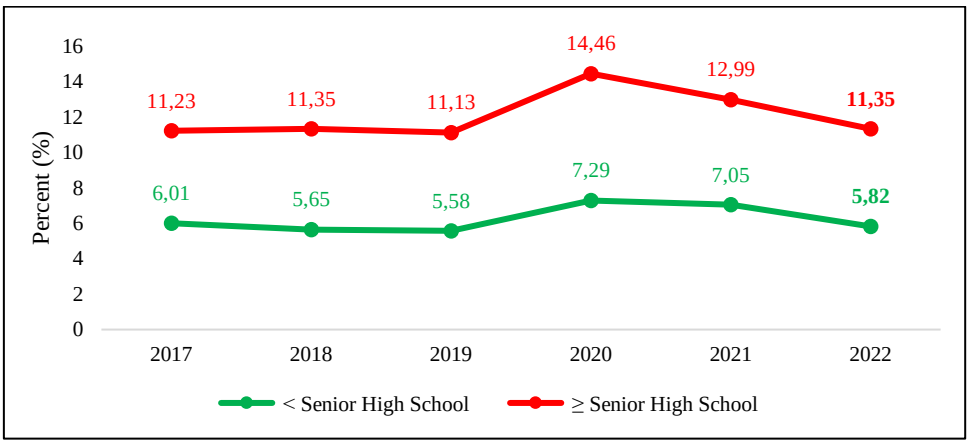

Figure 1. TPT by Highest Education Completed in West Java 2017—2022
Source: BPS (2017—2022)

The high unemployment rate is primarily due to a mismatch between demand and supply in the labor market. This situation leads to the inability of the labor markets to absorb educated workers results in high unemployment, and they are also forced to work in positions that are

actually for lower-educated graduates. When the educational qualifications held are higher than the average education level required for certain job fields, such workers are said to experience overeducation. According to Table 1, job types suitable for college graduates are those with codes 1, 2, and 3 (ILO, 2018). However, it can be observed that many college graduates still work outside these categories

Table 1. Number of Educated Workers by Education Level and Main Occupation in West Java 2022

Main Occupation*)	Senior High School (General)	Senior High School (Vocational)	Diploma I/II/III/Academy/University
1	251,530	170,283	1,132,989
2	71,212	42,827	150,873
3	331,679	318,117	575,274
4	1,168,294	807,362	493,674
5	291,899	253,519	109,836
6	149,513	73,817	21,475
7/8/9	1,596,048	1,567,895	255,382
X/00	234,838	109,460	30,533

Source: (BPS, 2022b).

Note:
*) 1. Professional, Technical, And Related Workers
2. Administrative and General Workers
3. Clerical and Related Workers
4. Sales and Marketing Workers
5. Services Workers
6. Agriculture, Animal Husbandry, Forestry Workers, Fisherment and Hunters
7/8/9. Production and Related Workers, Transport Equipment Operators and Labours
X/00. Others

Meanwhile, high school and vocational school graduates are known to work mainly as production workers, transport equipment operators, and labors. These jobs do not require high educational qualifications. According to the Indonesian Standard Classification of Occupations (KBJI), laborers are defined as those who perform routine and simple tasks, often using hand-operated equipment and physical strength (Kementerian Ketenagakerjaan & BPS, 2014). These jobs do not require a specific educational background as a qualification. Therefore, the high percentage of high school and vocational school graduates working in job types 7/8/9 opens up the possibility of overeducation issues.

The issue of overeducation among educated workers needs to be addressed through appropriate policies. This aligns with Sustainable Development Goal 4.4, which aims to "by 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship" (Bappenas, 2017). Overeducation negatively impacts workers because it prevents them from fully utilizing their skills and expertise. Overeducation leads to wage and income reductions (Sicherman, 1991). This condition contributes to dissatisfaction and decreases the worker's productivity (Sam, 2020).

