

The Impact of Educational Level on the Unemployment Rate in Saudi Arabia: A Time Series Quantitative Analysis from 2016 to 2023

Mashaël D. Matrafi¹ & Rozina Shaheen²

¹ Ph.D. Student, Effat University, Jeddah, Saudi Arabia

² Associate Professor, Effat University, Jeddah, Saudi Arabia

Correspondence: Mashaël D. Matrafi, Ph.D. Student, Effat University, Jeddah, Saudi Arabia. E-mail: Mashaël.matrafi@gmail.com; mdalmatraf@effatuniversity.edu.sa

Received: July 31, 2024

Accepted: September 26, 2024

Online Published: September 28, 2024

doi:10.5539/ijef.v16n10p74

URL: <https://doi.org/10.5539/ijef.v16n10p74>

Abstract

The aim of this research was to investigate the relationship between total unemployment rate as the dependent variable and educational level as the independent variable in the context of the Kingdom of Saudi Arabia (KSA). The labour market during the period 2016-2023 was analysed to determine the effect of the COVID-19-related crisis on the relationship between unemployment and educational level. A quantitative method was used to analyse data from the General Authority for Statistics of the KSA. In addition, a multiple regression analysis using the ordinary least square model was performed using Eviews 12 to analyse the data. The findings from the regression model revealed a positive relationship between educational level and total unemployment rate, with certain education categories significantly impacting the unemployment rate. While the pandemic had a significant short-term impact on the unemployment rate, the effect diminished over time, highlighting the resilience of the educated workforce during the crisis. Therefore, this research provides valuable insights to policymakers, educators, and job seekers. It suggests avenues for future research, emphasising the need for a more extended study period and an exploration of the positive relationship between high educational level and reduced total unemployment rate.

Keywords: total unemployment rate, educational level, KSA, COVID-19

1. Introduction

In Saudi Arabia, the relationship between education and employment stands as a pivotal factor in shaping the nation's economic landscape. This article delves into the intricate dynamics between educational level and the prevailing unemployment rate as the Kingdom strives for socioeconomic progress.

This investigation not only sheds light on the current scenario but also serves as a compass that guiding policymakers, educators, and job seekers towards a future where education acts as a catalyst for reducing unemployment and fostering sustainable economic growth. Saudi Arabia's Vision 2030, which outlines a plan for the country's future that includes less reliance on oil and more involvement of the private sector, was put into effect by the government to accomplish long-term objectives, including lowering the unemployment rate. The impact of education on the unemployment rate can play an important role in achieving this vision.

This article is structured with a comprehensive literature review that provides insights from various studies that examined the connection between education and unemployment (Lavrinovicha et al., 2015; Murawska, 2017; Rahmawati & Putri, 2021). Drawing from global and regional perspectives, these studies presented contrasting views on how educational levels may either positively or negatively affect unemployment rates. This backdrop sets the stage for the examination of the specific case of the Kingdom of Saudi Arabia (KSA).

The present study used recent data in the context of the KSA to examine the influence of educational level on unemployment rate. The data support the assumption that education negatively influences unemployment rate in the context of the KSA. The second part of the study investigated how the COVID-19 pandemic affected the unemployment levels during the time of investigation.

The rest of this article is structured as follows: a literature overview of related studies that addressed the relationship between education and unemployment; a discussion of the data and methodology used to analyse the data; and a discussion of the data analysis results.

2. Literature Review

Several studies have investigated the relationship between educational level and unemployment rate. A study in Latvia concluded that education not only impacts the unemployment level but also affects the income level (Lavrínovicha et al., 2015). Furthermore, European Union (EU) statistics have shown that the unemployment rate among professional degree holders is a five times lower than that among workers without a high school diploma, concluding that educational level has a significant impact on employment level in most EU countries (Snieska et al., 2015). Another study compared educational levels and unemployment rates between EU countries before 2004, which belonged EU15, and the 13 countries that newly joined the EU. The study found that the different educational levels had significant impacts on the unemployment rates (Murawska, 2017). In addition, a study indicated that academic degrees had a significant influence on the reduction of short-term unemployment levels (Núñez & Livanos, 2010). A panel data regression analysis between 2010 and 2019 revealed that literacy rate had no significant influence on unemployment rate, but government expenditure on education had a significant negative effect on unemployment rate (Rahmawati & Putri, 2021). Another study used data from 40 countries to analyse and compare unemployment rates between three population groups, namely those with lower, middle, and higher education, and found that highly educated people have a lower unemployment rate (Požega et al., 2013). In 2023, a study that investigated the relationship between education and unemployment rate found that during the COVID-19 pandemic, the unemployment rate increased significantly among less educated workers (Bálintová et al., 2023). A study that analysed data from several developing countries reported significant negative impacts between government expenditure and unemployment rates (Siddiqi, 2021).

