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Effects of Obesity in Labour Market Outcomes: Evidence from Malaysia

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ABSTRACT

With the aims to shed light on the relationship between obesity and labour market outcomes in Malaysia, the ordinal regression model was applied on the collected questionnaires. The result from the three models suggests that employers do not consider workers' appearance and gender when they employ workers. After all, they are more concern about performance, education background and age when recruiting their ideal staff member. Even though this study fails to prove the existence of discrimination which has led to lower wages among Malaysians, the result of this study has proven that obese workers receive unfavorable treatment. Since the prevalence of obesity among Malaysian adults is substantial, the outcome of this study is crucial as it gives comprehensive information on the impact of obesity on the labour market outcome in Malaysia. The information from this study may help the authorities how to develop activities and programs in fighting obesity and how to encourage Malaysian to maintain healthy lifestyle.

Keywords: Income, labour market outcome, Malaysia, obesity, ordinal regression

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INTRODUCTION

Previously, plus size body is preferable since many jobs require demanding physical activities such as the heavy and tough tasks in agriculture sector. However, today, labour market structure has immensely changed where job requirements are less focused on physical exertion, which means plus size body is less preferable. For instance, for an office job, bigger body size do not have significant impact on productivity

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(Sharifzadeh, 2013). In fact, a high level of Body Mass Index (BMI) always shows a direct relationship with productivity loss (Gates, Succop, Brehm, Gillespie, & Sommers, 2008; Park, 2009). Productivity loss among obese workers can occur as a result of injury at workplace and time needed to recover is longer compared to workers with normal weight. Furthermore, they are likely to increase the demand for support services and disability management since the obese condition are limiting their basic physical abilities (Borak, 2011).

As a profit- oriented firm, productivity loss will lower company's revenue and to mitigate such problem, employers are less likely to employ obese workers if they are given the choice. Slack can occur with increasing number of sick days, low productivity and accelerating burden of medical cost lead to negative perception of employers on the obese workers. In another perspective, it seems like the firms are penalized in terms of high health care cost and employees' unhealthy habits. Thus, obesity may be associated with high unemployment rate and in some cases, obese employees in certain job position would have to accept lower wages. Therefore, the effect of obesity on the labour market will be high unemployment rate and the probability of getting lower wages (Han, Norton, & Powell, 2011).

Another negative impact of obesity is the likelihood of discrimination by peers based on their appearances (Baum & Ford, 2004). Although Becker (1957) mentioned in his taste discrimination model, discrimination happened when employers took into consideration of race, gender and age. It will cause employers to prefer workers according to races but not their appearances. Obese workers are generally labelled as someone lacking in self-control, lazy and unintelligent, although, in actual fact, there are no differences between obese and non-obese workers in term of their ability, performance and personality. When gender is taken into consideration, the effect of obesity on wages differs between male and female, with the obese female being discriminated with lower earnings compared with non-obese counterparts (Caliendo & Lee, 2003; Judge & Cable, 2011). They are more likely to end up with low pay jobs such as in nursing care or health care centers. On the other hand, their non-obese counterparts are getting high pay customer related jobs which require attractive personality such as the sales and customer relationship representatives (Nickson, Timming, Re, & Perrett, 2016).

MATERIALS AND METHOD

This cross-sectional study involved a random sample of 533 individuals aged 20-59 years old. The sample size was determined based on the data obtain from Department of Statistics, Malaysia. The total working population of Malaysian in this category is approximately 12 million (Department of Statistics, 2015) and to obtain an accurate sample size, this study will use Krejcie & Morgan sampling technique. By applying this technique, the accurate sample size set for the study is

384, taking into consideration that as the population increases, the sample size will rise at a decreasing rate.

In this study, the response variable Y has 3 categories, namely, the low, middle and high-income groups. However, there is no standardized definition of low income, middle income and high-income group in Malaysia. The Ministry of Finance (MOF), Malaysia defined low-income group as those who earned monthly income of RM 2000 and below but there are contentious *debate* amongst academia, businesses and society on the differences of the income level among rural and urban areas (MOF, 2013). Income comprises basic wages including traveling allowance, accommodation, food supply, fuel, electricity, water and medical care (Salaries & Wages Survey Report, 2015). The corresponding dependent variables take the value; $y_i = (1, 2\ldots. n)$.