The labor market's inability to absorb educated workers leads to an overeducation mismatch. This occurs due to the gap between graduates' competencies and industry needs (Rahayu et al., 2021). Becker (1994) states that increasing productivity requires higher education and skill training as forms of human capital. The phenomenon of overeducation is likely caused by a lack of training and work experience. Additionally, individuals consider many factors when choosing a career, including jobs with lower educational requirements. According to Krumboltz (1976), career decision-making is influenced by genetic factors, events and environmental conditions, learning experiences, and task approach skills. Research on overeducation by Sitorus & Wicaksono (2020) shows that age, years of schooling, job field, gender, classification of residence, and training significantly affect the overeducation status of workers in Indonesia. Hasibuan & Handayani (2021) found that overeducation is more prevalent among Indonesian workers aged 25-29, male, unmarried, living in urban areas, and without training certificates. This research also states that workers experiencing overeducation receive a wage penalty of 6.26 percent to 7.5 percent lower than workers whose educational qualifications match their jobs.

In line with the 2018-2023 Regional Medium-Term Development Plan (RPJMD) of West Java Province, the government has prioritized the development of competitive human resources, focusing on improving the quality of education and fostering better alignment with the industrial sector (Pemerintah Provinsi Jawa Barat, 2018). However, data indicates that these efforts have not effectively reduced the number of educated unemployed workers or addressed the issue of overeducation. Appropriate policies are needed to prevent overeducation, especially among educated workers in West Java. Therefore, this study aims to provide the general overview and characteristics of the educated workers experiencing overeducation in West Java in 2022 and examine the variables influencing this phenomenon using multilevel binary logistic regression methods.

2. Research Method

2.1. Scope of Research

This study employed data from the raw data of the National Labor Force Survey (Sakernas) for August 2022, the publication on the Worker's Situation in West Java Province, and the website of West Java Investment Promotion Agency and One Stop Service (DPMPTSP). This research covered all regencies and cities in West Java Province. The unit of analysis was the population aged 15 years and older currently working in the following job categories: workers/employees, agricultural and non-agricultural freelancers, and types of work excluding military or police. The study focuses on individuals who started their main job within a year from the census (August 2021) and have at least a high school education or equivalent. With this concept, the total sample of this study was 1,546 workers.

The response variable was the status of overeducation among educated workers, categorized into two groups: overeducated and not overeducated. The classification of overeducation was

determined using a statistical approach, where the average years of schooling required for each job type established the standard for educational attainment. The process began by calculating the years of schooling for each worker by converting the education level data from Sakernas into years of schooling, following the guidelines set by BPS (2011). Next, the average years of schooling are calculated for each of the 9 types of jobs based on KBJI 2014. Workers were classified as "overeducated" if their educational attainment was above the average years of schooling plus one standard deviation for their job category. Conversely, workers were categorized as "not overeducated" when an educated worker's educational attainment was less than or equal to the average years of schooling plus one standard deviation for their job category. The predictor variables in this study included two levels: level 1 (individual) and level 2 (regency/city). The predictor variables at level 1 included age, gender, education level, ICT skills, employment contract, and residence classification. Meanwhile, the predictor variables at level 2 covered employment rates in the industrial/service sector and investment realization. Table 2 summarises the operational definitions of the research variables used.

Table 2. Operational Definitions of Research Variables

Variable Name	Notation	Category
Response Variable		
Status of Overeducation	Y	Not overeducated* Overeducated
Individual Variables		
Age	X_{10}	-
Gender	X_{20}	Female* Male
Education Level	X_{30}	High School/equivalent* University
ICT Skills	X_{40}	Have* Don't have
Employment Contract	X_{50}	Having a contract* No contract
Residence Classification	X_{60}	Urban* Rural
Contextual Variables		
Employment Rates in the Industrial/Service Sector	Z_{01}	-
Investment Realization	Z_{02}	-