However, the influence of education can be positive on unemployment rates. A study in Nigeria investigated the relationship between government expenditure on education and unemployment rate between 1970 and 2017 and showed a positive relationship (Agboola et al., 2018). In addition, a study in Est Java found that education had a positive effect on unemployment rate (Suyanto et al., 2019). Other studies have shown that education has no impact on unemployment duration. For instance, people with higher educational levels do not have significantly longer unemployment duration than those with primary or even secondary education (Mahmood et al., 2015).

Diverse studies have revealed a complex link between education and unemployment, with varied impacts. While some studies have emphasised a positive influence, others have highlighted nuances, urging continuous exploration for comprehensive insights. The following regression analysis was used to investigate this in the context of the KSA.

3. Model Specification and Data

To examine the impact of educational level on the unemployment rate in the KSA, this research considered time series data from 27 quarter-year observations from 2016 to 2023. Educational levels included no schooling (literacy), primary schooling, intermediate schooling, secondary schooling, bachelor's education or equivalent, diploma education or equivalent, master's education or equivalent, and PhD education or equivalent. The data sets were retrieved from the database of the General Authority for Statistics of the KSA (2023).

Table 1. Variable description

Variables	Description	Source
GRAND	Grand Total Unemployment Rate.	General Authority for Statistics, KSA, 2023.
NO-SC	No Schooling.	General Authority for Statistics, KSA, 2023.
PRIMA	Primary School Education	General Authority for Statistics, KSA, 2023.
INTRM	Intermediate School Education	General Authority for Statistics, KSA, 2023.
SECON	Secondary School Education	General Authority for Statistics, KSA, 2023.
BACHA	Bachelor's education or Equivalent	General Authority for Statistics, KSA, 2023.
DIPLOMA	Diploma education or Equivalent	General Authority for Statistics, KSA, 2023.
MASTE	Master education or Equivalent	General Authority for Statistics, KSA, 2023.
PH-D	PhD education or Equivalent	General Authority for Statistics, KSA, 2023.

Source: Author.

Hence, as a first step in measuring the empirical evidence of the effect of educational level on unemployment rate, this study used the ordinary least square (OLS) model. This study used a descriptive quantitative research methodology. Research using numerical data analysis is known as quantitative research. According to Prawira (2018), descriptive research, on the other hand, describes and interprets study findings expressed as numerical

data. In the present study, secondary data were used. This research was conducted as a time series using quarter-year data from 2016 to 2023 that were obtained from the official website of the General Authority for Statistics of the KSA (2023). A multiple regression analysis was the research method used. The mathematical model of the total unemployment rate was as follows:

Multiple Regression Equation Model

$$GRAND = B0 + B1 NO-SC + B2 INTRM + B3 SECON + B4 BACHA + B5 MASTE + uT$$

GRAND: total unemployment rate as the dependent variable;

B0: constant as the intercept;

u: error term;

T: 2016–2023;

B1: coefficient of the variable NO-SC ‘partial slope’;

NO-SC: independent explanatory variable representing the change in unemployment rate per quarter-year by the change in annual NO-SC rate;

B2: coefficient of the variable INTRM ‘partial slope’;

INTRM: independent explanatory variable representing the change in total unemployment rate per quarter-year by intermediate education;

B3: coefficient of the variable SECON ‘partial slope’;

SECON: independent explanatory variable representing the change in total unemployment rate per quarter-year by secondary education;

B4: coefficient of the variable BACHA ‘partial slope’;

BACHA: independent explanatory variable representing the change in unemployment rate per quarter-year by bachelor’s education;

B5: coefficient of the variable MASTE ‘partial slope’;

MASTE: independent explanatory variable representing the change in unemployment rate per quarter-year by bachelor’s education.