Therefore,

Y_1= 1 if the income level starts from RM0 to RM2500,

Y_2= 2 if the income level starts from RM2501 to RM7000,

Y_3= 3 if the income level start from RM7001 and above.

Meanwhile, the independent variables (n) represent other socioeconomic and demographic characteristics $X= (X_1, X_2, \ldots X_n)$.

$$\text{Logit}\,[P\,(Y \leq j\,|x) = \alpha j + \beta_1\,ENG_i + \beta_2 ATT_i + \beta_3 PER + \varepsilon_i \quad (1)$$

$$\text{Logit}\,[P\,(Y \leq j\,|x) = \alpha j + \beta_1\,BMI_i + \beta_2\,Age_i + \beta_3\,Gender_i + \beta_4\,Education\ level_i + \varepsilon_i \quad (2)$$

$$\text{Logit}\,[P\,(Y \leq j\,|x) = \alpha j + \beta_1\,BMI_i + \beta_2\,Gender_i + \beta_3\,BMI_i * Gender_i + \varepsilon_i \quad (3)$$

Model (1) above includes variables; ENG, ATT and PER which represent English, worker attitude and performance, respectively. Whereas, in Model (2), BMI, age, gender and education level of the respondents are tested. Finally, Model (3) examines BMI, gender and the interaction term between both BMI and gender are observed.

Model (1) explains the differences in income in the absence of discrimination in Malaysia labour market. Meanwhile, in Model (2), other variables will be held constant, while only BMI is varied to test whether discrimination exists in the labour market. The comparison of the result between Model (1) and Model (2) will help explain if discrimination occurs due to the size of the body. In addition, Model (3) will take into consideration of the interaction between genders across body weight. The result will further explain the income differences.

RESULTS AND DISCUSSION

After combining the data collected through

random face-to-face interviews and online questionnaires, a total of 533 sets of questionnaires were collected. As the aim of this study is to estimate the impact of obesity on the labour market, those who are not working such as homemaker and students are excluded. Finally, only 391 sets of questionnaires are found useable for the analysis. The descriptive statistics of all respondents is shown in Table 1.

Approximately, 30 respondents were underweight, 163 respondents were in the

Table 1
Descriptive statistics of all respondents

Sample (N)	**Underweight (<18.49)**	**Normal (18.5-24.9)**	**Overweight (25-29.9)**	**Obesity (>30)**	**Total**
Age					
20-29	17 (12.7%)	73 (54.5%)	23 (17.2%)	21 (15.6%)	134
30-39	11 (6.3%)	65 (35.1%)	49 (29.3%)	49 (29.3%)	174
40-49	2 (2.9%)	19 (27.1%)	28 (40%)	21 (30%)	70
50-59	0	6 (46.2%)	5 (38.5%)	2 (15.3%)	13
Gender					
Female	25 (8.7%)	117 (41%)	73 (26.54%)	67 (23.76%)	282
Male	5 (4.5%)	46 (42 %)	32 (29.4%)	26 (24.1%)	109
Marital status					
Single	21 (11.7%)	85 (47.2%)	41 (22.7%)	33 (18.4%)	180
Married	8 (4%)	76 (38.2%)	58 (29.1%)	57 (28.7%)	199
Divorced	1 (8.3%)	2 (16.7%)	6 (50%)	3 (25%)	12
Ethnic					
Malay	12 (5.5%)	75 (34.4%)	61 (28%)	70 (32.1%)	218
Chinese	18 (14.1%)	76 (59.4%)	25 (19.5%)	9 (7%)	128
Indian	0	7 (31.8%)	5 (22.7%)	10 (45.5%)	22
Others	0	5 (21.7%)	14 (60.9%)	4 (17.4%)	23
Monthly income					
RM 0- RM 2500	5 (7.6%)	36 (54.5%)	11 (16.7%)	14 (21.2%)	66
RM 2501- RM 7000	25 (9%)	108 (39%)	79 (28.5%)	65 (23.5%)	277
RM 7001 and above	0	19 (39.6%)	15 (31.3%)	14 (29.1%)	48
Education level					
Primary school	0	1 (25%)	1 (25%)	2 (50%)	4
Secondary school	2 (3.7%)	29 (53.7%)	12 (22.2%)	11 (20.4%)	54
Diploma	8 (22.9%)	17 (48.6%)	9 (25.7%)	1 (2.8%)	35
Degree	11 (11.1%)	46 (46.5%)	23 (23.2%)	19 (19.2%)	99
Postgraduate (Master & PhD)	9 (4.5%)	70 (35.2%)	60 (30.15%)	60 (30.15%)	199