Description: *reference category

2.2. Methods of Analysis

This study effectively employed descriptive and inferential analysis. The descriptive analysis aimed to provide a detailed overview and characteristics of educated labor experiencing

overeducation in West Java in 2022 using graphs, tables, and figures. Furthermore, we used multilevel binary logistic regression with random intercept to identify the predictor variables that influenced the status of overeducation mismatch. It is also beneficial for determining the tendencies of variables that significantly impact the overeducation mismatch status of educated labor in West Java in 2022. Multilevel analysis is fitted for data with a hierarchical structure, usually obtained from multistage sampling (Hox et al., 2018). It is used when modeling hierarchical data with a categorical response variable with two categories (binary). Below is the equation of the multilevel binary logistic regression model with a random intercept used in this study:

$$ln\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \gamma_{00} + \sum_{p=1}^{P}\gamma_{p0}X_{pij} + \sum_{q=1}^{Q}\gamma_{0q}Z_{qj} + u_{0j} + \varepsilon_{ij} \quad (1)$$

Description:

γ_{00} : intercept

γ_{p0} : regression coefficient for the *p*-th predictor variable at level 1 (fixed slope)

γ_{0q} : regression coefficient for the *q*-th predictor variable at level 2 (fixed slope)

X_{pij} : *p*-th response variable for the *i*-th individual in the *j*-th regency/city

Z_{qj} : *q*-th response variable for the *j*-th regency/city

u_{0j} : random effect for the *j*-th regency/city

ε_{ij} : residual error for the *i*-th individual in the *j*-th regency/city

i : individual at level 1, i = 1, 2, ..., n; n = 1546

j : regency/city at level 2, j = 1, 2, ..., m; m = 27

p : predictor variable at level 1, p = 1, 2, ..., P; P = 6

q : predictor variable at level 2, , q = 1, 2, ..., Q; Q = 2

The Multilevel binary logistic regression was done by following steps:

1. Test of random effect
2. Calculation of Intraclass correlation coefficient
3. Simultanous parameter significance test
4. Partial parameter significance test
5. Interpretasion of odds ratio.

3. Results and Discussion

3.1. Overview and Characteristics of Educated Workers Experiencing Overeducation

According to BPS data (2022b), about 43.53 percent of the population in West Java had attained at least a high school education or its equivalent, corresponding to approximately 10.21 million people. Labor market imbalances have led many educated workers to take jobs that require lower educational qualifications than their own. In addition, this study revealed that approximately 40.22 percent of educated workers in West Java experienced overeducation. This result meant that about 40 out of every 100 educated workers in West Java worked in roles unmatched by their level of education.

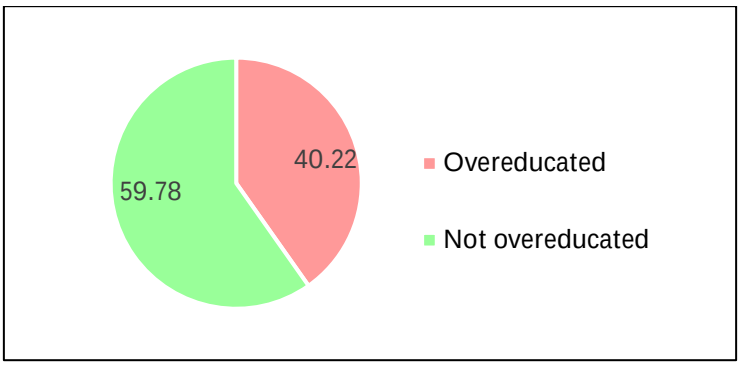

Figure 2. The proportion of educated workers based on overeducation status in West Java in 2022
Source: Sakernas August 2022, processed

According to Table 3, the most educated workers in West Java were males with high school education or equivalent, ICT skills, work contracts, and residing in urban areas. Among educated workers, men exhibited a higher percentage of overeducation than women. This is due to differences in labor market characteristics, where men are often seen as primary breadwinners and are expected to be more competitive. Male workers were more likely to accept various types of jobs to quickly meet the demand for income (Yonanda & Usman, 2023). The percentage of the educated workforce in West Java experiencing overeducation was higher among university graduates, at 51.5 percent. This finding aligned with Hasibuan & Handayani (2021), which found that diploma graduates have the highest percentage of overeducation compared to other education levels. The high rate of overeducation among university graduates reflects an inability to utilize the human capital provided by their education fully.

