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Logistic Regression Model on the Inclusion of Foreign Workers in Malaysia Based on Selected Demographic Factors

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ABSTRACT

This study aims to determine the relationship between the status of labor force participation among foreigners with demographic factors including gender, stratum, marital status, educational attainment, and age. Using the Labor Force Survey (LFS) Report obtained from the Universiti Kebangsaan Malaysia Data Bank, which spans the period from 2003 until 2015, foreign national participation in the labor force in Malaysia between the ages of 15 and 64 is considered in this study. The labor force participation among foreigners was analyzed using logistic regression to determine the impact of demographic factors on the participation of foreign workers for selected years. The result of the logistic regression analysis revealed that certain demographic factors influenced labor force participation among foreigners in Malaysia where educational attainment influenced the inclusion of labor among foreigners in Malaysia in 2003, stratum and educational attainment in 2006, stratum and age in 2009, stratum and educational attainment in 2012, and stratum, educational attainment and age in 2015. Stratum factors are seen to affect the participation of the labor force in certain years, especially for foreigners living in urban areas compared to the rural areas. Foreigners with formal education are more likely to enter the labor market compared to those who do not have formal education. In terms of age categories, middle-aged foreigners influence the rate of labor force participation as compared to young foreigners. However, the labor force participation among foreigners is not influenced by gender in the Malaysian labor market.

1 INTRODUCTION

According to Kamus Dewan (2002), the word labor means people who work to get wages. Thus, foreign labor or worker refers to an employee who comes from a foreign country and has been working for a particular period of time. Malaysia has also experienced the influx of a large number of foreign citizens, particularly as low-skilled workers (Hamzah & Daud,

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2016). Reports from the Ministry of Home Affairs have also recorded the number of registered foreign labor in Malaysia at 2.1 million people and have estimated unregistered foreign workers at more than 3 million people with the number of male foreign labor being higher than female foreign labor. These reports show that the involvement of foreign workers in Malaysia is to ease the shortage of labor in various economic sectors (Hassan, 2009).

Various studies have been conducted to determine the factors that may influence labor force participation. These studies have found gender to be one of the important factors. Although men and women in the labor force are equally educated, women's labor participation rate is still lower than the men's (Ismail & Jajri, 2012; Wye & Ismail, 2012; Garcia et al., 2015). This is also supported by Ismail and Noor (2005) who conducted a study on the differences in wage payment according to gender in the manufacturing industry in Malaysia, where employers prefer to employ male workers compared to women as women are seen as less productive and skillful.

There are also several studies that use stratum, for example rural and urban areas, as another factor that may affect the inclusion of labor. There are also results indicating that men and women (Contreras et al., 2011) who live in urban areas have a greater chance of entering the labor market than men and women living in rural areas.

In addition, labor participation is also influenced by marital status. Liu (2012) in his study showed that married men and women tend to be in the labor market. In terms of the involvement of male workers, Faridi et al. (2009b) argued that married male workers should take part in economic activities to meet their household needs. A married man is said to have a higher chance of being a laborer than a single man (Liu, 2012). Married men's tendency to participate in the labor market also increases especially when they have children (Maurer-Fazio et al., 2005).

Education also plays an important role as the main contributor of employment (Faridi et al., 2009a; Faridi et al., 2009b). Individuals who are highly educated and have experience, skills, knowledge, capacity, and efficiency will have higher chances to be chosen by employers. In a study conducted by Contreras et al. (2011), it was demonstrated that educational achievement is a key factor in determining the involvement in labor for men and women. This was also supported by Liu (2012) where educational achievements increase the tendency of males and females to join the labor force especially in urban areas.

In addition, an individual's age also affects their involvement in the labor force. Labor inclusion is low in young workers, increasing with age up to 50 years old and staying stable or decreasing slightly after the age of 50 years (Borjas & Van Ours, 2010). This is also consistent with the study by Fullerton Jr (1999) in the United States, where men and women have a higher participation in the workforce for those aged from 25 to 44 years, lower participation for groups of ages 16 to 24 years and 55 to 64 years, and very low for those aged 65 years and over.