4. Results and Analysis

Table 2. Descriptive statistics

	GRAND	NO-SC	PRIMA	INTRM	SECON	BACHA	DIPLOMA	MASTE	PH-D
Mean	11.71	3.504	7.347	8.144	10.24	16.291	8.5	5.07	1.136
Median	12.1	2.923	7.320	8.094	10.48	17.394	8.4	4.85	0.7387
Min	15.5	8.013	10.77	12.121	14.32	21.056	10.9	8.299	3.186
Max	8	1.029	4.51	5.86	7.01	9.900	5.24	2.877	0.0000
Std. Dev.	1.774	2.00	1.67	1.65	1.72	2.833	1.299	1.345	0.940
Skewness	-0.36	0.811	0.324	0.46	0.0269	-0.661	-0.716	0.518	0.584
Kurtosis	3.025	2.7	2.40	2.44	3.143	2.938	3.0500	2.647	2.2616
Jaqure-Bera	0.644	3.03	0.87	1.30	0.0265	1.967	2.589	1.34809	2.148
Probability	0.7246	0.21	0.645	0.51	0.9868	0.373	0.273	0.500	0.341
Sum	316.270	94.6	198.3	219	276.754	439.86	228.019	1.34809	30.672
Sum Sq. Dev	81.88	104.12	72.525	71.28	77.329	208.77	43.9162	47.104	23.010
Observations	27	27	27	27	27	27	27	27	27

Source: Author.

Table 2 presents the descriptive statistics of the variables before analysis. Descriptive statistics presents raw data in a meaningful form, allowing for a simpler data interpretation. Interpretation of raw data is difficult and time consuming; we used descriptive statistics to avoid this dilemma. In Table 2, each of the nine variables has 27 observations. The mean values, maximum and minimum values, standard deviations, and kurtosis, among others, are given. Thus, from descriptive statistics, one can predict the analysis.

Table 2 displays the summary statistics for the data set used. The table shows skewness, with some variables having a positive sign that indicates that the distribution was skewed to the right and other variables negatively

skewed to the left. On the other hand, the kurtosis revealed that it almost satisfied the symmetrical condition of the expected value of 3. Some variables had a value of <3. However, the probability of all the variables was positive and relatively low, with all the variables in the model having statistically insignificant values at a 5% significance level. Thus, the in-built null hypothesis that the data set is approximately standard is acceptable. Furthermore, an interesting relationship was found between the mean and median values of all variables in the model. The mean-to-median ratio for all the data sets was within the unit proximity. This implies that when plotted on a standard normal curve, the median will not be significantly different from the mean value of the distribution.

4.1 Scatter Plot of the Dependent and Independent Variables

As shown in Figure 1, most unemployment rates are distributed between bachelor’s and secondary education, which can be a result of the study population being composed mostly of the young age group (General Authority for Statistics of the KSA, 2023). By contrast, the minimum unemployment rate was found among PhD holders. However, further examination can be performed to measure the unemployment rate for comparison with that of the total degree holders.

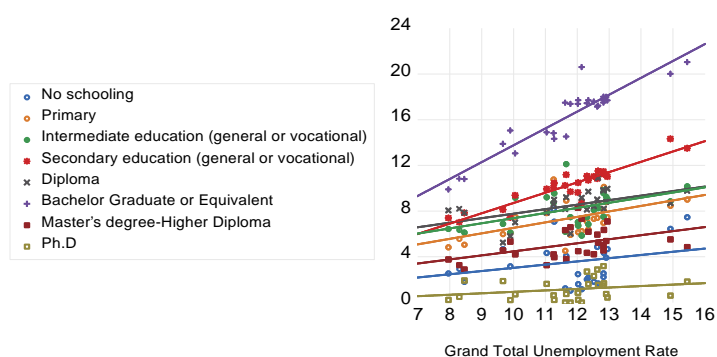


Figure 1. Scatter plot of all variables according to unemployment rate

Source: Author, Eviews 12 Output.