category of normal weight and finally, 198 respondents were overweight or obese persons. The total respondents were divided into 4 age groups which range from 20-29, 30-39, 40-49 and 50-59 years old. Approximately, 34% of the respondents were between 20-29 years old, 174 respondents aged between 30-39 years old and 83 of them aged 40 and above. Women dominated the survey with 72.12%.

Slightly, over half (50.9%) of the respondents are married followed by the next largest group of single respondents, with 180 people (40.1%). The numbers of divorced respondents in this study are relatively low which only 12 people. On the other hand, around 16.9% respondents are earning monthly income in the category between RM 0 - RM 2500 and 48 respondents are earning above RM 7001.

Information on the education status indicated that out of 391 respondents interviewed, 4 respondents had at least completed primary education, 54 respondents had completed their basic education, 9% respondents had gone through diploma studies and 76.2% were educated up to tertiary level. Surprisingly, about 199 of the respondents had qualification at the masters or doctoral level.

In questionnaires, the results were tested for their validity and reliability, where the

Table 2
Reliability and factor analysis

Variable	Cronbach's alpha	Kaiser-Meyer-Olkin (KMO)
Positive attitude	0.822	0.888
Worker's performance	0.752	0.869
Importance of English	0.866	0.855

reliability test and factor analysis were performed. Three variables were included; positive attitude, worker's performance and the importance of English were tested. The Cronbach's alpha obtained for the variables in Table 2 are above 0.7 which indicated the presence of internal consistency among the items in the scale (constructs or domains), following George and Mallery (2003) rules of thumb.

On the other hand, to test sampling adequacy, the KMO test was performed and the results are above 0.8 which are acceptable and the samples are adequate following Kaiser (1974) rule of thumb. As the sample size is more than 300 respondents, thus, the adequacy of the sampling drawn for this study is generally acceptable. Although there is no standardized minimum sample size for factor analysis, it is a universal agreement that factor analysis is inappropriate when the sample size is below 50 (Kadam & Bhalerao, 2010).

The result is further explained in the below Table 3. First, with the purpose to determine whether the final model

improves the ability to predict the outcome, a comparison between models without explanatory variables against the model with all the explanatory variables was performed. Based on the model fitting information, the *p* values for both Model 1 and 2 are less than 0.05 which indicates rejection of the null hypothesis that the model without predictors is as good as the model with the predictors. The final model gives a significant improvement over the baseline intercept-only model. Unlike Model 1 and 2, Model 3 failed to reject the null hypothesis which indicates the model without predictors is as good as the model with the predictors.

Secondly, the Pearson and Deviance goodness of fit test were performed to compare the goodness of fit measures. These statistics are intended to test whether the observed data are consistent with the fitted model. As the observed significance level is large, the null hypothesis is accepted, the data and the model prediction are similar; thus, indicating both models are good

Third, in traditional OLS model, R^2 is obtained to summarize the proportion of variance in the outcome that can be accounted for the explanatory variables. In other words, large R^2 values suggested that the greater number of variations in the outcome was explained. Nevertheless, for the ordinal regression model, there are three pseudo R^2 values being computed instead of relying on one R^2. The three Pseudo R^2 values are relatively lower at 6.7%, 8.4% and 4.3% for Model 1. This suggests that the positive attitude, performance and application of English explained a relatively small proportion of the variation between workers and their income. The outcome is expected as there are numerous factors which contribute to the difference in income level. Meanwhile, for Model 2, the three Pseudo R^2 values are higher than both Model 1 and 3. Although the Pseudo R^2 remains low, this does not negate the fact that there is statistically significant contribution of age and education level to income and reflex differences in income level.

