Journal of Quality Measurement and Analysis *JQMA* 17(1) 2021, 49-59
e-ISSN: 2600-8602 *http://www.ukm.my/jqma*

ANALYSIS OF GENDER INCOME GAP IN MALAYSIA

(Analisis Jurang Pendapatan antara Jantina di Malaysia)

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ABSTRACT

The participation of women in the Malaysian labour market has shown a significant increase over the years. However, compared to the male labour force participation rate, the female labour force participation rate is still at a low level. Various efforts have been made by the government to ensure gender equality in the economic sector, however, there is still discrimination against women in the workplace. One of them is the income gap between male and female workers. This study aims to analyse the gender income gap in Malaysia and identify the factors that contribute to the income gap. This study utilises two models, namely multiple linear regression model and Blinder-Oaxaca income decomposition model. Data were obtained from the Salaries & Wages Survey in 2016. Multiple linear regression model is used to estimate the influence of demographic and human capital factors on employee income levels. The Blinder-Oaxaca income decomposition model is used to analyse gender income differences. The results of the study found that the income of female workers, on average, is lower than that of male workers. The study also shows that education plays an important role in determining the gender income gap. In addition, the income decomposition model suggests that the big gap in the gender income is contributed by unexplained factors, which refer to discrimination.

Keywords: gender discrimination; income decomposition; labour market

ABSTRAK

Penyertaan wanita dalam pasaran tenaga buruh di Malaysia telah menunjukkan peningkatan yang signifikan dari tahun ke tahun. Namun jika dibandingkan dengan kadar penyertaan tenaga buruh lelaki, kadar penyertaan tenaga buruh perempuan masih lagi berada pada tahap yang rendah. Pelbagai usaha telah dilakukan oleh pihak kerajaan untuk memastikan kesaksamaan jantina dalam sektor ekonomi, namun masih wujud diskriminasi terhadap perempuan di tempat kerja. Satu daripadanya adalah jurang pendapatan antara pekerja lelaki dan perempuan. Kajian ini bertujuan untuk menganalisis jurang pendapatan jantina di Malaysia dan mengenal pasti faktor yang menyumbang kepada jurang pendapatan berkenaan. Kajian ini menggunakan dua model, iaitu model regresi linear berganda dan model pengasingan pendapatan Blinder-Oaxaca. Data diperoleh daripada Survei Gaji & Upah pada tahun 2016. Model regresi linear berganda digunakan untuk menganggar pengaruh faktor demografi dan modal insan terhadap aras pendapatan pekerja. Model pengasingan pendapatan Blinder-Oaxaca pula digunakan untuk menganalisis perbezaan pendapatan berdasarkan jantina. Hasil kajian mendapati pendapatan pekerja perempuan, secara purata, adalah lebih rendah berbanding dengan pekerja lelaki. Kajian ini juga menunjukkan bahawa pendidikan memainkan peranan penting dalam menentukan jurang pendapatan berdasarkan jantina. Di samping itu, model pengasingan pendapatan menunjukkan bahawa sebahagian besar jurang pendapatan jantina disumbangkan oleh faktor yang tidak dapat dijelaskan, yang merujuk kepada diskriminasi.

Kata kunci: diskriminasi jantina; penguraian pendapatan; pasaran buruh

1. Introduction

The Malaysian labour market has seen positive changes since independence, in line with its economic growth. The Economic Outlook 2020 Report shows that the total labour force in the first half of 2019 increased by 2.2% to 15.5 million labour force (Ministry of Finance Malaysia 2019). The increase in labour force indicates that Malaysian labour market is in favourable condition. Alongside the increase in the labour force, women's labour force participation rate had also increased to 54.1% in 2015. However, men's labour force participation rate (80.6%) remains higher than women's in 2015. The gap is not only evident in the labour force participation rate but also in earned incomes. According to Selamat (2009), the gender income gap persists, although both men and women do similar jobs. If this situation continues, the labour market will cripple due to dissatisfaction among women employees, resulting in them leaving the labour market and not contributing their skills optimally (Ismail *et al*. 2013).