Educated workers without ICT skills dominated the proportion of overeducation status (48.6 percent). According to Mandrone et al. (2023), workers with limited proficiency in foreign languages and insufficient ICT knowledge experienced overeducation more frequently. As presented in Table 3, educated workers without contracts were 6.7 percent more likely to be overeducated than those with contracts. Employment contracts ensure skill alignment and provide job stability. As a result, it will reduce the tendency to be an overeducated worker. Educated workers in rural areas face a higher rate of overeducation than those in urban areas. These conditions arise due to the scarcity of job availability that aligns with the educational qualifications of highly skilled workers. Additionally, restricted access to quality job opportunities in rural areas forces educated workers to accept positions that do not match their qualifications.

Table 3. An Overview of Overeducation Status Based on The Characteristics of The Educated Workers in West Java in 2022

Variable	Category	Percentage	Overeducation Status (%)	
			Overeducated	Not overeducated
Gender	Male	58.1	43.0	57.0
	Female	41.9	36.3	63.7
Education Level	High School/equivalent	77.0	36.9	63.1
	University	23.0	51.5	48.5
ICT Skills	Don't have	33.3	48.6	51.4
	Have	66.7	36.0	64.0
Employment Contract	No contract	36.5	44.5	55.5
	Having a contract	63.5	37.8	62.2
Residence Classification	Rural	9.2	52.6	47.4
	Urban	90.8	39.0	61.0

Source: Sakernas August 2022, processed

Figure 3 illustrates the diverse employment rate patterns across industrial and service sectors within West Java. A notable disparity existed, with Pangandaran Regency recording the lowest employment rate at 63.03 percent, while Depok City highlighted the highest rate at 91.49 percent. The strategic proximity to Jakarta's economic hub, well-developed infrastructure, and diversified economic landscape drove Depok City to have an elevation of employment rate (TKK). Conversely, Pangandaran's lower TKK was driven by its remote location, limited infrastructure, and economic reliance on agriculture and tourism.

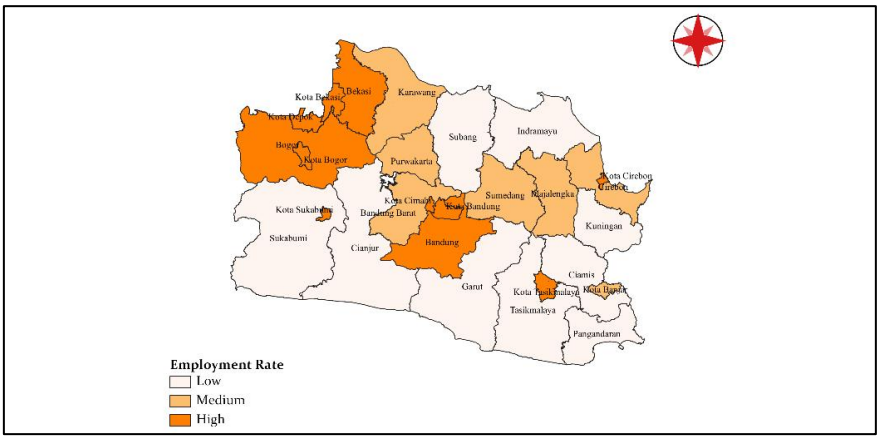

Figure 3. Distribution Map of Employment Rates in the Industrial & Service Sector by Regency/City in West Java in 2022

