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Analyzing the Characteristics of Highly Educated Unemployment in Indonesia's Capital City

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Abstract

Indonesia's capital city, Jakarta, is facing a problem of highly educated unemployment, a phenomenon that has become a very serious issue as Indonesia's population continue to increase facing the demography dividend. This study aims to analyze the characteristics of highly educated unemployment in Jakarta. The logistic regression model is used to analyze the labor force associated to important aspects such as highly educational attainment, age, gender, marital status, and status in the household. This study finds that being less-educated, young, male, single, and member of the household respectively increase the probability of being unemployed. However, it also finds that total effect of highly educational attainment on the probability of employment peaks maximum value when the labor forces are single and head of the household and drops to the lowest value when the labor forces are married and member of the household.

Keywords: *Unemployment; Higher Education; Labor Force*
JEL Classification: E24; I23; J21

INTRODUCTION

Unemployment is an important issue to study in Indonesia for two reasons. Its number continues to rise at a faster pace than economic growth by which the degree of labor absorption varies by regions and educational attainment. The second reason is that Indonesia has just begun entering the phase of population accumulation at the productive age range as a result of the demographic bonus, yet the benefit will only be fully perceived when the labor force is fully utilized.

According to BPS-Statistics of Indonesia, during the last six years since August 2014, the amount of unemployment with diploma or university certificate in Indonesia had risen from 688.660 to 965.308 people (BPS, 2019). During this period, the unemployment rate was over 5 percent. However, in fact, since 2009 the government of Indonesia has poured 20 percent of the state budget to encourage the growth of the education sector, including higher education. Therefore, highly educated unemployment is urge to be the main research subject.

Government has shown their commitment to improve the quality of labor force. Nevertheless, according to Digdowiseiso (2020), improvement cannot be achieved by increasing government spending on education without making advancements in quality assurance, equal access to education, capacity, and enrollment. He further suggested that the government must establish a tax deduction program. Also, the government should focus on economic growth and minimum wages which have a major impact on the educated unemployment rate during the past ten years, according to Wirawan & Sentosa (2021).

The highly educated labor forces have unique respond given their characteristics when faced with the opportunity to work. In Indonesia, for example, people generally assume that a young scholar likes to change jobs frequently, which causes him often to be unemployed; an highly educated woman may leave her job because of marriage and then finds it difficult to get a work. These assumptions are examples of real manifestations of the characteristics of highly educated unemployment, which will be the focus of this research.

According to a theory by Becker (1976), people sacrifice money and years of their youth as a self-investment for better quality by going to school. This terminology is widely known as human capital, a self-investment aiming to achieve higher returns for future work. Higher education is indeed an investment that makes individuals could assess the quality of human resources, as Human Capital Theory said. Based on this perspective, the problem of highly educated unemployment can be viewed as a waste of investment for the individuum, and also as a missed utilization for the nation. This protracted highly educated unemployment problem may indicate that the government is squandering a lot of money for the educational policies.

Unemployment can be analyzed in terms of the desires of job seekers the and availability of jobs. According to job search theory, the level of wages desired by job seekers has a significant impact on the match (reservation wages). Considering their investment in human capital, the reservation wage rate for highly educated job seekers is generally higher than the reservation wage rate for less-educated job seekers. Reservation wages in general will vary depending on the characteristics of highly educated job seekers such as age, gender, marital status, household head status, etc. These distinctions are the factors that will determine whether or not these highly educated job seekers remain unemployed. In this research, we analyze the cause of highly educated unemployment by employing the human capital theory and labor market theory in particular.

In terms of location, urban areas are hubs for the highly educated labor force, typically develop in the secondary and tertiary sectors. Rural areas, which are typically supported by the primary sector, become unattractive to highly educated job seekers due to the limited types of jobs available, so they will flock to big cities to look for work, competing with the highly educated labor force that are originally from these cities, as studied by Mohanty (2021) in India, Feng (2017) in China, Klein (2015) in West-Germany.

There are many urban areas in Indonesia with severe unemployment problems, but due to time constraints and limited resources, this study focused on Jakarta, the country's largest metropolis. The data used in this study come from the Labor Force National Survey (LFNS) held by BPS-Statistics of Indonesia in 2019.

The year 2019 was chosen as the year of observation because it was the most recent data available before the Covid-19 pandemic.

Jakarta is an important city for Indonesia as it is the center of government, culture, and bussiness. BPS noted that in 2019, Jakarta contributed to 2,840 827.86 billion rupiahs, or about 17.56 percent of the country's total gross domestic product, which is the largest contribution compared to 33 other provinces (BPS, 2020). Along with 9 surrounding satellite cities, Jakarta is the second-largest megapolitan city worldwide after the Great Tokyo (UN, 2018). It is an economic base for more than 10.5 million residents in 2020. Of course, it is also a major urbanization destination for migrants from various regions looking to find work.