Table 1 shows the Malaysia Gender Gap Index (MGGI) scores for 12 years. MGGI identifies the gap between men and women across four sub-indices encompassing Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment. A score of 1.0 (100%) indicates that gender equality has been achieved. Overall, the MGGI increase slowly from 2006 to 2017. This suggests that gender inequality still exists with a 33% gap between men and women in 2017. Similarly, the Economic Participation and Opportunity sub-indices show a positive change from 2006 to 2017 with a score of 0.59 and 0.65, respectively.

Table 1: MGGI by year and score

Year	Overall	Economic Participation and Opportunity
2006	0.65	0.59
2007	0.64	0.57
2008	0.64	0.56
2009	0.65	0.56
2010	0.65	0.58
2011	0.65	0.59
2012	0.65	0.60
2013	0.65	0.59
2014	0.65	0.62
2015	0.65	0.63
2016	0.67	0.66
2017	0.67	0.65

Source: Malaysian Open Data Portal (2018).

The Blinder-Oaxaca income decomposition method was used in many studies to analyse the gender income gap (Deshpande *et al.* 2018; Fernandez 2009; Ismail *et al.* 2013). Multiple linear regression and Blinder-Oaxaca income decomposition method were used in this study to analyse the gender income gap in Malaysia further. Past studies suggested many factors contribute to the gender income gap including occupational segregation, women's responsibility towards family, gender discrimination and human capital (Blau & Kahn 2017; Chapman & Harding 1985; Fernandez 2009; Ismail & Jajri 2012; Zainol Abidin *et al.* 2016). The study aims to analyse the Malaysian gender income gap and identify the factors contributing to the gender income gap. Five variables used in this study were employee's monthly income, gender, age, marital status and education level. This research information is expected to help the government devise strategies to boost women's economy and ensure gender equality in Malaysia.

2. Materials and Method

Salaries & Wages Survey 2016 data conducted by Department of Statistics Malaysia, consisting of 13,089 samples were obtained from The National University of Malaysia (UKM) Bank Data. Data obtained contains information on workers' demographic factors, education background and their industries. Table 2 represents the distribution of education level and marital status by gender. Almost 60% of the sample were male, and the rest were female. Overall, the majority of the workers obtained a secondary education and above. The proportion of male who obtained secondary education is higher than female. However, more females obtained tertiary education than males.

Table 2: Education level and marital status by gender

	Male		Female		Total	
Variables	Number	%	Number	%	Number	%
Education level						
No education	78	0.60	55	0.42	133	1.02
Primary	691	5.28	257	1.96	948	7.24
Secondary	4846	37.02	2543	19.43	7389	56.45
Tertiary	2226	17.01	2393	18.28	4619	35.29
Marital status						
Single	2615	19.98	1742	13.31	4357	33.29
Married	5226	39.93	3506	26.79	8732	66.71
Total	7841	59.91	5248	40.1	13089	100.0

2.1. *Multiple linear regression model*

Multiple linear regression was used to estimate the effect of demographic factors and human capital, in this case refers to education level, on workers' income level. This model consists of three income equation: (1) using the pooled sample, (2) male sample and (3) female sample. The regression model for workers' monthly income used is as follows:

$$\ln W = \alpha + \bar{X}\beta + \bar{Z}\delta + \varepsilon \tag{1}$$

where W is monthly income, $\bar{X}$ represents a vector of demographic variables, $\bar{Z}$ represents a vector of human capital variables and ε is the error term. The existence of this error may be due to the effect of other variables not included in the model.