Labor participation is lower for young people (age 15–24 years) as most of them are still schooling (Toossi, 2011; Kim, 2012). Therefore, labor force participation rapidly increases when the teenagers have left school (Fallick & Pingle, 2007). However, labor force participation shows a negative relationship with old age (Purcell & Whitman, 2006). This reduction is related to retirement factors as well as social security for retirees (Kim, 2012). In theory, labor participation is lower in the older generation. This is due to the increase in salaries and income, social security, and private pension funds availability as well as disability benefits offered by the social security program (McConnell et al., 2010).

In addition, Hussain et al. (2016) conducted studies related to socioeconomic and demographic factors that affect labor force participation in Pakistan. They used logistics models to analyze demographic factors that affect labor force participation. The findings showed that the level of education, age, gender, and location affect the participation of labor. The results are also supported by Faridi et al. (2009b) and Ain Nadia (2017) where demographic factors such as stratum, gender, marital status, educational achievement, and age have also contributed to the participation of labor in Malaysia.

A previous study has been done on the same cases, but limited to analyzing the relationship between labor participation and demographic variables using the chi-square independence test separately (Rahim et al., 2018). The application of the logistic regression model is better if more than two categorical independent variables are handled simultaneously (Sperandei, 2013). In other studies, the logistic regression models are estimated to explore the association between women's job status (Meozzi, 2014) and labor force participation (Mohamed, 2015) with selected demographic variables. Since demographic factors are seen to affect labor force participation, our previous study is extended to observe the influence of demographic factors on the participation of labor among foreigners in Malaysia simultaneously using logistic regression models.

2 LITERATURE REVIEW

Demographic Factors Influencing the Inclusion of Foreign Workers

Demographic factors such as age, gender, education, race, size, and household composition are among the causes of people's migrations to other countries for the purpose of obtaining employment. Gender factors and marital status are very closely related and are important demographic factors that affect individual involvement in the labor force. In terms of women's participation for instance, Nam (1991) showed that unmarried women actively join the labor market from the ages of 15 to 24 years while married women are in a better workforce position than unmarried women. However, Ntuli (2007) found that marriage has a negative impact on the participation of women in the labor force. Through the same study, the factor of marriage instability was also found to lead to many women entering the labor market.

Nevertheless, women's labor participation rate is still lower than men (Ismail & Jajri, 2012; Wye & Ismail 2012; Garcia et al., 2015). Based on a review by Ismail and Noor (2005), employers in the manufacturing industry prefer to employ male workers compared to women as to them, women are less productive and skillful. Liu (2012) in his study showed that married men and women tend to be in the labor market. In terms of the involvement of male workers, Faridi et al. (2009b) argued that married male workers should take part in economic

activities to meet their household needs. A married man is said to have a higher chance of being a laborer than a single man (Liu, 2012). Married men's tendency to participate in the labor market also rises especially when they have children (Maurer-Fazio et al., 2005).

In addition to gender and marital status, the stratum factor also influences people to enter the job market. For example, the research of Uraz et al. (2010) showed that the tendency of women in urban areas to enter the labor market is lower by 31 per cent compared to rural areas. The discovery is supported by Abdullah et al. (2012) who found that women living in rural areas or less developed areas in Malaysia are more likely to enter the labor market compared to women who are married in urban areas.

In contrast, Kim (2012) showed that educational achievements have positive relationships with the participation of male and female labor. This means that the higher the education achievement the higher the wage received, and this situation will encourage labor force participation. In a study to determine the participation of the male labor force, Faridi et al. (2009b) found that higher education and professional qualifications, have a positive relationship with labor force participation than those with basic education, i.e. primary and secondary education. This is particularly true for higher education.