Furthermore, the search for characteristics that characterize highly educated unemployment must be conducted using statistically accurate measurement methods. One method is to test the variables suspected of being characteristics of highly educated labor forces. The goal is to identify variables that are significantly more closely related to highly educated unemployment than highly educated workers. Logistic regression is a statistical method that is appropriate for this purpose because the observed dependent variable is binary data, namely highly educated unemployed and highly educated workers. Meanwhile, the chosen independent variables are higher education attainment and its interaction with age, gender, marital status, and household status.

METHOD

Two analysis methods were employed in this research: descriptive and inferential analyses.

(1) Descriptive analysis uses charts and tables to provide a general description of educated unemployment in Indonesia. It is also used as a supporting instrument to sharpen further analysis.

(2) Logistic Regression analysis is used to explain the relationship between the dependent variable in the form of binary data and independent variables in the form of interval or categorical data. Binary variable consists of only two categories: the one representing a successful event (Y = 1) and another one representing the failed event (Y = 0). All independent variables in this study are also binary, as explained in the description of research variables. One of the considerations why Logistic Regression is an excellent choice for this data is that it does not assume normality, linearity, or homoscedasticity (David, 2014, p.12-14).

In logistic regression, the explanatory variable is assumed to follow the Bernoulli distribution. The basic logistic regression model with p as the explanatory variable is formulated in the following formula:

$$\pi(x_i) = \frac{\exp\left(\sum_{j=0}^{p} \beta_j X_{ij}\right)}{1+\exp\left(\sum_{j=0}^{p} \beta_j X_{ij}\right)} \quad (1)$$

π(xi) is the chance of the i-th observation to fall into the category considered successful. It is the expected value of the random variable Yi. is parameter value estimated using the Maximum Likelihood Estimate (MLE) method.

The goal of the logistic regression is to construct a model that explains the relationship between the independent variables and the dependent variable. When using this regression, one category of the dependent variable is selected as the reference category. Separate odds ratios are determined for all independent variables for each category of the dependent variable with the exception for the reference category. By looking at the table "Omnibus tests of model coefficients", if the significance value of the model in the last stage is less than α, then hypothesis null is rejected. Furthermore, the partial test is carried out to determine which variables are significant and then included in the model.

This research generates main and interaction effects in the logistic regression model. An interaction represents a synergistic or multiplicative effect tested by adding a product variable, implying a non-additive effect that is over and above the effect of the linear effects of independent and dependent variable entered together in the model. The regression coefficient for the product term represents the degree to which there is an interaction between the two variables.

The model used in this analysis concerned on factors affecting an individual to be educated unemployed, expressed as follows:

$$y = f(x_1, x_2, x_3, x_4, x_5)$$

Using the multiple logistic regression model with interaction effect, the equation transforms into:

$$\hat{g} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3 + \hat{\beta}_4 x_4 + \hat{\beta}_5 x_5 + \hat{\beta}_{12} x_1 x_2 + \hat{\beta}_{13} x_1 x_3 + \hat{\beta}_{14} x_1 x_4 + \hat{\beta}_{15} x_1 x_5 \quad (2)$$

Where:
x_1 = Highly educational attainment
x_2 = Age
x_3 = Gender
x_4 = Marital status
x_5 = Status in household
$\hat{\beta}_1$ = Logistic regression effect

Odds ratio is used widely to explain the relationship of variables rather than the coefficient of regression. Odds ratio a is suitable additional analysis that is facilitated by a logistic regression model. This value can explain the effect of changing the value of an explanatory variable on the opportunity or observation to experience the success category.

RESULTS AND DISCUSSION

Jolianis et al. (2020) discovered that the average jobless duration for educated people in Indonesia was between 0 and 3 months. Education level, job training, work experience, age, marital status, position in the household, and residential location all affect how long educated workers remain unemployed; however, gender has no bearing on this time frame.

Figure 1 depicts how the labor force participation rate fluctuated from 2014 to 2020. The highest labor absorption rate was 93.9 percent in 2016, as the impact

of Jakarta's economic growth, which increased by 5.85 percent that is higher than the national economic growth. The graph shows a significant decrease of labor absorption in 2020 when compared to the previous five years. The main cause of this is thought to be a drop of economic activity caused by the Covid-19 pandemic. Character identification is typically depicted in 2019, when the virus has not yet been affected. Therefore, this study will use 2019 data to analyze data under normal conditions. The labor force absorbed in 2019 was distributed to various economic sectors, each with different labor requirements.