Table 3. Correlation matrix

	GRAND	NO-SC	PRIMA	INTRM	SECON	BACHA	DIPLOMA	MASTE	PH-D
GRAND	1.00	0.249	0.5015	0.481	0.928	0.925	0.540	0.467	0.238
NO-SC	0.249	1.00	0.714	0.596	0.354	0.013	0.077	-0.186	-0.005
PRIMA	0.5015	0.714	1.00	0.760	0.592	0.280	0.395	-0.049	0.114
INTRM	0.481	0.596	0.760	1.00	0.613	0.197	0.361	-0.092	0.235
SECON	0.928	0.354	0.592	0.613	1.00	0.738	0.576	0.205	0.287
BACHA	0.925	0.013	0.280	0.197	0.738	1.00	0.403	0.638	0.137
DIPLOMA	0.540	0.077	0.395	0.361	0.575	0.403	1.00	0.119	0.214
MASTE	0.467	-0.186	-0.049	-0.092	0.205	0.637	0.119	1.00	-0.213
PH-D	0.238	-0.005	0.114	0.235	0.287	0.137	0.214	-0.212	1.00

One statistical method for determining the strength of the relationship between the two quantitative variables is correlation analysis. Table 3 displays the value in which one variable varies when other variables change. The linear relationship between the two variables is also provided. As can be observed from the matrix, the correlation value ranges from -1 to +1, with the total unemployment rate showing a positive relationship with all the variables.

4.2 Estimated Equations

To examine the relationship between the dependent variable (total unemployment rate) and the independent variables (no schooling, primary education, intermediate school education, intermediate school education, bachelor’s education or equivalent, diploma education or equivalent, master’s graduate or equivalent, and PhD education or equivalent), a regression with all variables was run in Eviews 12. As shown in Table 4, the F-probability for model 1 is significant at 0.00 less than 5%, which means that the model is a good fit. The R² value is 0.995, which means that all independent variables explain the dependent variable by 99. The stepwise backward tool was used to eliminate insignificant variables, resulting in the removal of PH-D as a variable that

had no significant effect on the total unemployment rate. The second model (stepwise backward) is significant at 0.00 less than 5%, indicating a perfect fit at a R^2 value of 0.994. However, the model showed a high level of multicollinearity, which affects its reliability. Thus, a third model was run, dropping the variables with high multicollinearity. The third model is significant at 0.00 less than 5%, indicating a good fit, and the R^2 value of 0.993 explains the impact of the independent variables on the total unemployment rate. All the independent variables demonstrated a positive relationship with total unemployment rate. NO-SC, INTRM, SECON, and BACHA are significant at the 5% level. For instance, NO-SC (i.e. increase in quarterly literacy rate) will lead to an increase in the total unemployment rate by 0.041. This result is logical, as according to Hajji and Nugroho (2013), total unemployment rate is positively and significantly impacted by literacy rates. Furthermore, only a small portion of people, mostly of the elderly demographics, continued to be illiterate between 2016 and 2023.

Table 4. Results of regression Model 1

Model (1): All variables	Coefficient	Std. Error	T- Statistics	Prob
C	0.119	0.236	0.504	0.620
NO-SC	0.055	0.023	2.401	0.027
PRIMA	-0.001	0.0343	-0.038	0.969
INTRM	0.0636	0.0323	1.968	0.064
SECON	0.439	0.0432	10.16	0.000
BACHA	0.341	0.026	13.125	0.113
DIPLOMA	0.048	0.029	1.661	0.000
MASTE	0.067	0.0353	1.885	0.075
PH-D	0.059	0.0355	1.670	0.112
R2	0.995			
Prop(f-statistic).	0.000			
Durbin-Watson stat.	0.860			
Model (Stepwise backward) all variables	Coefficient	Std. Error	T- Statistics	Prob
C	0.105	0.247	0.427	0.673
NO-SC	0.050	0.024	2.103	0.049
PRIMA	-0.0068	0.036	-0.191	0.850
INTRM	0.073	0.033	2.209	0.039
SECON	0.441	0.045	9.775	0.039
DIPLOMA	0.051	0.030	1.677	0.109
BACHA	0.348	0.026	12.974	0.000
MASTE	0.0469	0.034	1.345	0.194
R2	0.994			
Prop(f-statistic).	0.000			
Durbin-Watson stat	0.959			

Source: Eviews 12 Output.