By incorporating the estimates into Eq. (1), the estimated income equation for pooled, male and female sample are as follows:

$$\ln W = \beta_{10} + \beta_{11}AGE + \beta_{12}GEN + \beta_{13}MAR + \beta_{14}EDU_{11} + \beta_{15}EDU_{12} + \beta_{16}EDU_{13} + \varepsilon \tag{2}$$

$$\ln W_M = \beta_{20} + \beta_{21}AGE_M + \beta_{23}MAR_M + \beta_{24}EDU_{21} + \beta_{25}EDU_{22} + \beta_{26}EDU_{23} + \varepsilon_M \tag{3}$$

$$\ln W_F = \beta_{30} + \beta_{31}AGE_F + \beta_{33}MAR_F + \beta_{34}EDU_{31} + \beta_{35}EDU_{32} + \beta_{36}EDU_{33} + \varepsilon_F \tag{4}$$

where W is monthly income, β_{i0} is the intercept, AGE is age, GEN is gender, EDU_{i1}, EDU_{i2} and EDU_{i3} are dummy variable for primary education, secondary education and tertiary education respectively, ε is the error term, M and F are male and female, respectively.

2.1.1. Model evaluation

The multiple linear regression model must satisfy normality, linearity and reliability assumptions to ensure analysis accuracy. Evaluation of the fitness of the model is as follows:

(1) The coefficient of determination, R^2

The coefficient of determination, R^2 is used to determine the independent variables' contribution to the variance in the dependent variable. Values of R^2 that are close to 1 imply that most of the variability in worker's monthly income is explained by the regression model (Montgomery *et al*. 2012). R^2 is defined as below:

$$R^2 = 1 - \frac{\sum\left(Y_i - \hat{Y}_i\right)^2}{\sum(Y_i - \bar{Y})^2} \tag{5}$$

Enter regression procedure was used to determine each independent variable's relative contribution to the log of monthly income. Table 3 shows the enter regression procedure.

Table 3: Independent variables for each model

Model	Independent variables
1	Age
2	Age, marital status
3	Age, marital status, education level
4	Age, marital status, education level, gender

(2) F-test

This test was used to test for regression's significance by identifying the linear relationship between the dependent variable and any of the independent variables (Montgomery *et al.* 2012). The hypothesis used in this test is as follows:

$$H_0: \beta_1 = \beta_2 = \cdots = \beta_k = 0$$

$$H_1: \beta_i \neq 0, \text{ for at least one } i$$

Rejection of null hypothesis shows that linear relationship exists between the dependent variable and at least one independent variable. F-statistic is defined as below:

$$F_0 = \frac{\left(\frac{\text{Sum of squares due to regression}}{k}\right)}{\left(\frac{\text{Error sum of squares}}{n-k-1}\right)} \tag{6}$$

where *n* is data count, *k* is the degree of freedom, the sum of squares due to regression and error sum of squares are as follows:

$$\text{Sum of squares due to regression} = \sum_{i=1}^{n}\left(\hat{Y}_i - \bar{Y}\right)^2$$

$$\text{Error sum of squares} = \sum_{i=1}^{n}\left(Y_i - \hat{Y}_i\right)^2$$

If the *p*-value is less than the significance level, then the null hypothesis is rejected.

(3) *t*-test

This test was used to test for the significance of the independent variable in determining the independent variable. (Montgomery *et al*. 2012). The hypothesis used in this test is as follows:

$$H_0: \beta_i = 0$$
$$H_1: \beta_i \neq 0$$

Rejection of the null hypothesis implies that the independent variable is significant in determining the log of worker's monthly income. *t*-statistic is defined as below:

$$t_0 = \frac{\hat{\beta}_i - 0}{\text{se}\left(\hat{\beta}_i\right)} \tag{7}$$

where $se\left(\hat{\beta}_i\right)$ is the standard error of the independent variable. If the *p*-value is less than the significance level, then the null hypothesis is rejected.

(4) Multicollinearity

Multicollinearity is a problem when the independent variables have a high correlation with each other or have near-linear relationships. Multicollinearity can be detected by looking at the variance inflation factors (VIF) that are defined as follows:

$$VIF = \frac{1}{1 - R_i^2}$$

A VIF value around 5 to 10 implies that multicollinearity exists (Montgomery *et al*. 2012).