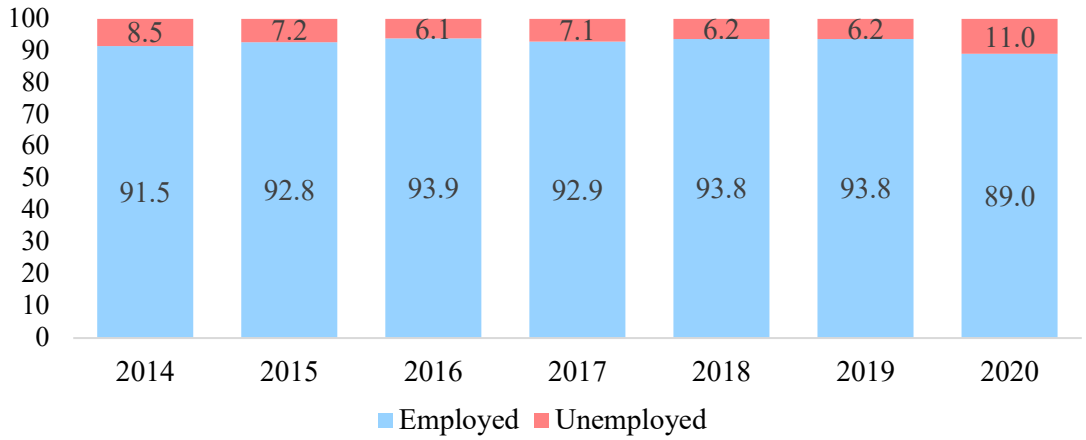

Figure 1. Labor force in Jakarta (Percentage), 2014-2020
Source: BPS-Statistics of DKI Jakarta Province, 2021

Table 1 presents labor absorption in 2019 based on the economic sector and education. According to the educational background of workers in the tertiary sector, university graduates have the highest employment rate, accounting for more than 86 percent of undergraduate workers. In contrast, elementary school graduates have the lowest rate of employment, accounting for 71.1 percent of workers in this group. This is supported by the study of Feng (2017) who found that the less educated people have the higher possibilities to be unemployed. Given that the tertiary sector is the leading sector in economic growth and employment, this trend is evidence that Jakarta is increasingly in need of workers with higher education. The secondary sector, on the other hand, exhibits a different pattern than the tertiary sector. Thus, it concludes that encouraging the growth of the tertiary sector is the most effective way to improve DKI Jakarta's economy.

Table 1. Percentage of Working Population by Educational Attainment and Main Industry in Jakarta, August 2019

No	Main Industry	No Certificate	Primary School	Junior High School	Senior High School	University
	Primary Sector	4.5	0.9	0.2	0.7	1.2
1	Agriculture, Forestry, and Fishing	4.4	0.9	0.1	0.4	0.2
2	Mining and Quarrying	0.0	0	0.1	0.3	1.0
	Secondary Sector	17.3	28.0	24.1	18.6	12.6
3	Manufacturing	7.5	15.0	15.5	14.1	6.25
4	Electricity and Gas	0.0	0	0.0	0.6	0.7
5	Water Supply; Sewerage, Waste Management, and Remediation	3.5	0.9	0.4	0.1	0.3
6	Construction	6.3	12.1	8.2	3.7	5.4
	Tertiary Sector	78.2	71.1	75.7	80.7	86.1
7	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	26.9	21.6	22.6	23.6	18.0
8	Transportation and Storage	14.1	14.6	16.5	19.9	10.9
9	Accommodation and Food Service Activities	14.6	17.6	12.6	7.6	3.8
10	Information and Communication	0.7	0.2	1.0	2.7	6.4
11	Financial and Insurance Activities	0.0	0.4	0.5	2.9	9.7
12	Real Estate Activities	2.5	1.4	1.8	2.7	3.5
13	Company Business Activities	1.2	3.6	4.2	5.8	6.3
14	Public Administration and Defense; Compulsory Social Security	0.0	1.6	2.0	5.9	12.4
15	Education	0.8	0.9	1.7	1.3	8.5
16	Human Health and Social Work Activities	0.0	0.4	0.5	1.0	2.8
17	Other Services Activities	17.4	8.8	12.3	7.2	3.9
	Total	100.0	100.0	100.0	100.0	100.0
	Number of Workers	90,019	316,011	524,315	1,535,070	570,578

Source: BPS-Statistics of DKI Jakarta Province 2019 (tabulated)

The highest unemployment rate was recorded in the unemployed aged 15-19 years, while the lowest were unemployed people aged 55-59 years. Under the age of 30, the unemployment rate is always above the total unemployment rate. It demonstrates that young people are more vulnerable to be unemployed in Jakarta, in line with the findings of Devanto (2017)'s study. Young age does allow for more flexibility in finding and selecting the desired job. In many ways, young people are commonly idealistic, including when it comes to choosing a career.

In the group of unemployed university graduates, the unemployment rate decreases as the age level increases until 34. After that age, then the unemployment rate fluctuates. Despite fluctuating, the unemployment rate is always below the total university unemployment rate (4.6 percent) except for the unemployed group aged 35-39. This fluctuation indicates that the labor market for this group tends to be more dynamic. Even if a job seeker is not young, having a university graduate

background that provides a wide range of skills required by employers gives them more options in choosing a job.