Table 5. Results of final regression model

Model (Final Model no multi collinearity Issue) all variables	Coefficient	Std. Error	T- Statistics	Prob
C	0.300	0.223	1.343	0.193
NO-SC	0.041	0.0198	2.076	0.050
INTRM	0.074	0.0300	2.4693	0.022
SECON	0.468	0.0430	10.88	0.00
BACHA	0.344	0.0268	12.813	0.00
MASTE	0.0500	0.035	1.4141	0.172
R2	0.993			
Prop (f-statistic).	0.0000			
Durbin-Watson stat.	1.321			

Source: Eviews 12 Output.

According to Adriani (2019), education is a component of human capital that helps people become more knowledgeable and skilled. One's productivity increases with knowledge and skill capital, which leads to more employment options. Increased employment prospects will boost one's chances of landing a job, hence lowering

the unemployment rate. However, the SECON and BACHA increases per quarter year led to increases in total unemployment rate by 0.468 and 0.344, respectively. This result can be explained by the fact that the study population was composed mostly of young people. Moreover, educated people wait for positions that pay the wages they want, thus increasing the demand for high wages (Suyanto et al., 2019).

A 1-year increase in MASTE will lead to an increase in total unemployment rate of 0.0469 per quarter-year; however, this result is insignificant at 0.172 more than 5%.

Table 6. Diagnostic test

Diagnostic Checking	Breusch-Godfrey test (Autocorrelation)	VIF test (Multicollinearity)	ARCH test (Heteroscedasticity)	Jarque-Bera test (Normality)
	Obs*R-squared (0.1438)	Variance Inflation Factor (1.616-5.949)	Obs*R-squared (0.725)	Jarque-Bera (0.375763) Probability 0.8287

Source: Eviews 12 Output.

To analyse the data from the auto-correlation issue, the DW stat of 1.31 indicates an auto-correlation issue. A further test using the Breusch-Godfrey serial correlation LM test resulted in a value of 0.1438, which is more than 5%, leading to the acceptance of the null hypotheses with no auto-correlation issue. The issue of multicollinearity was investigated using the VIF test between 1.616 and 5.949 less than 8, which means that no severe multicollinearity exists. The data showed no heteroscedasticity in the ARCH test, resulting in 0.725 more than 5%; thus, the null hypothesis of homoscedasticity was accepted. The normality of data distribution was determined using Jarque-Bera's residual test, which resulted in a value of 0.8287 more than 5%; thus, null hypothesis of normal data distribution was accepted. The study findings are consistent with those of Hossain et al. (2018) that showed only a weak association between unemployment among recent graduates and educational attainment. Similarly, a study in Indonesia that investigated the relationship between educational level and total unemployment rate reported that the still-high rate of population increase is the primary driver of the positive effect, followed by the increase in the number of people entering the workforce with a bachelor's degree or higher. As a result, job openings are not enough to support the current workforce (Suyanto et al., 2019). A further cause that can be a factor contributing to unemployment is the mismatch between a person's talents and the skills required by the workforce or business (Herispon, 2009, as cited in Suyanto et al., 2019). A highly educated person possesses greater abilities. In addition, employability and educational attainment are not always correlated. Similarly, Kobylińska et al. (2017) asserted that graduates' theoretical knowledge was the only cause of young workers' unemployment in Europe. In the KSA, the total unemployment rate is not further increased by the increase in higher education level, its ease of access, and the large number of university graduates.

4.3 Effect of the COVID-19 Pandemic on the Total Unemployment Rate

Table 7. Results of the regression model with the dummy effect of the COVID-19 Pandemic

Model (Final Model Dummies for 2020 Covid-19) all variables	Coefficient	Std. Error	T- Statistics	Prob
C	0.353	0.248	1.423	0.193
NO-SC	0.0388	0.0206	1.883	0.050
INTRM	0.0739	0.0305	2.421	0.022
SECON	0.466	0.0441	10.568	0.00
BACHA	0.343	0.027	12.530	0.00
MASTE	0.0483	0.036	1.338	0.172
DCovid19 (2020)	0.0544	0.102	0.533	0.599
R2	0.993			
Prop(f-statistic).	0.0000			
Durbin-Watson stat.	1.369			

Source: Eviews 12 Output.