There are also several studies that relate to the participation of women's labor force. For instance, as mentioned in Acid et al. (2001), Guven-Lisaniler and Bhatti (2005), Ntuli (2007), Evans and Kelley (2008), Faridi et al. (2009a) Chaudhry and Rehman (2009), Kim (2012) and Liu (2012), a woman's probability to be a worker would increase as her education level rises. As mentioned in Guven-Lisaniler and Bhatti (2005), the tendency for labor participation is higher among women as their education level increases. The education factor was found to clearly contribute to the employment of foreign workers in another study by Achim and Rusdi (2017). Contrastingly, due to the low level of education among most of the foreign workers, they are massively employed in the manufacturing sector which has high demand for a less skilled workforce. In the same notion, Suresh and Lai (2014) highlighted that rapid growth in the manufacturing and construction industries in developing countries has created job opportunities that require a workforce with a lower education level. In this study, most respondents agreed that foreign workers are not so particular in choosing jobs due to their low education level.

The employment of foreign workers is also influenced by their age. Based on the study by Borjas and Van Ours (2010), labor inclusion is small in young workers, grows along with an increase in age up to 50 years old, and remains stable or slightly decreases after 50 years of age. This is also consistent with the United States-based research by Fullerton Jr (1999), where men and women have higher participation in the workforce for those aged 25 to 44 years, lower participation for groups aged 16 to 24 years and 55 to 64 years, and very low participation in those aged 65 years and over. Youth participation in labor (age 15–24) is smaller as most of them are still in school (Toossi, 2011; Kim, 2012). Participation in the labor force increases rapidly as adolescents leave school (Fallick & Pingle, 2007). Participation in the labor force, however, indicates adverse relationships with the elderly (Purcell & Whitman, 2006). As stated in Kim (2012), the decline is attributed to the retirement factor as well as retirement social security. In principle, the older generation has lower labor participation. This is due to the increase in wages and income, the availability of social security and private pension funds, as well as disability benefit plans (McConnell et al., 2010).

Logistic Regression Analysis of Foreign Workers

Because participation in the labor force is a binary type of data, i.e. whether the person joins the labor force or doesn't join the labor force, suitable statistical techniques are required to evaluate this data. As suggested earlier by Gunderson (1977), an appropriate statistical technique for determining factors influencing labor engagement is logistic regression analysis. This method is increasingly important and has been widely used by researchers to determine factors that influence labor participation.

For example, logistic regression analysis was used to determine the relationship between demographic factors and social capital with migrant workers' participation in local community activities (Palmer et al., 2011). In the study, education level and age were among the important factors influencing the involvement of migrant workers in community activities in China. Logistic regression analysis was also used to determine factors influencing the immigrant's probability of being employed (Mancinelli et al., 2009). The results of the analysis showed that education, reputation, and network contribute to increasing the probability of foreigners working in Italy.

Moreover, logistic regression analysis was also used to determine the predictive value of intention to leave which is whether or not to remain working with a number of demographic factors such as age, gender, religion, marital status, education, and origin (Kirschenbaum & Weisberg, 1990). In another study by Khongthanachayopit and Laohasiriwong (2017), logistic regression analysis was used to look at demographic factors that influence foreigners' tendency to seek health services in the country where they work. In addition, Hussain et al. (2016) used logistic regression to analyze demographic factors that influence labor participation.

The results showed that education level, training, age, location of residence, and duration of employment influence labor participation. Gender is also an important factor in influencing labor force participation, especially in developing countries such as Pakistan, where there is more involvement among men and women are comparably less active in the labor market. The findings also showed that education and training are the major sources of human capital formation which in turn have an impact on income and labor participation. Faridi et al. (2009b) and Ain Nadia (2017) also endorsed the findings, where demographic factors such as stratum, class, marital status, educational achievement, and age also contribute to labor participation in Malaysia.

The implementation of the logistic regression model, as explained by Sperandei (2013), is best if more than two categorical independent variables are treated simultaneously. In other research, the logistic regression models were calculated to investigate the correlation with selected demographic variables for women's employment status (Meozzi, 2014) and labor force participation (Mohamed, 2015). Logistic regression models have also been used to show how demographic and

socioeconomic factors can affect the temporary movement of labor (Dodd et al., 2016).