2.2. *Blinder-Oaxaca income decomposition model*

The income decomposition model used in this study was built by Blinder (1973) and Oaxaca (1973). This model divides the income differentials into two parts. The first part refers to the income differentials due to differences in productivity characteristic, including human capital. The second part refers to unexplained income differentials, which often used as a measure for discrimination.

This study used Neumark (1988) approach in building the Blinder-Oaxaca income decomposition model, which uses the pooled sample's coefficient as non-discriminatory coefficients. Therefore, the mean gender income differentials can be written as follows:

$$\overline{\ln W_M} - \overline{\ln W_F} = \underbrace{(\bar{X}_M - \bar{X}_F)\hat{\beta}^*}_{Q} + \underbrace{\bar{X}_M(\hat{\beta}_M - \hat{\beta}^*) + \bar{X}_F(\hat{\beta}_F - \hat{\beta}^*)}_{U} \tag{8}$$

where $\ln W_M, \ln W_F, \bar{X}_M, \bar{X}_F, \hat{\beta}_M$ and $\hat{\beta}_F$ are the mean of the natural logarithm of the observed monthly incomes, the mean of the observed productivity characteristics and the coefficient estimates for females and males respectively. $\hat{\beta}^*$ is the coefficient estimates obtained from the pooled sample estimates. The first term on the right-hand side of Eq. (8) represents the explained part of income differentials, while the last two terms represent the income differentials' unexplained part.

3. Results and Discussions

3.1. *Model evaluation*

(1) The coefficient of determination, R^2

Table 4 reports the R^2 values for each model from the enter regression procedure. The difference in R^2 value refers to the relative contribution of the independent variable to the log of monthly income. Based on Table 4, model 3 and 4 is the best model in estimating the income equation for the male and female sample and the pooled sample, respectively. For all income equation, almost 30% of the variability in the log of monthly income can be explained by education level, holding other independent variable constant.

Table 4: R^2 value for enter regression procedure

	Pooled		Male		Female	
Model	R^2	R^2 difference	R^2	R^2 difference	R^2	R^2 difference
1	0.0851[a]	-	0.1049[a]	-	0.0571[a]	-
2	0.1075[b]	0.0224	0.1418[b]	0.0369	0.0665[b]	0.0094
3	0.4073[c]	0.2998	0.4051[c]	0.2633	0.4579[c]	0.3914
4	0.4245[d]	0.0172	-	-	-	-

Note: [a] Regressor: (constant), age.
[b] Regressor: (constant), age, marital status.
[c] Regressor: (constant), age, marital status, education level.
[d] Regressor: (constant), age, marital status, education level, gender.

(1) *F*-test

Table 5 summarises the *F*-statistic for the pooled sample, male sample and female sample income equation. The *p*-value for all income equations model are less than the significance level, 0.05. This demonstrates that at least one of the independent variables is significant to the model.

Table 5: Summary of *F*-statistic

	Pooled	Male	Female
F	1608.55	1067.28	885.50
p-value	0.000	0.000	0.000

(2) *t*-test

The coefficients and *p*-value of all independent variables are shown in Table 6. The *p*-value for all independent variables in the three income equations are significant at 1% except for the education level variable in the male sample income equation, which is significant at 10%. This shows that all independent variables are significant in determining the log of monthly income.

Table 6: Coefficients and *p*-values of variables

Variables	Pooled		Male		Female	
	Coefficients	*p*-value	Coefficients	*p*-value	Coefficients	*p*-value
Gender	-0.190***	0.000				
Age	0.018***	0.000	0.016***	0.000	0.020***	0.000
Marital status (married)	0.1930**	0.000	0.255***	0.000	0.113***	0.000
Education level						
Primary	0.221***	0.000	0.144*	0.022	0.281***	0.000
Secondary	0.651***	0.000	0.534***	0.000	0.822***	0.000
Tertiary	1.392***	0.000	1.212***	0.000	1.634***	0.000
Constant	6.173***	0.000	6.126***	0.000	5.570***	0.000

Note: ‘ * ’ – significant at 10% ‘ *** ’ – significant at 1%

(3) Multicollinearity

Table 7 reports the VIF of all independent variables for the three income equations. The secondary and tertiary education variable have VIF value above 10, indicating that the model has a multicollinearity problem. According to Allison (2012), the multicollinearity can be ignored because the variable is an indicator dummy variable which proportion of cases in the reference category is small.