This study examined the relationship between unemployment rate and educational level during the period 2016–2023, within which the global COVID-19 pandemic occurred, affecting many aspects of life globally. The KSA was also affected by the crisis, and the impact of the COVID-19 pandemic on the unemployment rate cannot be

ignored. As can be seen from Figure 2, the unemployment rate increased significantly during the pandemic in 2020 and peaked at more than 15%. The dummy variable was insignificant at 0.599 more than the 5% level, and the curve returned to normal, decreasing after 2020.

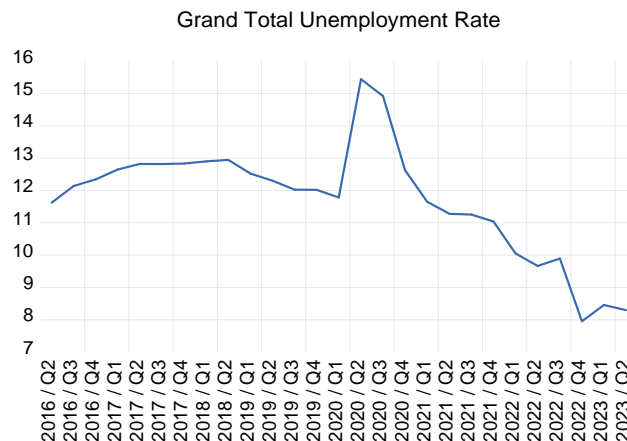


Figure 2. Time series graph for the impact of the COVID-19 Pandemic

Source: Eviews 12 Output.

5. Conclusion

This study examined the effect of educational level on total unemployment rate. It examined different education levels such as no schooling, primary education, intermediate education, secondary education, diploma, bachelor's education, master's education, and PhD education, from 2016 to 2023, using the quantitative method for analysing time series data. The regression analysis revealed a positive relationship between educational level, such as intermediate education, secondary education, and even a bachelor's degree, and unemployment rate. By contrast, the literature has shown that if a person's educational level is higher, their productivity is also greater. Therefore, the opportunity to obtain a job is also greater. According to Simanjuntak (1998), the educated labour market generally has greater work productivity than the uneducated labour market, so an educated person has more job opportunities. However, this result can be explained by many reasons. One reason is that the study population was composed mostly of young people in their secondary or tertiary school years, making employment opportunities inadequate to accommodate the existing workforce. Another reason is that the workforce with a high school education or higher do not want to work in jobs that are not linear to their education (Suyanto et al., 2019). Furthermore, in contrast to previous encounters, a college degree is no longer regarded as an essential qualification for employment. Experience and the so-called soft skills, which do not require a college degree, are the two most crucial factors for obtaining employment (B Āintov Ā et al., 2023). Another finding of this study is that the literacy rate affects the total unemployment rate positively, even though less, and the older population is still literate between 2016 and 2023 according to the General Authority for Statistics of the KSA (2023).

The COVID-19 pandemic affected the total unemployment rate during the study period by peaking at the second and third quarters of 2020. However, this impact is insignificant and decreases again. This highlights the resilience of the Saudi Arabian labour market in the face of the global COVID-19 crisis, showing a recovery in the unemployment rate after 2020. This can be a result of its educated workforce.

This study adds to the knowledge on the labour market in the KSA and provides information to guide policymakers in decision-making. However, owing to the limited duration and time, the study investigated only for the period 2016-2023. Future research can be conducted to investigate within a longer time frame. Furthermore, it can investigate the mismatch problem between educational outcomes and labour market needs by adjusting policies to tolerate the increase in unemployment rate between the populations with secondary and bachelor education because the present study mostly included a young population in their secondary and tertiary school years. This can be solved by creating employment opportunities that can accommodate the existing workforce. In addition, policymakers can create policies to increase job opportunities or even encourage private businesses to tolerate this.

However, owing to the limited duration and time, the study investigated only the period 2016–2023. Future researchers can investigate within a longer time frame. Moreover, further investigations should identify

additional factors that influence the labour market in Saudi Arabia.