Source: Sakernas August 2022, processed

As depicted in Figure 4, a notable disparity existed in investment realization across West Java's regencies and cities. Notably, most of these areas, particularly those in the eastern and southern regions, fall into the category of low investment realization. In 2022, Banjar Regency recorded the lowest investment realization in West Java, amounting to a mere 29.57 billion rupiahs. Conversely, Karawang and Bekasi emerged as the top performers, attracting substantial investments of 3.72 trillion and 4.70 trillion rupiahs, respectively. These regions owe their high investment levels to their strategic locations, excellent accessibility, and extensive industrial zones.

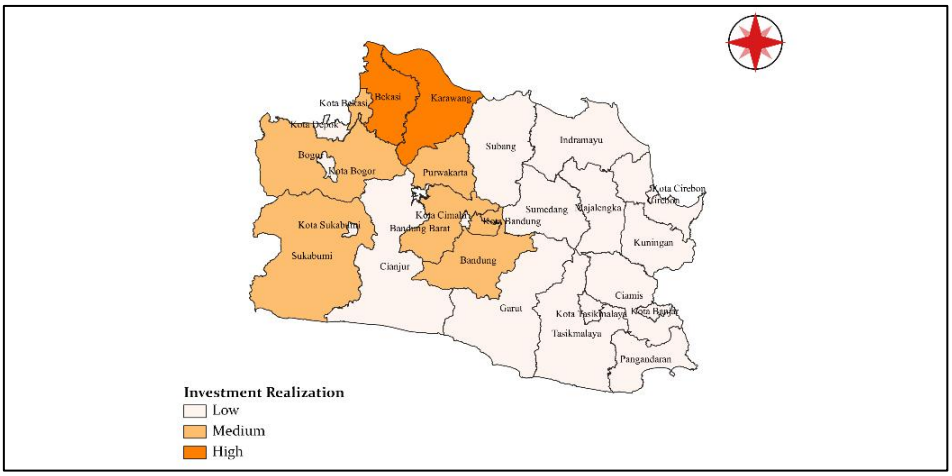

Figure 4. Distribution Map of Investment Realization by Regency/City in West Java in 2022
Source: Sakernas August 2022, processed

3.2. Variables Affecting Overeducation Status in Educated Workers

In multilevel regression, random effects arise due to variation at higher levels. Testing for random effects is conducted to assess the model's fit with the data. This test can determine whether a multilevel binary logistic regression model is better than a standard binary logistic regression model. According to the significance test for random effects using the equation, the computed LR statistic value is 6.4625 with a p-value of 0.011. This value is greater than the $\chi^2_{0,05\ (1)}$ = 3,84 and less than α = 0.05, leading to the decision to reject H_0. At a 5 percent significance level and with the given sample size, it can be concluded that random effects significantly impact the variation of the response variable. In other words, there are variations in the overeducation status of educated workers at the regency/city level in West Java in 2022.

The calculation of the Intraclass Correlation Coefficient (ICC) is performed to determine the extent of the response variable's variability caused by differences in characteristics among groups at level 2. The calculation yields an ICC value of 2.01 percent. This means that the variability in the overeducation status of educated workers in West Java is attributable to differences in characteristics of each regency/city, accounting for 2.01 percent. According to Theall et al. (2011), an ICC value at or above 2 percent indicates potential impacts at a higher level, such as the

surrounding environment, and is very useful if the study is conducted within a hierarchical framework.

Simultaneous parameter testing assesses the impact of all predictor variables simultaneously on the overeducation status of educated workers in West Java in 2022. The calculation using the G test statistic yields a G value of 132.01, which is greater than $\chi^2_{0,05\ (8)}$ = 15,51. Additionally, a p-value of 0.000 or less than α = 0.05 leads to the decision to reject H_o. This means that at least one predictor variable affects the overeducation status of educated workers in West Java in 2022.