The importance of using logistic regression analysis was also emphasized by Giancola and Salmieri (2018) who utilized it to determine the relationship between educational status and inclusion of immigrants based on selected demographic factors. Their statistics also show that people of foreign backgrounds are disadvantaged in schooling, labor market participation, and occupational accomplishments.

3 METHODOLOGY.

The analysis was conducted using data collection techniques by taking secondary data from the Department of Statistics Malaysia (DOSM). The relevant data was retrieved from the Labor Force Investigation Report (LFI) data for the years 2003, 2006, 2009, 2012, and 2015. The LFI report defines the age of the worker and refers to those aged 15 to 64 years old (on the previous year's birthday) during the reference week, whether in labor or outside labor. The LFI uses the actual status approach where a person is classified based on their activities in the labor force during the reference week.

The status of this activity is divided into the labor force category which refers to the ages of 15 to 64 years old (on the previous year's birthday) during the reference week, whether working or not working. The author used data related to foreigners aged 15 to 64 who are participating in the labor force in Malaysia. The LFI data has 15 variables such as state, stratum, gender, age, nationality, ethnic group, marital status, educational achievement, highest certificate obtained, summary of the labor force, employment status, field of study, job classifications, industry classifications and weights. However, only certain demographic variables were considered in this study, i.e. labor force participation, gender, stratum, marital status, level of education, and age.

Logistic Regression Model

The binary logistic regression model was used to build a model based on selected demographic factors for predicting whether foreign workers are currently employed in the Malaysian labor force. The dependent variable ' 1 ' represented employed foreigners and ' 0 ' represented unemployed foreigners. In this study, the independent variables are selected demographic factors such as gender, stratum, marital status, educational achievement, and age. The logistic regression model for selected years will be examined to investigate the demographic factors that may affect the participation rate of labor among foreigners.

Thus, to determine the influence of demographic factors on the inclusion of foreign workers, the logistic regression model can be written as shown in Equation 1.

$$logit\,[p] = ln(odds) = ln\left[\frac{p}{1-p}\right] = \beta_0 + \beta_1 X_1 + \beta_1 X_2 \ldots + \beta_k X_k \quad (1)$$

Where p is the probability that $Y = 1$ and $X_1, X_2 \ldots X_k$ are the independent variables with respective regression coefficient β.

In Equation (1), the logistic regression models of foreign labor participation for the years 2003, 2006, 2009, 2012, and 2015 are estimated. These models combine independent variables consisting of demographic factors such as gender variables, stratum, marital status, educational achievement, and age. Marriage status is also considered for individuals who join the labor force as stated in the previous studies by Ntuli (2007), Faridi et al. (2009a) and Contreras et al. (2011).

The marital status is divided into two categories as follows: never been married and experienced marriage before. In this case, widow/widower and divorced are categorized in the have experienced marriage category. Educational achievement is categorized into no formal education and formal education where primary education, secondary education, and higher education are in the category of formal education. Due to the sensitivity of optimizing the final results in using the logistic regression, continuous age is not considered in this study and age is categorized as young and middle age where the young category ranges from 15 to 29 years old and middle age category in the age group of 30 to 64 years old. The variables and their respective categories in the logistic regression models are summarized in Table 1.

Table 1
The variables used and their respective categories

Variables	Definition	Categories	Reference Category
Y	Labor Force Participation	Non-Employment, Employment	Employment
X_1	Gender	Female, Male	Male
X_2	Stratum	Rural, Urban	Urban
X_3	Marital Status	Never Been Married, Experienced Marriage Before	Experienced Marriage Before
X_4	Level of Education	No Formal Education, Formal Education	Formal Education
X_5	Age	Young (15-29 years), Middle and Old Age (30-64 years)	Middle and Old Age (30-64 years)

4 FINDINGS

Tables 2 and 3 show the non-employment and employment rates among foreign citizens from 2003 to 2015 based on demographic factors according to the categories defined in the previous section. In general, there are more male than female foreigners in both categories during the time period. Moreover, there are more foreign worker involvement in both categories in urban areas compared to rural areas. Apart from that, foreign labor participation rates in urban areas are not so noticeable for 2003, 2006 and 2009 as compared to 2012 and 2015. Unemployed workers who are not married are also greater in number than employed workers. In addition, foreigners with formal education are greater in number than those who have no formal education for both categories. Also, most of the employed workers are among the middle and old aged. However, the number of unemployment shows a significant increase among young people when most of them are involved as recorded starting from the year 2006.