Meanwhile, for the group of unemployed who are not university graduates, the unemployment rate tends to decrease with increasing age. Above the age of 34, the unemployment rate tends not to fluctuate as much as in the undergraduate group (BPS-Statistics of DKI Jakarta Province, 2019). They are typically recruited to become skilled workers despite their lack of education. As a result, they will keep their jobs as they get older because finding a job as a skilled worker at such a young age is difficult.

Table 2 shows that the unemployment rate for men and women is not significantly different, with 6.2 percent for men and 6.3 percent for women. It demonstrates that there is no gender discrimination in the labor force in Jakarta, supported by the finding of Klein (2015). Women have a higher unemployment rate (10.3 percent) than men in the group of unemployed high school graduates (7.5 percent). In this case, it appears that secondary education is slightly more helpful for men than for women in finding work. Still, the unemployment rate remains higher than the overall unemployment rate (6.2 percent).

Table 2. Unemployment Rate by Educational Attainment and Gender in Jakarta, August 2019

Gender	No Certificate	Primary School	Junior High School	Senior High School	University	All Education
Male	5.4	4.2	5.2	7.5	4.6	6.2
Female	2.0	1.6	3.9	10.3	4.5	6.3
Both Gender	3.5	3.1	4.8	8.4	4.6	6.2

Source: BPS-Statistics of DKI Jakarta Province (2019)

Table 3 illustrates how the status of unmarried people is very close to unemployment, while the unemployment rate for married people is relatively low. When the data is detailed by education level, the same pattern emerges for all groups. It clearly shows how marriage ties can play a significant role in determining unemployment although indirect (Pratomo, 2017).

Table 3. Unemployment Rate by Educational Attainment and Marital Status in Jakarta, August 2019

Marital Status	No Certificate	Primary School	Junior High School	Senior High School	University	All Education
Married	2.1	2.2	1.8	2.6	3.0	2.5
Single	6.4	5.7	12.5	17.0	7.0	12.9
Both Status	3.5	3.1	4.8	8.4	4.6	6.2

Source: BPS-Statistics of DKI Jakarta Province (2019)

According to Table 4, the unemployment rate for heads of households is relatively low (2.6 percent), whereas the unemployment rate for non-headed households is quite high (9.7 percent). When the same pattern was examined by education level, it was found in all groups. This is also supported by the study of Setyadi (2019). When a person is not responsible for meeting the daily needs of his household, he appears to have more freedom of responsibility; however, this also appears to be a trait of an unemployed person.

Table 4. Unemployment Rate by Educational Attainment and Status in Household in Jakarta, August 2019

Status in Household	No Certificate	Primary School	Junior High School	Senior High School	University	All Education
Head	2.4	2.0	2.6	3.2	2.0	2.7
Member	4.9	4.6	7.6	13.3	6.3	9.7
Both Status	3.5	3.1	4.8	8.4	4.6	6.2

Source: BPS-Statistics of DKI Jakarta Province (2019)

Setyadi et al. (2019) used the linear regression model to regress the unemployment duration on age, sex, education level, income during unemployment period, and GRDP of the industrial, service, and agricultural sectors. Findings and Originality: They found that variables of age, sex, the income of job seekers, education level at the junior and senior high school level, and GRDP in the agricultural sector have a positive effect on the unemployment duration. The variables of the status of household head, the high school education level, as well as the GRDP service sector negatively affect the unemployment duration. Thus, it is recommended for the government to develop service sectors to shorten the duration of unemployment.

Research conducted by Pratomo (2017) to study the factors that affect a highly educated person to become unemployed in Indonesia. By using the multinomial logit analysis method, the results showed that there are several significant variables as characteristics of educated unemployed people in Indonesia, namely women, the young population, the unmarried, and having work experience. In other words, among the educated unemployed group, women have a higher tendency to be unemployed than men. In terms of age, the older a person is, the tendency for that person to be unemployed will be small. On the other hand, young people have a higher probability of being unemployed. Furthermore, having work experience is a significant advantage for a person to get a job compared to job seekers without experience.

Kataoka (2017) conducted research to identify interprovincial differences in labor force distribution and utilization based on educational attainment in Indonesia. One significant finding is that, of all education groups, workers with no primary education are most unequally allocated across provinces. With a declining labor share with no primary educational attainment at the national level, the least educated workers are concentrated in remote, agriculturally dominated, low-income, off-Java provinces because rural-to-urban labor migration is highly skewed

towards the educated and skilled. Thus, the large pool of unskilled workers in an area prevents economic development in that region and imbalances economic growth across the nation. Another significant finding is that senior-secondary educated labor with the lowest employment rate has the largest interprovincial inequality values in the employment rate. Variations in higher interprovincial employment rates could increase interprovincial migration

The first model is estimated by determining the main effects of highly educational attainment, age, gender, marital status, and household status on unemployment. The second model is calculated by incorporating the interaction effect of highly educational attainment with age, gender, marital status, and household status into the first model. Operational definition of each variable is provided as follows:

Table 5. Operational Definition

Variable	Measures
x_1	*Highly Educational Attainment:* It shows the respondent's status based on education level and employment status. Respondents are those who graduate from university. The variables are then grouped into two statuses, employed and unemployed.
x_2	*Age:* It is calculated based on the month and year at the time of census reduced by the month and year of birth of the respondent, rounded down. It is a binomial variable using 30 as the separator.
x_3	*Gender:* It divides respondents into two groups, male and female according to generally understood physical characteristics.
x_4	*Marital status:* It is the legal status of social relations with their partners, divided into single and married.
x_5	*Status in household:* It shows the relationship between the respondent and the head of the household. The head of the household is considered as the person most responsible for all members of the household.
$x_1 x_2$	Interaction of highly educational attainment with age
$x_1 x_3$	Interaction of highly educational attainment with gender
$x_1 x_4$	Interaction of highly educational attainment with marital status
$x_1 x_5$	Interaction of highly educational attainment with status in household

Tables 6 shows the result of logistic regression for the first model, while Table 7 provides information for second model.

Table 6. Logistic Regression Output Without Interaction Effect

	Independent Variable	Coefficient	Odds Ratio	t-value	p-value
x_1	*Highly Educational Attainment (base: Otherwise)*				
	Highly Educated	0.38	1.47***	3.05	0.002
x_2	*Age (base: Youth)*				
	Over 30	0.61	1.84***	5.26	0.000
x_3	*Gender (base: Male)*				
	Female	0.42	1.53***	4.32	0.000
x_4	*Marital status (base: Single)*				
	Married	1.29	3.62***	10.31	0.000
x_5	*Status in Household (base: Member of household)*				
	Head of household	0.84	2.32***	6.65	0.000
	Constant	1.21	3.37***	16.52	0.000

Pseudo R-Squared	0.133	Number of observations	8,240
Chi-Square	536.20	Prob > chi2	0.000
Akaike Crit. (AIC)		Bayesian crit. (BIC)	

*** $p<.01$, ** $p<.05$, * $p<.1$

In the first model, all independent variables significantly affect the dependent variable. Highly educational attainment effects the labor force participation positively, which means that highly educated labor forces have lower opportunity to become unemployed compared to the non-university labor force. Age also shows a positive relationship with labor force participation, means that labor forces in age over 30 years have lower probability to become unemployed compared to the labor forces younger than them. In terms of gender, the table shows that female labor forces have lower tendency to become unemployed compared to the males. Meanwhile, status as a married person has a positive impact on labor force participation, which also says that unemployment is relatively close to the labor forces who are single. The last variable, status in household, is positive as well. It tells that being member of the household has tendency for becoming unemployed.

Among all independent variables, marital status has the highest coefficient for 1.29, while the lowest is highly educational attainment for 0.38. These coefficient in the logistic regression is basically the exponential value of odds ratio. So, to interpret them conveniently, we provide their value of odds ratio. For the marital status, the odds ratio is 3.62, means that a married person has 3.62 higher odds for being employed compared to the single person. Meanwhile, the odds ratio for highly educational attainment is 1.47, which means that highly educated labor forces have 1.47 higher odds for being employed compared to the labor forces who never go or graduate from university. Statistically says that having university certificate only increase the odds for being employed for almost one a half times, while being a married person increases it for over 3.5 times. Even though high education affects labor participation positively, the first model shows that its effect is the lowest.

The positive relationship of higher education to the labor force participation indicates that what happens in labor forces of Jakarta may follows the view of The Human Capital Theory. Investing themselves by completing their education up to university first in fact helps them to increase their chances of avoiding unemployment. With economy mainly driven by service sectors, Jakarta demand for abundant numbers highly educated workers is indeed very high.

Age, gender, marital status, and status in household respectively does affect the labor force participation, but there are also interactions of each of them with highly educational attainment which strongly argued influence the labor participation. The second shows these effects by combining the interaction effect of highly educational attainment with the other four variables. Table 7 below shows the logistic regression output with 2-ways interactions effect as follows:

Table 7. Logistic Regression Output with 2-ways Interaction Effect

	Independent Variable	Coefficient	Odds Ratio	t-value	p-value
x_1	*Highly Educational Attainment (base: Otherwise)*				
	Highly Educated	0.54**	1.71	2.54	0.011
x_2	*Age (base: 30 years and under)*				
	Over 30 years	0.71***	2.03	5.48	0.000
x_3	*Gender (base: Male)*				
	Female	0.36***	1.44	3.37	0.001
x_4	*Marital status (base: Single)*				
	Married	1.42***	4.12	10.20	0.000
x_5	*Status in Household (base: Member of household)*				
	Head of household	0.73***	2.07	5.28	0.000
$x_1.x_2$	*Highly Educational Attainment # Age*				
	Highly Educated # Over 30 years	-0.47	0.63	-1.55	0.121
$x_1.x_3$	*Highly Educational Attainment # Gender*				
	Highly Educated and female	0.32	1.38	1.20	0.230
$x_1.x_4$	*Highly Educational Attainment # Marital status*				
	Highly Educated and married	-0.72**	0.49	-2.25	0.024
$x_1.x_5$	*Highly Educational Attainment # Status in Household*				
	Highly Educated and head of household	0.61*	1.84	1.68	0.094
	Constant	1.20***	3.31	15.64	0.000
	Pseudo r-squared 0.1367	Number of observations 8,240			
	Chi-square 550.05	Prob > chi2 0.000			
	Akaike crit. (AIC)	Bayesian crit. (BIC)			
	*** p<.01, ** p<.05, * p<.1				