Fourth, since the ordered logit model estimates one equation over all levels of the response variable; testing of Parallel Lines is required to compare the ordinal model which has one set of coefficients for all thresholds against the model with a separate set of coefficients for each threshold. The result indicated that the proportional odds assumption appears to have hold because the significance of the Chi-Square statistic is 0.092, 0.307 and 0.153 which is greater than 0.05. Thus, the intercepts in the equations may vary, but the parameters would be identical for each model.

Since the i) dependent variable is ordinal, ii) independent variables are in continuous, ordinal or categorical, iii) there is no multicollinearity detected as VIF < 10, IV) proportional odds assumption is met, the data will be analysed using ordinal regression.

Based on the parameter estimation, only performance is statistically significant affecting monthly income for Model 1.

Table 3
Ordinal regression result

		Model 1	Model 2	Model 3
Model fitting information		0.000*	0.001*	0.314
Goodness of fit				
Pearson		0.478	0.227	0.315
Deviance		1	0.943	0.153
Pseudo R2				
Cox and Snell		0.067	0.267	0.021
Nagelkerke		0.084	0.337	0.026
McFadden		0.043	0.195	0.013
Test of Parallel		0.092	0.307	0.153
Parameter				
Threshold				
	1	2.141 (0.653 to 3.630)	4.965 (2.058 to 7.872)	-1.215 (2.022 to 0.408)
	2	5.920 (4.300 to 7.540)	9.636 (6.583 to 12.689)	1.568 (1.568 to 3.264)
Variables				
Attitude		-0.050 (0.342 to 0.441)		
Performance		0.806*(0.323 to 1.288)		
English		0.160 (-0.120 to 0.440)		
BMI				
	2		0.027 (0.856 to 0.909)	
	3		-0.040 (0.984 to 0.904)	
	4		-0.081 (-1.044 to 0.880)	
Age				
	2		1.476*(0.845 to 2.106)	0.029 (0.820 to 0.920)
	3		2.833*(2.014 to 3.653)	0.763 (0.183 to 1.710)
	4		3.664*(1.965 to 5.363)	0.600 (-0.363 to -1.565)
Male			0.6786 (0.150 to 1.208)	-0.153 (2.100 to 1.794)
Education level				
	2		3.508 (0.772 to 6.244)	
	3		4.927*(2.096 to 7.757)	
	4		5.963*(3.133 to 8.793)	
	5		6.300*(3.481 to 9.120)	
BMI*Gender				
2	2			0.632 (-1.458 to 2.721)
3	2			0.124 (-2.029 to 2.277)
4	2			0.159 (-2.037 to 2.343)

*significant at 0.05 level

One unit increase in performance will lead to 0.805% increases in the log odds 95% (CI 0.323 to 1.288) of higher income level given that all other variables in the model are held constant. A transform of the coefficient value into the odds ratio of being in the high income versus the combined middle and low income are about 2.239 times 95% (CI 1.150 to 2.692). Meanwhile, other variables such as English and Attitude were insignificant. Application of English in the workplace does not improve the workers gaining power which is conversely with the existing literature (Honna, 2015; Nair et al, 2012; Phan, Kho, & Ching, 2013). This might be caused by a large number of Malay respondents (56 %) participating in this study. In Malaysia, majority Malays are enrolled in the public sector (Woo, 2015). Thus, the impact of English application in workplace relative to income level is limited as the public sector is often in favour of enhancing the status of Malay language instead of English. The civil servants' salary scheme is rather sticky due to the influence of seniority and education background compared to the importance of fluency in English (Suruhanjaya Perkidmatan Awam, 2015).

In addition, the positive attitude failed to explain the sources of differences in income. Having positive attitude such as always come to work on time and willing to stay back after office hour to finish incomplete tasks do not ensure better income. This is because, in Malaysia; the standard appraisal is usually done annually and therefore, the workers should consistently remain positive in the workplace with the hope that reward is granted.