Partial parameter testing determines the impact of each predictor variable on the overeducation status of educated workers in West Java in 2022. This partial parameter testing is done using the Wald test. The Wald test results and odds ratio for each predictor variable are presented in Table 4. The partial test results show that all predictor variables except age and investment realization have p-values less than α (0.05). In conclusion, the variables of gender, education level, ICT skills, employment contract, place of residence classification, and employment rates in the industry & service sector significantly influence the overeducation status of educated workers.

Table 4. Partial Test Result

Prediktor Variable	$\hat{\gamma}$	SE ($\hat{\gamma}$)	*p-value*	Exp ($\hat{\gamma}$)
Individual Level				
Constant	-1.448	0.138	0.000	0.235
Age	0.053	0.057	0.352	1.054
Gender				
Male	0.531	0.115	0.000*	1.700
Female*(ref)*				
Education Level				
University	1.093	0.145	0.000*	2.985
High school/equivalent*(ref)*				
ICT Skills				
Don't have	0.827	0.123	0.000*	2.287
Have*(ref)*				
Employment Contract				
No contract	0.291	0.117	0.013*	1.338
Having a contract*(ref)*				
Residence Classification				
Rural	0.561	0.172	0.001*	1.753
Urban*(ref)*				
Regency/City Level				
Employment Rates in the Industrial/Service Sector	-0.160	0.075	0.033*	0.852
Investment Realization	-0.024	0.077	0.751	0.976

Source: Sakernas August 2022, processed

Note: (ref) denotes the reference category; (*) significant at α=0.05

Thus, the multilevel binary logistic regression equation with a random intercept is as follows:

$$ln\left(\frac{\hat{\pi}_{ij}}{1-\hat{\pi}_{ij}}\right) = -1{,}448 + 0{,}053Age_{ij} + 0{,}531Gender^{*}_{ij} + 1{,}093Education^{*}_{ij} + 0{,}827ICT^{*}_{ij} + 0{,}291Contract^{*}_{ij} + 0{,}561Res^{*}_{ij} - 0{,}160ER^{*}_{ij} - 0{,}024Invest_{ij} + \hat{u}_{0j} \quad (2)$$

3.3. Tendencies of Significant Variables Affecting Overeducation Status Among Educated Workers

Table 4 revealed an odds ratio of 1.7 for the gender variable, meaning that educated male workers in West Java were 1.7 times more likely to experience overeducation than their female counterparts. This result contradicted the initial assumption that female workers were more likely to experience overeducation due to the characteristics of West Java Province, which was a developing country with a presumed paternalistic culture. According to Balgah, et al. (2019), men were more engaged in work activities than women. This aligned with the "Triple Roles Framework," which considered men as primary breadwinners. Consequently, the intense competition within the labor market might force educated men to accept jobs that did not fully utilize their qualifications, leading to overeducation.

The partial test results showed a significant positive association between education level and overeducation. The odds ratio for the education level variable was 2.985, meaning that college graduates were nearly three times more likely to experience overeducation, holding other factors constant. This finding contradicted Borjas (2013), who suggested that education, as a human capital investment, was expected to provide good returns in the future. However, it aligned with Sitorus & Wicaksono (2020), who found that each additional year of schooling increases the tendency of overeducation. This could be explained by Thurow's (1975) job competition model, which stated that individual skills were more often acquired through informal education rather than formal education. Thus, it could be said that higher education did not guarantee ease in obtaining a suitable job due to the lack of skills acquired through on-the-job training.

With an odds ratio of 2.287, educated workers with ICT skills exhibited a significantly higher tendency to overeducation, as indicated by the odds ratio of 2.287. This finding can be explained by the current labor market demand for basic ICT skills as a prerequisite for various types of jobs. Without ICT skills, the job opportunities for educated workers are limited to positions that do not require these skills. Workers without ICT skills will struggle to use new technologies, making them more susceptible to job loss (OECD, 2014). On the other hand, possessing ICT skills allows educated workers to enhance their competitiveness and relevance in a labor market that increasingly demands digital technology capabilities.