Table 7 shows that the main effects of all independent variables of this second model are statistically significant. Yet, while comparing the coefficients of the main effects between the second and the first model, it shows that the treatment of adding interaction effects is responded differently by each variable. Coefficients of highly educational attainment, marital status, and age in the second model are higher than coefficients of the same variables in the first model, while coefficients of gender and status in household are lower. By seeing on the main effect only, coefficient of marital status is indeed still the highest among all, but the lowest value

is now the coefficient of gender. This change proves that the treatment of adding interaction effects is very helpful to identify the effect more in-depth.

The effect of age and gender are solely depicted in each of their main effects since their interactions with highly educational attainment are not statistically significant to the second model. In both model, age consistently has a positive impact on the labor participation, emphasizing that young labor forces are more likely to be unemployed compared to the labor forces who are over 30. The odds ratio of age in the second model is 2.03, which means that the odds of being employed for labor forces in age over 30 is two times higher compared to the labor forces under 30. It alerts that this issue emerges to be another serious problem of unemployment for Jakarta. The World Bank (2018) in a workpaper said that there are more qualified young people to live today than ever before in history, yet they are disproportionately affected by unemployment and inactivity. Many of the causes of youth inactivity are structural and require traditional intervention. However, Fan (2007) found that developing countries typically tend to end up with the educated unemployment. This finding is in line with the study by Pasay (2012), but contrary to Pratomo (2017) that is focusing on educated unemployment in young age only.

Meanwhile, the odds ratio of gender in the second model 1.44, saying that the odds of becoming employed for female is 1.44 times higher compared to the male. The Job Search Theory is considerably relevant to explain why female is slightly superior to male in terms of labor participation. Due to this theory, female has lower reservation wage compared to male considering the limitation of kinds of jobs available for them. This lower reservation wage gives them shorter duration to find jobs. In 2019, average rate of net wage for male workers in Jakarta was 4,765,401 rupiah, while for female was 3,956,385 rupiah or almost 17 percent lower. This higher average wage in one side pushes male labor forces to extend their duration of job searching, and also eases female labor forces to shorten their duration of job searching. This result supports the finding of Mohanty (2021). The previous study by Feng (2017) also found the same way but it has more details. He found out that less educated women which is younger individuals tend to be unemployed. However, Klein (2015) found something different, that both sexes, whether female or male have the same opportunities to be unemployed.

Regarding the interaction effects, interaction of highly educational attainment respectively with marital status and status in household are significantly fit to the second model. It tells that the total effects of each of these three variables now depend on each other values. However, these two effects show different directions of relationship to the labor participation.

Interaction of highly educational attainment and marital status is negative, saying that highly educated labor forces who are married have higher tendency for becoming unemployed. It is contrary to the main effects of highly educational attainment and marital status which are both positive. The coefficient of this interaction (-0.720) is relatively big compared to the coefficient of the main effect of highly educational attainment (0.54) and marital status (1.42), showing that its effect cannot be underestimated.

In Indonesia, including Jakarta, commonly people put education first before marriage. People then get married before or after getting a job. For employed people, pursuing higher education is still reasonable without losing their job. It is a

very rare case when someone quits his or her job for continuing education to university. On the other hand, there are more cases when people leave their jobs because of marriage consideration. If work becomes an obstacle to marriage, the decision to prioritize marriage, which is generally a collective decision with parents and other family members, becomes the preferred option.

In Indonesia, it may not always but usually someone who graduated from university will marry someone who is also highly educated. If a highly educated worker in Jakarta marries someone from outside Jakarta, of course he will invite his or her partner to stay and look for work in Jakarta, considering that this city offers a variety of jobs. In fact, not a few highly educated young couples from outside Jakarta are trying to speculate to get jobs by migrating to the capital after marriage. Both cases increase the population of highly educated and married labor forces in Jakarta.

Meanwhile, the interaction effect between education and household status is positive, increases the main effects of both variables which are also positive. In other word, the tendency for being employed will be higher when highly educated labor forces are also head of household. The coefficient of this interaction (0.61) is relatively big compared to the main effects of highly educational attainment (0.54) and status in household (0.73). It emphasizes that being head of household for educated labor forces is an important booster to increase the opportunity of employment.

The highly educated labor forces who are also the head of household consist of those who live with other household members as well as those who live alone. The head of the household, as the person who is most responsible for meeting the basic needs of the household, will think twice before leaving his job for any reason given the high prevalence of living in Jakarta. On the other hand, highly educated household members have the flexibility to choose their jobs.