Table 2
Rate of non-employed foreigners (in %) based on demographic factors

Variables	Categories	Year				
		2003	2006	2009	2012	2015
Gender	Male	75	66	67	79	81
	Female	25	34	33	21	19
Stratum	Urban	60	78	72	79	86
	Rural	40	22	28	21	14
Marital Status	Not married	70	66	65	66	67
	Experienced Marriage Before	30	34	35	34	33
Educational Attainment	No Formal Education	25	20	12	29	22
	With Formal Education	75	80	88	71	78
Age	Young	20	61	72	66	74
	Middle and old age	80	39	28	34	26

Table 3
Rate of employed foreigners (in %) based on demographic factors

Variables	Categories	Year				
		2003	2006	2009	2012	2015
Gender	Male	66	65	68	69	69
	Female	34	35	32	31	31
Stratum	Urban	59	58	55	63	64
	Rural	41	42	45	37	36
Marital Status	Not married	48	48	43	40	36
	Experienced Marriage Before	52	52	57	60	64
Educational Attainment	No Formal Education	9	7	12	9	10
	With Formal Education	91	93	88	91	90
Age	Young	47	52	46	40	39
	Middle and old age	53	48	54	60	61

Logistic Regression Analysis

The results of the logistic regression models are summarized in Table 4. From this table, Hosmer-Lemeshow tests of the goodness of fit are determined to test the adequacy of the models in describing the data. The results of the significance values or the p-values for these statistics are 0.785 for 2003, 0.273 for 2006, 0.890 for 2009, 0.252 for 2012, and 0.630 for 2015. Since the significance values are greater than 0.05 for all the selected years, the models adequately fit the data. Apart from that, the variation in the dependent variable can be explained further by the model based on the Cox and Snell R^2 and Nagelkerke R^2 values. These values, as well as the 2 Log-likelihood values are very informative for model comparison.

Based on Table 4, for gender variables in 2006, male foreigners who joined the Malaysian labor market are 0.757 times higher than the female foreigners. In 2009, foreign men who joined the Malaysian labor market are 0.915 times higher than women manpower. In the year 2003, foreigners in the urban area are 0.784 times higher than foreigners in the rural area. In year 2009, foreigners in the urban area are 0.478 times higher than foreigners in the rural area. In 2012, the stratum factor is seen to give a meaningful impression on the inclusion of foreigners in Malaysia where the value of the odds ratio is greater than 1.

For marital status, in 2006, the experienced marriage before foreigners are 2.132 times higher in the Malaysian labor market as opposed to foreigners who have never married. In 2012, the experienced marriage before foreigners who joined the Malaysian labor market are 1.897 times higher than foreigners who have never married. In contrast, foreigners who have formal education are seen to have a higher odds ratio in the selected years compared to foreigners who have no formal education. In the year 2003, foreigners who have a formal education are 4.858 times higher than foreigners who have no formal education. Also, in 2012, foreigners who have formal education are 4.751 times higher than foreigners who have no formal education accompanying the Malaysian labor market. This indicates that the Malaysian labor market has more inclusion of foreign workers who have a formal education.

Based on this study, middle and old aged foreigners who are between the ages of 30 to 64 provide a higher odds ratio compared to younger foreigners who are between 25 29 years old starting from 2006. In 2015, middle and old aged foreigners who participated in the Malaysian labor market is 3.089 times higher compared to young foreign nationals. Also, in the year 2009, middle-aged foreigners are 2.428 times higher than young people who joined the Malaysian labor market.