On the other hand, with the intention to examine the probability of getting different income level from various BMI categories, the BMI were restricted to four levels following WHO cut-off points. The result seems to contradict with the existing literature (Garcia & Quintana Domeque, 2009; Johansson, Bockermen, Kiiskinen, & Heliovaara, 2009). It shows that the different level of BMI failed to explain the differences in income levels in Malaysia. As mentioned earlier, since the respondents are predominantly Malays, there is high possibility that they are working as government servants and thus resulting in the sticky wages where their appearance does not affect their salary. However, in private sector, people who are physically attractive would earn more and highly likely to be seen as suitable leaders (Averett, 2014). This is because discrimination happened when employers have a negative perception that obese women tend to have a limited self-control than women who have a moderate weight. Employers often associate obesity with laziness, dishonesty and demotivation. Thus, in Malaysia labour market, employers are looking into performance, education level and age in any pay raise decision.

However, from the individual personal perceptive, a few respondents were among those with BMI above 30 answered the

relevant questions in the questionnaires to verify the existence of discrimination. Out of 93 obese participants, around 30% of the participants agreed that body weight limits their ability in all kinds of job. Approximately 50% of the participants claimed their jobs involve sedentary work and low mobility. While, 63% of the participants felt they are treated differently due to their body weight. In addition, 73 of them claimed that their supervisors will take into consideration of their weight in delegating job assignment. Overall, some of the respondents feel that body weight does affect their profession and make them less productive compared to others.

As shown in Table 4, the odds of older age group (Category 4) getting higher income was 3.664* 95% (CI 1.965 to 5.363) times compared to another age

Table 4
Odds ratio

		Model 1	Model 2	Model 3
Parameter				
Threshold				
	1	2.141 (0.653 to 3.630)	4.965 (2.058 to 7.872)	-1.215 (2.022 to 0.408)
	2	5.920 (4.300 to 7.540)	9.636 (6.583 to 12.689)	1.568 (1.568 to 3.264)
Variables				
Attitude		1.051 (0.710 to 1.555)		
Performance		1.381*(1.381 to 3.627)		
English		1.174 (0.887 to 1.553)		
BMI				
	2		1.027 (0.425 to 2.482)	1.029 (0.422 to 2.510)
	3		0.960 (0.373 to 2.469)	2.147 (0.832 to 5.534)
	4		0.921 (0.352 to 2.412)	1.823 (0.695 to 4.781)
Age			1.476*(0.845 to 2.106)	
	2		2.833*(2.014 to 3.653)	
	3		3.664*(1.965 to 5.363)	
	4			
Male			0.6786 (0.150 to 1.208)	0.858 (0.122 to 6.018)
Education level				
	2		3.508 (0.772 to 6.244)	
	3		4.927*(2.096 to 7.757)	
	4		5.963*(3.133 to 8.793)	
	5		6.300*(3.481 to 9.120)	
BMI*Gender				
2	2			1.880 (0.232 to 15.204)
3	2			1.132 (1.852 to 9.749)
4	2			1.165 (1.303 to 10.417)

*significant at 0.05 level

group, a statistically significant effect, Wald $\chi^2(1) = 4.23$, $p = 0.000$. Older workers are expected to be experienced, knowledgeable and skilled compare to their younger counterparts and they are at greater income level. Meanwhile, the contribution of gender to the various income levels is undefined. The result was consistent with the Salaries & Wages Survey Report where the mean difference across gender are only RM91 (Department of Statistics, 2015). Whereas, the odds of degree holder (Category 4) getting higher income was 5.963* 95% (CI 3.133 to 8.793) times compared to those with other education level, a statistically significant effect, Wald $\chi^2(1) = 4.13$, $p = 0.000$. Similarly, the odds of Master and PhD holder (category 5) getting higher income was 6.300* 95% (CI 3.481 to 9.120) times compared to another education level, a statistically significant effect, Wald $\chi^2(1) = 4.13$, $p = 0.000$. Thus, workers with at least tertiary education performed better in the labour market (better rewards in term of salary) compared with workers who have basic education (primary and secondary education) and this finding is supported by Sandy Baum (Baum, 2014).

Comparatively, Model 3 examines the effect of various BMI level across gender to the multiple income levels. It is tested by adding an interaction term to the model in which the two predictor variables, BMI and gender are multiplied. Unlike other researches which have made significant contribution across gender in obesity and overweight worker to wages, Model 3 suggests that there is no evidence to support the fact that BMI has led to discrimination thus resulting in lower wages in Malaysia.