To discuss the results of the analysis of this study more empirically, predictions are constructed using the second model which including the interaction effects. These predictions are expected to provide a clearer explanation of the characteristics of educated unemployment in Jakarta in 2019.

Based on the result in Table 9, after removing insignificant terms, the final model is specified as follows:

$$\text{Ln}\left(\frac{P_Y}{1\text{-}P_Y}\right) = 1.20 + 0.54X_1 + 0.71X_2 + 0.36X_3 + 1.42X_4 + 0.73X_5 - 0.72X_1X_4 + 0.61X_1X_5 \quad (3)$$

While statistically informative, the implication of the result will be much clearer when the above model is evaluated under more realistic scenarios.

The above model estimates the odds of employed over unemployed. However, the probability of unemployment is directly obtained when the equation is transformed in the following manner to calculate the probability $(1 - P_Y)$:

$$\text{Since} \quad \text{Ln}\left(\frac{P_Y}{1 - P_Y}\right) = Y^*$$

so it is transposed to:

$$(1 - P_Y) = 1 - \frac{e^{Y^*}}{e^{Y^*} + 1}$$

Where

$$Y^{*}=1.20 + 0.54X_1 + 0.71X_2 + 0.36X_3 + 1.42X_4 + 0.73X_5 - 0.72X_1X_4 + 0.61X_1X_5 \quad (4)$$

Probabilities for becoming unemployed for labor forces in Jakarta 2019 are estimated when different numbers are entered for each independent variable. Since we have four independent variables, all having value of either 0 or 1, all possible combinations of independent variables will be 4 x 22. In other words, we will have 16 estimations when all independent variables are systematically varied. We will present six models below where the probability of unemployment is higher than 4.5 which is considered quite high unemployment rate. These are models or "scenarios" where the impact of education is most pronounced.

Table 8. Predictions of Probability of becoming Unemployed Using Logistic Regression Model

No	Prediction	Y*		(1-P_Y) x 100%	
		X_1=1	X_1=0	X_1=1	X_1=0
(1)	(2)	(3)	(4)	(5)	(6)
1	X_2=0; X_3=0; X_4=0; X_5=0	1.73	1.20	15.03	23.22
2	X_2=0; X_3=1; X_4=0; X_5=0	2.10	1.56	10.96	17.38
3	X_2=0; X_3=0; X_4=1; X_5=0	2.43	1.89	8.11	13.10
4	X_2=1; X_3=0; X_4=0; X_5=0	2.44	1.90	8.01	12.95
5	X_2=0; X_3=1; X_4=1; X_5=0	2.79	2.26	5.78	9.49
6	X_2=1; X_3=1; X_4=0; X_5=0	2.80	2.27	5.71	9.38

Note: X_1= highly educational attainment, X_2=age, X_3=gender; X_4=marital status, X_5=household head

Among highly educated labor forces (X_1=1), the first prediction or those who are young (X_2=0), male (X_3=0), single (X_1=0), and member of household (X_1=0) have a 15.03 percent probability for being unemployed, and it indicates the highest unemployment probability among all possible scenarios (see appendix). It is followed by the second prediction or highly educated (X_1=1) labor forces who are young (X_2=0), female (X_3=0), single (X_4=0), and member of household (X_5=0) who have a 10.95 percent probability for being unemployed. This high probability warns that they are the groups of people who are the main problem inside the educated unemployment in Jakarta.

Meanwhile, the third prediction or the probability for becoming unemployed for highly educated (X_1=1) labor forces who are young (X_2=0), male (X_3=0), married(X_4=1), and member of the household (X_5=0) is 8.11 percent. This probability is relatively similar to fourth prediction or the highly educated (X_1=1) labor forces who are over 30 (X_2=1), male (X_3=0), single (X_4=0), and member of household (X_5=0). Since male is commonly pointed out as the head of the household, these two groups of labor forces seem to be supported by their parents or other family members in the same household. Some of the men may live

temporarily with their parents or relatives until they find work and are able to live independently. However, the people with these characteristics are proved to have a high probability of becoming highly educated unemployed.

The fifth prediction or the probability of highly educated (X_1=1) labor forces who are young (X_2=0), female (X_3=0), married (X_4=1), and member of the household (X_5=0) for becoming unemployment is 5.78 percent. Finally, the sixth prediction or the probability of highly educated (X_1=1) labor forces who are over 30 (X_2=1), female (X_3=1), single (X_4=0), and also member of the household (X_5=0) is 5.71 percent. Even though these probabilities are relatively low compared to the previous predictions, but they are also burden for the highly educated unemployment since the highly educated unemployment rate is 4.55 percent.

The predictions above describe how the probability of unemployment for highly educated labor forces varies by age, gender, marital status, and status in the household. It is useful to assess the impact of education under different scenarios when each independent variable is assumed to take a particular value. However, the total effect of highly educational attainment on the probability of unemployment, as expressed in the final model, needs additional calculation because highly educational attainment has interaction effects with marital status and status in the household.