Table 7: VIF of independent variables

Variables	Pooled	Male	Female
Gender	1.04	-	-
Age	1.50	1.54	1.44
Marital status (married	1.44	1.50	1.37
Education level			
Primary	7.55	8.99	5.41
Secondary	24.84	24.18	24.95
Tertiary	23.35	21.22	24.86

3.2. *Results of regression estimates*

Table 8 reports ordinary least square (OLS) estimates for the three income equations: (1) using the pooled sample, (2) male sample and (3) female sample. The results demonstrate that all incorporated variables are positive and significantly determine the natural log of income. Based on the coefficient of determination, R^2 for all income equations, more than 40% of the dependent variable's variation can be explained by independent variables, consistent with past studies by Ismail and Jajri (2012) and Ismail *et al.* (2013).

Based on the coefficient values, the pooled sample, male sample and female sample income equation are as follows:

$$\ln \widehat{W} = 5.792 + 0.018AGE + 0.190GEN + 0.193MAR + 0.221EDU_{11} + 0.651EDU_{12} + 1.392EDU_{13} \quad (9)$$

$$\ln \widehat{W}_M = 6.126 + 0.016AGE_M + 0.255MAR_M + 0.144EDU_{21} + 0.534EDU_{22} + 1.212EDU_{23} \quad (10)$$

$$\ln \widehat{W}_F = 5.570 + 0.020AGE_F + 0.113MAR_F + 0.281EDU_{31} + 0.822EDU_{32} + 1.633EDU_{33}. \quad (11)$$

Since the equation is in log form, the percentage change of independent variable towards the percentage change of income can be calculated using the following formula:

$$W = \left(e^{\beta_{X_i}} - 1\right) \times 100 \quad (12)$$

where β_{X_i} is the coefficient value of the independent variable.

Based on the pooled sample income equation analysis, an increase in one unit (one year) age will only increase the worker's income up to 2%. Worker's income level will also increase up to 20% if the worker is male or married. Returns to education increases as education level increases. This finding is coherent with past studies about the relationship between human capital and workers' income (García-Aracil 2007; Ismail & Jajri 2012).

By incorporating the coefficient value of male's and female's marital status in Eq. (12), it is shown that married male workers receive higher income premiums, which is 29% compared to 11.96% income premiums received by married female workers. In contrast, each education level demonstrates that female workers' education return is twice their male counterparts. This result is also consistent with past studies (Ismail & Jajri 2012; Ismail *et al*. 2013; Papapetrou 2004).

Table 8: Results of regression estimates

Variables	Pooled	Male	Female
	Coefficient (*t*-value)	Coefficient (*t*-value)	Coefficient (*t*-value)
Demography			
Age	0.018 (34.96) ***	0.016 (25.43) ***	0.020 (24.12) ***
Gender	0.190 (19.81) ***	-	-
Marital status (married)	0.193 (16.37) ***	0.255 (16.61) ***	0.113 (6.16) ***
Human capital			
Education level			
Primary	0.221 (4.51) ***	0.144 (2.30) *	0.281 (3.55) ***
Secondary	0.651 (14.01) ***	0.534 (8.93) ***	0.822 (11.20) ***
Tertiary	1.392 (29.77) ***	1.212 (20.08) ***	1.633 (22.21) ***
Constant	5.792 (115.59) ***	6.126 (96.66) ***	5.570 (69.14) ***
N	13089	7841	5248
R^2	0.4245	0.4051	0.4579