References

- Adriani, E. (2019). Human capital measurement (a literature study). *Jurnal Manajemen Dan Sains*, 4(1), 176. <https://doi.org/10.33087/jmas.v4i1.86>
- Agboola, S., Musa, I., & Ibrahim, Z. (2018). Relationship between educational expenditure and unemployment rate on economic growth in Nigeria. *International Education Journal*, 1(3), 100-110. <https://doi.org/10.31058/j.edu.2018.13007>
- B ěıntov ě M., Barcziov ě A., & Machov ě R. (2023). The relationship of education and unemployment. *Hradec Economic Days*, 13. <https://doi.org/10.36689/uhk/hed/2023-01-002>
- General Authority for Statistics of the KSA. (2023). Retrieved from <https://www.stats.gov.sa/>
- General Authority for Statistics of the KSA. (2023, September 30). *Labor force*. Retrieved from <https://www.stats.gov.sa/en/814>
- Hajji, M. S., & Nugroho, S. B. M. (2013). Analysis of GRDP, inflation, provincial minimum wages, and literacy rates on open unemployment rates in Central Java Province. *Diponegoro Journal of Economics*, 2(3), 1-10.
- Hossain, M. I., Yagamaran, K. S. A., Afrin, T., Limon, N., Nasiruzzaman, M., & Karim, A. M. (2018). Factors influencing unemployment among fresh graduates: A case study in Klang Valley, Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 8(9), 1494-1507. <https://doi.org/10.6007/ijarbss/v8-i9/4859>
- Kobylińska, U., Rollnik-Sadowska, E., & Samul, J. (2017). Young people on the labour market in Poland? The point of view of the employer. *Oeconomia Copernicana*, 8(4), 553-568. <https://doi.org/10.24136/oc.v8i4.34>
- Lavrinovicha, I., Lavrinenko, O., & Teivans-Treinovskis, J. (2015). Influence of education on unemployment rate and incomes of residents. *Procedia-Social and Behavioral Sciences*, 174, 3824-3831. <https://doi.org/10.1016/j.sbspro.2015.01.1120>
- Murawska, A. (2017). Influence of population's education level on the employment and unemployment rates in the European Union countries. *Economics and Law*, 16(2), 171-184. <https://doi.org/10.12775/EiP.2017.012>
- Núñez, I., & Livanos, I. (2010). Higher education and unemployment in Europe: An analysis of the academic subject and national effects. *Higher Education*, 59, 475-487. <https://doi.org/10.1007/s10734-009-9260-7>
- Požega, Ź., Crnković, B., & Stipetić, Z. (2013). Analysis of unemployment rates by education level of unemployed. *Interdisciplinary Management Research*, 9, 303-311.
- Prawira, S. (2018). The influence of economic growth, provincial minimum wages, and education levels on open unemployment in Indonesia. *Jurnal Ecogen*, 1(4), 162. <https://doi.org/10.24036/jmpe.v1i1.4735>
- Rahmawati, A., & Putri, P. I. (2021). The effect of education variable on the open unemployment rate. *Efficient: Indonesian Journal of Development Economics*, 4(2), 1160-1173. <https://doi.org/10.15294/efficient.v4i2.46128>
- Siddiq, A. (2021). Determinants of unemployment in selected developing countries: A panel data analysis. *Journal of Economic Impact*, 3(1), 19-26. <https://doi.org/10.52223/jei3012103>
- Simanjuntak, P. J. (1998). *Introduction to human resource economics*. Lembaga Penerbit Fakultas, Ekonomi Universitas Indonesia.
- Snieska, V., Valodkiene, G., Daunoriene, A., & Draksaitė, A. (2015). Education and unemployment in European Union economic cycles. *Procedia-Social and Behavioral Sciences*, 213, 211-216. <https://doi.org/10.1016/j.sbspro.2015.11.428>
- Suyanto, S., Purnomo, B., & Standsyah, R. E. (2019). Impact of education and health on the unemployment rate and economy of East Java. *Sinergi: Jurnal Ilmiah Ilmu Manajemen*, 9(2), 26-31. <https://doi.org/10.25139/sng.v9i2.1873>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).