The total effect of highly educational attainment is obtained by taking derivative of equation (4) with respect to highly educational attainment as shown below:

$$D_{X_1} Y = \frac{d(\text{Log (Odds Ratio Y)})}{dX_1} = 0.54 - 0.72X_4 + 0.61X_5$$

It is shown that the total effect of highly educational attainment varies according to marital status and household status. The following table shows the total education effect when the values of marital status and household head status are varied.

Table 9. Total Effect of Highly Educational Attainment to the Labor Participation

	Household Head (X_5 = 1)	Household Member (X_5 = 0)
Married (X_4 = 1)	$D_{X_1} Y$ = 0.42 Odds Ratio Y=$e^{0.42}$=1.53	$D_{X_1} Y$ = -0.18 Odds Ratio Y = $e^{-0.18}$ = 0.83
Single (X_4 = 0)	$D_{X_1} Y$ = 1.15 Odds Ratio Y=$e^{1.145}$=3.16	$D_{X_1} Y$ = 0.54 Odds Ratio Y=$e^{0.54}$=1.71

The highest total effect of highly educational attainment is obtained when the labor forces are single (X_4=0) and head of household (X_5=1). The odds ratio for this feature is 3.14, means that the odds of highly educated labor forces for being employed is over three times higher compared to the less educated labor forces. But if the labor forces are married (X_4=1) and head of the household (X_4=1), the odds ratio decrease to 1.53, indicating that the odds for highly educated labor forces who are married and being head of household are only one and a half times higher for being employed compared to the less-educated labor forces.

The total effect of highly educational attainment is negative when the labor forces are married (X_4=1) and household member (X_5=0). The odds ratio is 0.83, which indicates that they are less likely to be employed. Finally, the total effect of highly educational attainment is 1.709 for the labor forces are single (X_4=0) and household member (X_5=0).

This exercise, compared with earlier estimations, shows the impact of education in a more precise fashion with different values in marital status and status in the household. That is, the impact of marital status and household head status is the largest when the labors are single and head of household (3.14) followed by single and household member (1.71), married and household head (1.53) and married and household member (0.83). Being single will increase the probability of employment for educated labor force. It appears that being free from marital obligation will enable them to find jobs more easily. Being household head raises the probability of employment, suggesting that they will be more risk averse.

CONCLUSION

The finding shows that, in general, a high education, being female, married, and being the household head increase the probability of employment while age lowers the probability of employment. Those five characters investigated in this research could be explained one by one. Education, theoretically, the positive effect of this variable on employment proves that the human capital theory is relevant for employment status for the labor force in Jakarta in 2019. The negative effect of age, particularly, those at age 30 or below is in line with the explanation of the labor market theory, where the younger labor force tends to have a much higher reservation wage, resulting in a longer job search period or higher probability of unemployment. Being single increases the probability of employment or put differently, being married decreases the probability of employment. We suspect that being free from marital obligation will enable them to find jobs more easily. Being household head on the other hand increases the probability of employment because being the household head normally comes with family obligation, and as a result, they tend to be more risk averse.

Those characteristics could not only being investigated as single parameter but this study also explores how the interaction effect between them. Thus, it was also found that education has interactions with marital status and household head status. Any educated people who is single and in charge as the head of household has the highest total effect, but those who are married and member of the household have the lowest total effect.

In general, this research found support for hypotheses with regard to the main effect of educational attainment, age, gender, marital status, and household status but nor for interaction effects of education with age and gender. It was assumed that with increasing age, education effect will increase, and highly educated males compared with females have advantages for getting jobs. However, these assumptions were not supported in this research. It shows that age effect does not vary with a higher education, and gender discrimination in work participation does not also exist in the highly educated labor forces, though the effect of gender still remains as a main effect and need to be addressed in the government policy.

POLICY IMPLICATION

Based on the findings above, the government also needs to pay attention to the absorption of educated young workers. The government needs to design and implement policies that favor young job seekers, such as: improving the school-to-work transition through active labor market policies, increasing the relevance of technical highly education and training, improving career guidance, and other related policies.

Furthermore, to overcome the negative impact of marriage at the employment rate, the government needs to create policies that family friendly to the educated labor forces. For example, the government can encourage the development of the creative industry sector that allows educated workers to work from home. One of the other steps that can be chosen is for example by adopting a step implemented by Japan which provides day-care center facilities in strategic places in the middle of the city, so that women with higher education have to stop working to take care of children. These policies are government steps to make maximum use of the educated workforce. Thus, the investment in education through the time and money they have sacrificed and the absorption of the government's budget for higher education is not wasted.

This research cannot answer all the questions related to the phenomenon of educated unemployment due to lack of data and the research is focused on Jakarta in particular. However, this research can be a bridge for further research related to educated unemployment in Jakarta and in other cities in Indonesia.

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