Table 4
Binary Logistic Regression Analysis of Demographic Factor Effects to Labor Force Participation Among Foreigners in Malaysia

	2003	2006	2009	2012	2015
Constant	4.873** (130.775)	3.780** (43.832)	4.406** (81.922)	3.580** (35.871)	5.137** (72.265)
Gender					
Male	-0.704 (0.495)	-0.279 (0.757)	-0.089 (0.915)	-0.604 (0.547)	-0.584 (0.558)
Stratum					
Urban	-0.244 (0.784)	-1.009** (0.364)	-0.739* (0.478)	-0.866* (0.421)	-1.307** (0.271)
Marital Status Experienced Marriage Before	0.342 (1.408)	0.757 (2.132)	0.390 (1.477)	0.640 (1.897)	0.622 (1.863)
Educational Attainment					
With Formal Education	1.581** (4.858)	1.230** (3.422)	0.080 (1.083)	1.558** (4.751)	0.857* (2.355)
Age					
Middle and old age	-1.289 (0.276)	0.028 (1.028)	0.887* (2.428)	0.653 (1.922)	1.128** (3.089)
2 Log Likelihood	218.598	416.520	453.668	378.821	409.807
Pseudo R^2					
Cox & Snell	0.006	0.006	0.005	0.010	0.012
Negalkerke	0.066	0.049	0.041	0.084	0.098
Hosmer and Lemeshow Test	3.952	8.731	3.615	10.184	5.247

The full models for the selected years can be written as shown in Equations 2 – 6 respectively.

$$\ln\left(\frac{p}{1-p}\right) = 4.873 - 0.704X_1 - 0.244X_2 + 0.342X_3 + 1.581X_4 - 1.289X_5 \quad (2)$$

$$\ln\left(\frac{p}{1-p}\right) = 3.780 - 0.279X_1 - 1.009X_2 + 0.757X_3 + 1.230X_4 + 0.028X_5 \quad (3)$$

$$\ln\left(\frac{p}{1-p}\right) = 4.406 - 0.089X_1 - 0.739X_2 + 0.390X_3 + 0.080X_4 + 0.887X_5 \quad (4)$$

$$\ln\left(\frac{p}{1-p}\right) = 3.580 - 0.604X_1 - 0.866X_2 + 0.640X_3 + 1.558X_4 + 0.653X_5 \quad (5)$$

$$\ln\left(\frac{p}{1-p}\right) = 5.137 - 0.584X_1 - 1.307X_2 + 0.622X_3 + 0.857X_4 + 1.128X_5 \quad (6)$$

Where x_1 = 1 for male, x_2 = 1 for urban, x_3 = 1 for experienced marriage before, x_4 = 1 for formal education and x_5 = 1 for middle and old age.

5 DISCUSSION

The political stability and economic growth of a country are among of the reasons for the inclusion of foreign labor in the country. In tandem with the development of technology, legal foreign labor admission to another country is becoming easier and faster. Their migration to work in other countries is also influenced by demographic factors such as age, gender, education level, workplace location, and marital status. Due to the inherent influence of demographics in the involvement of foreigners in the employment sector, various research and analysis have been carried out to determine the relationship between demographic factors and the participation of foreign labor force. However, most of the studies especially in Malaysia are limited to the analysis of trends and descriptive presentations of the labor force in general.

Hence, further analysis is required to determine the relationship between demographic factors and foreign labor force participation in the Malaysian context. Since the demographic factors are independent variables which consist of at least two categories, logistic regression analysis is suitable to determine simultaneously the implications of all these factors with the inclusion of foreign labor that consists of binary data. The analysis of the relationship and determination of demographic factors with various aspects involving either national workers or foreign workers using logistic regression analysis has been carried out in many other countries such as China (Palmer et al., 2011), Italy (Mancinelli et al., 2009) and Pakistan (Hussain et al., 2016). As supported by Sperandei (2013), the implementation of the logistic regression model is best if more than two categorical independent variables are treated simultaneously.