Next, the predicted probability will be computed for each category of the dependent variable for Model 1 and 2. The ordinal logit model estimates a score "P" as a linear function of attitude, performance and English (Model 1) is equal to:

$$P1 = 2.141 - 0.050\ X_1 + 0.805\ X_2 + 0.160X_3$$

$$P2 = 5.920 - 0.050\ X_1 + 0.805\ X_2 + 0.160X_3$$

$$S = -0.050\ X_1 + 0.805\ X_2 + 0.160X_3$$

$$P(\text{ordinal} = \text{"low income"}) = P(S + u \leq \text{cut1}) = P(S + u \leq 2.141)$$

$$P(\text{ordinal} = \text{"middle income"}) = P(\text{cut1} < S + u \leq \text{cut2}) = P(2.141 < S + u \leq 5.920)$$

$$P(\text{ordinal} = \text{"high income"}) = P(\text{cut2} < S + u) = P(5.920 < S + u)$$

Therefore, for all average values, the probability of being in the low income group is 15%, middle income group 73%, and high income group is 12% in Model 1. Likewise, the ordinal logit model estimates a score "P" as a linear function of BMI, Age, Education level and Gender (Model 2) is presented below:

$$P1 = 4.965 + 1.027\ X_1 + 0.960\ X_2 + 0.921X_3 + 1.476\ X_4 + 2.833\ X_5 + 3.664X_6 + 0.679\ X_7 + 3.508X_8 + 4.927\ X_9 + 5.963\ X_{10} + 6.300X_{11}$$

$$P2 = 9.636 + 1.027\ X_1 + 0.960\ X_2 + 0.921X_3 + 1.476\ X_4 + 2.833\ X_5 + 3.664X_6 + 0.679\ X_7 + 3.508X_8 + 4.927\ X_9 + 5.963\ X_{10} + 6.300X_{11}$$

$$S = 1.027\ X_1 + 0.960\ X_2 + 0.921X_3 + 1.476\ X_4 + 2.833\ X_5 + 3.664X_6 + 0.679\ X_7 + 3.508X_8 + 4.927\ X_9 + 5.963\ X_{10} + 6.300X_{11}$$

P (ordinal= "low income") = P ($S + u \leq$ _cut1) = P ($S + u \leq 4.965$)

P (ordinal= "middle income") = P (cut1 < $S + u \leq$ cut2) = P ($4.965 < S + u \leq 9.636$)

P (ordinal= "high income") = P (cut2 < $S + u$) = P ($9.636 < S + u$)

CONCLUSION

As obesity and overweight become a rising concern in Malaysia, the impact on the labour market is largely undefined, despite evidence from the health perspective that indicates obesity and overweight workers tend to be associated with various chronic diseases (MOH, 2011). Thus, this study has figured out the potential impact of different BMI levels particularly on obesity and overweight to the various income levels. Combining the data collection though questionnaires and face to face interviews, the ordinal regression model was applied.

The result from Model 1 suggests that performance leads to higher income level. On the other hand, based on the findings in Model 2, it has revealed that BMI and gender are unable to explain differences in income levels in Malaysia. This indicates that, employers do not consider workers' appearance and gender when they recruit workers, since they are more concern about education background and age when recruiting their ideal staff member. Age is a crucial factor in recruitment because matured workers are expected to be experienced, knowledgeable and skilled compared to their younger counterparts. Thus, workers who possess basic education (primary and secondary education) are getting lesser reward compared to workers who finished at least tertiary education.

Although BMI failed to explain differences in various income levels, obese workers participating in this study agreed that stigma does exist in Malaysia labour market. More than half of the obese respondents claimed that they were being offered inferior jobs. The respondents felt that they were treated differently due to their body weight and some asserted that their supervisors would take into consideration of their weight in delegating job assignment. Even though this study fails to prove the presence of discrimination which leads to lower wages in Malaysia labour market, to some extent, this study has shown that obese workers do receive unfavorable treatment. If the future research in this area can distinguish between private and public employees, then this will help to eliminate the sticky effect to their salary. For instance, a data set with more detail information on workers workplace environment might help to further explain the occurance of discrimination.

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