Based on Table 4, the odds ratio for the employment contract variable was 1.338. This indicated that educated workers lacking an employment contract were 1.338 times more likely to experience overeducation than those with an employment contract, assuming other predictor variables remained constant. This finding aligned with existing research highlighting a strong link

between informal employment and skill mismatches (Handel et al., 2016). An employment contract signifies a more structured and transparent organizational environment. This structure can enhance clarity in job requirements for both employers and employees, therefore mitigating the risk of qualification mismatches.

The residential classification variable had an odds ratio of 1.753, showing that educated workers living in rural areas were 1.753 times more likely to experience overeducation mismatch than those living in urban areas, assuming other predictor variables remain constant. This finding was consistent with Akhtar, Javed, and Noreen (2018), who stated that workers in rural areas have a higher tendency to experience overeducation mismatch compared to urban workers. Locations with a population density of less than 20,000 or rural areas have a higher risk of education mismatch, including both undereducation and overeducation (Buchel, 2003). Similarly, Sulaimanova (2022) found that the limited labor market and the majority of jobs requiring only low skills result in a higher proportion of overeducated workers in rural areas.

The coefficient for the employment rate in the industry/service sector variable was negative (-0.160) concerning overeducation status. An increase in the employment rate in the industry/service sector would reduce the tendency of educated workers to experience overeducation. In addition, the odds ratio value of 0.852 indicated that each unit increase in the employment rate in the industry/service sector in a regency/city would reduce the tendency to experience overeducation by 0.852 times. This finding aligned with Sitorus & Wicaksono (2020), who stated that workers in the industry and service sectors had a lower tendency to experience overeducation compared to those in the agriculture sector. This can be attributed to the generally higher and more suitable educational qualification requirements prevalent in the industry and service sectors, better matching the skills and education of the workforce.

In this study, the analysis was only conducted on the individuals who began working in their main job or business activity within one year of enumeration or August 2021. This approach was chosen because determining overeducation status using statistical methods tends to be sensitive to the cohort effects (Charalambidou & McIntosh, 2021). Cohort effects referred to differences between units of analysis that arise due to exposure to varying social, economic, or environmental factors at different times. Consequently, individuals having held the same position of worked in the same field for more than one year are excluded from the analysis.

4. Conclusion and Recommendations

Based on the result of this study, the percentage of overeducation was higher among educated workers with the characteristics of being male, college graduates, lacking ICT skills, having no employment contract, and living in rural areas. The individual variables that significantly influence the overeducation status of educated workers in West Java in 2022 are gender, education level, ICT skills, employment contract, and residential classification. Additionally, in contextual variables, the employment rate in the industry and service sectors

significantly affects the overeducation status of educated workers in West Java in 2022. The tendency to experience overeducation is higher among educated workers in West Java in 2022 who are male, college graduates, lack ICT skills, have no employment contract, live in rural areas, and reside in a regency/city with a low employment rate in the industry/service sector.

The government needs to develop information and communication technology (ICT) training programs specifically targeted at the educated workforce. The government also needs to encourage the creation of jobs in the industry and service sectors, especially in areas with high levels of overeducation mismatch. Adjustments to the education system or curriculum must be made to create a better alignment between educational outputs and labor market needs. This includes enhancing internship programs, industrial cooperation, and mapping local labor needs. Finally, empowering rural communities through entrepreneurship programs and infrastructure improvement can also create job opportunities that better match the qualifications of the educated workforce. Future research could utilize primary data and adopt the self-assessment method for determining overeducation status allowing greater consideration of occupational heterogeneity. Researchers are also encouraged to incorporate new variables that captured the social side of workers. In addition, further studies could emphasis on other contextual factors such as district/city minimum wages (UMK).

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