The determination of demographic factors that influence the involvement of foreigners in labor force participation is important to help the Government to identify the trends and changes in the composition of foreign labor, especially in Malaysia. The trends and patterns of this change can be seen for a particular period or by the year of foreign admission as stated in the Malaysian Labor Force Investigation Report (LFI). As the focus of the study was to determine the trend of the inclusion of foreign labor in certain years, the results showed that there was a change in the demographic pattern of foreigners' labor force for that particular year. Consistent results were also recorded for the participation of foreign male labor force which was constantly greater than the female. Foreign labor force began to show dominance in urban areas starting in 2012. As expected, unmarried foreign labor is exceeded by those who are married. The analysis also shows that most of the foreign labor have formal education. The involvement of foreigners who are middle-aged were also recorded with the lower number of young foreigners who joined the Malaysian labor market.

Logistic regression models are also used to show how demographic and socioeconomic factors can affect temporary labor movement (Dodd et al., 2016). However, the interpretation of the logistic regression coefficient is not as straightforward as compared to the interpretation of a linear coefficient. The regression coefficient is convenient for testing the impact of independent variables, but the odds ratio is easier to interpret. The -values below 0.05 or 0.01 of the independent variables indicate the significant effect of the independent variables to the dependent variable. To better understand and for easier interpretation of this result, the value of the odds ratio for each variable used in this study needs to be studied.

The odds ratio larger than 1 reflects a positive relationship. A positive relationship means that when the independent variable "increases", the odds for the dependent variable will also be increased. However, if the odds ratio of the independent variable is less than 1, it indicates a negative relationship between the independent variable and dependent variable. Although the results of odds ratio showed an increase in the foreign male labor force in the years 2013 to 2009 and a decrease in 2012 and 2015, the -value of gender is greater than 0.05 which means gender does not affect participation in the labor force among foreigners in Malaysia in all the years. In addition, the stratum factor is seen to influence the inclusion of labor among foreigners in Malaysia. Moreover, the p-values for the stratum in the years 2006 to 2015 are less than 0.05 which indicate that the stratum has a significant impact on the inclusion of labor among foreigners in Malaysia for the selected year.

Foreigners who have experienced marriage before gives a higher value of odds ratio than foreigners who have never been married. However, the p-values of the marital status are greater than 0.05 indicating that the status of marriage does not significantly affect the participation in the labor force

among foreigners in Malaysia in the selected years. Educational achievement is among the important factors in the inclusion of labor among foreigners in Malaysia. The p -values of the achievement of education in the selected years, except in 2009, are less than 0.05 which means educational achievement has a meaningful impact on the inclusion of labor among foreigners in Malaysia. Moreover, in the years 2006, 2012, and 2015, the educational achievement factor is seen to give a positive impact on the inclusion of labor among foreigners in Malaysia. The age of labor among foreigners is also seen to give an impact in the inclusion of labor among foreigners in Malaysia.

As the gender factor is seen not to influence the labor participation of foreigners for each selected year, further analysis can then be done among men and women foreigners separately to see the influence of other demographic factors that affect their participation in the labor force. In addition, considerations of factors in addition to the demographic factors in the determination of labor participation among foreigners are also desirable to be carried out in further studies.

CONCLUSIONS

Based on the results of logistic regression analysis, educational attainment was the only factor that had an impact on labor inclusion among foreigners in Malaysia in 2003. Meanwhile, in 2006, the stratum factor and educational achievement influenced labor inclusion among foreigners in Malaysia. Moreover, the stratum and age factors had a meaningful impact on labor inclusion among foreigners in Malaysia in 2009. The stratum factor and educational achievement influenced labor inclusion among foreigners in Malaysia in 2012. However, in 2015, the stratum factor, educational achievement, and age affected labor inclusion among foreigners in 2015. The results indicate that certain demographic factors influence the inclusion of foreign workers in Malaysia for the selected year.

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