Note: ‘ * ’ – significant at 10% ‘ ** ’ – significant at 5% ‘ *** ’ – significant at 1%

3.3. *Results of income decomposition model*

Table 9 illustrates the decomposition of gender income differentials divided into the explained and unexplained part. Overall, the mean monthly income among male workers is higher, with 7.584 log points than their female counterparts, 7.512 log points. The difference demonstrates that males earn 7.4% higher than females. However, the unexplained part in the income differentials gives negative value, which is -0.119 log points. This indicates that if female were to be paid for the same characteristics as male, they would earn higher than males. The estimate of income gap is lower than Maczulskij and Nyblom (2020), who examined the Finnish gender wage gap and found that males receive 16% higher wages than females.

The unexplained part of the income differentials is 0.190 log points, which is bigger than the gender income differentials itself. According to Becker (1971), the unexplained portion of income differentials may represent discrimination. Thus, this finding suggests that income discrimination exists in the Malaysian labour market, affecting females.

Based on Table 9, education level contributes negatively to the total differentials. This indicates that education could bridge the gender income gap, consistent with Ismail and Jajri (2012). A significant portion of the unexplained part is contributed by the worker’s marital status. The results show that married male workers earn higher than females of the same status. This suggests that married women may encounter a motherhood penalty in the workplace, coherent with Takenoshita (2020).

Table 9: Results of income decomposition model

Variables	Explained	Unexplained	Total
	$\left(\bar{X}_M - \bar{X}_F\right)\hat{\beta}^*$	$\bar{X}_M\left(\hat{\beta}_M - \hat{\beta}^*\right) + \bar{X}_F\left(\hat{\beta}_F - \hat{\beta}^*\right)$	$\overline{\ln W}_M - \overline{\ln W}_F$
Age	0.0258	-0.134	-0.108
	(-21.68)	(-70.53)	(-150.42)
Marital status	-0.000303	0.0238	0.0238
	(0.255)	(12.53)	(33.15)
Education level	-0.144	-0.114	-0.258
	(121.0)	(-60.0)	(-359.33)
Constant	-	0.415	0.415
		(218.42)	(577.99)
Total	-0.119	0.190	0.0718
	(100.0)	(100.0)	(100.0)
Overall			
Male	7.584		
Female	7.512		
Difference	0.0718		
Explained	-0.119		
Unexplained	0.190		

Note: Figures in parentheses are the percentage of total differentials calculated by dividing each variable coefficient by their respective total.

4. Conclusion

This study aims to analyse the Malaysian gender income gap and identify the factors contributing to the income gap. Factors including gender, age, marital status and education level were included in the analysis to examine the extent of the gender income gap using multiple linear regression and the Blinder-Oaxaca income decomposition model. The results of this study show that the gender income gap exists in the Malaysian labour market. Male workers, on average, earn higher than their female counterparts. A large portion of the gender income gap is unexplained, indicating that income discrimination exists. The results are also consistent with Papapetrou (2004) in Greece and Sukma and Kadir (2019) in Indonesia, which showed that about 60% and 70% of the gender income gap, were unexplained.

The results also reveal that income discrimination was attributed to workers' marital status that is often affecting women. This is partly due to the motherhood penalty and employer's perception towards women, resulting from gendered norm and expectations (Miller & Vagins 2018). In contrast, the negative relationship between education level and the gender income gap demonstrates that education could bridge the income gap between male and female.

Overall, the gender income gap problem could give a negative impact on the Malaysian labour market. Discriminatory factors must be taken into account in labour legislation to ensure gender equality. A study found that a change in labour legislation that requires firms to provide gender-disaggregated wage statistics reduces the gender pay gap in Denmark by approximately 2% (Bennedsen *et al*. 2019). A non-discriminatory labour market could ensure a country's development is at its optimum level since both men and women could contribute actively to the economy.

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Received: 6 April 2021
Accepted: 15 June 2021

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