


Exploring the impact of massification of higher education on the labour force participation and empowerment of Malaysian women



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ABSTRACT

Article History

Received: 31 January 2024

Revised: 10 April 2024

Accepted: 29 April 2024

Published: 31 July 2024

Keywords

Gender disparity

Higher education

Labour force

Malaysia and sustainable

development goals SDGs

Massification.

This paper aims to investigate the mismatch between the massification of higher education and the participation of women in the labour force in Malaysia. The objective is to statistically uncover the effect of educational attainment on the female labour force participation rate. The paper analyzed the data collected from various sources, like the World Bank, the World Economic Forum, and the Department of Statistics Malaysia. The paper employed various hypotheses tests, including the independent samples T-test, Mann-Whitney test, and Kruskal-Wallis test, to assess the relationship and determine whether to accept or reject the study hypotheses. The finding showed that females substantially outnumbered males among higher education's graduates. Despite this improvement, women remain underrepresented in the labour force compared to the rate of their education attainment as well as that of men. The paper statistically rejects the notion that there is a positive linear connection between educating women and labour force participation. It is not all about educating women; decision-makers have to search for other factors that hinder women from fully participating in the labour force, particularly in the world of Muslim nations. The paper enriches the literature on gender parity and contributes to the ongoing debate about the effect of education on female labour force participation.

Contribution/ Originality: The paper contributes to the heated debate about the effect of education on female labour force participation. It employed three statistical techniques to test this relationship. The paper's conclusion has been revised to reflect that education is not the sole factor contributing to Muslim women's increased engagement in labour force.

1. INTRODUCTION

Global planners and policymakers are becoming increasingly concerned about women's labour force participation. Considering that women represent more than half of the world's population, their contribution to labour force participation does not reflect this number (Thaddeus et al., 2022). To address this, several laws and policies have been passed, mostly focusing on education, to empower women and lessen gender inequality. People often assume that educating women will increase their employment rate, thereby accelerating economic growth. When women have the capacity for economic independence, they generally make more decisions within the household and control more resources (Goldin, 1994). As indicated by Bills (2018) education is an instrument for women's equality and development as measured by a country's female labor force participation rate. According to Verick (2018) as women

earn money, the household's income increases, thereby leading to more consumption of goods and services, which increases GDP. Despite this, compared to men, not all working age women are in the labour force. Globally, almost 80% of men aged 15–64 are in the labour market, versus only 52.6% of women within the same age group (World Bank, 2023).

Numerous programs aimed at empowering women and eliminating gender inequality have been undertaken on a national, regional, and international scale. As of 2015, it has emerged as one of the main aims of the (17th) sustainable development goals SDGs to be accomplished by 2030 (United Nations, 2022). As an instance, goal 4th addresses quality education by “ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all.” Target 3th of the fourth goal (4.3) specifically guarantees equal access to affordable and quality technical, vocational, and tertiary education, including enrolment in universities. Furthermore, the 5th goal pertains to gender equality and the empowerment of all women and girls. This is explicitly mentioned in the first target (5.1), which states that ending all forms of discrimination against all women and girls everywhere. Also Goal 8th aims to promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. Goal 10th concerns the reduction of inequality within and between nations. Explicitly, the second target (10.2) states that by 2030, all people, regardless of age, gender, disability, race, ethnicity, origin, religion, economics, or other factors, will be empowered and promoted for social, economic, and political inclusion. A lot of work has been done by the assigned countries, including Malaysia, to meet the SDGs commitment and address gender inequality.

Like other countries, Malaysia has committed to the SDGs and implemented internal policies aiming to close the gender gap in all aspects of life, including education and the workforce. Accordingly, the female gross enrolment ratio in tertiary education has jumped from only 10.7% in the 1950s to around 48% today. In 2023, Malaysia achieved gender parity in education, as it scored one and ranked number one (World Economic Forum, 2023). This is also supported by Elhadary and Samat (2023) who stated that the gender gap in education has almost closed and even reversed. Regarding labour force participation, several policies have been adopted to ensure that female have an equal share in labour market. These policies include childcare services, paid maternity leave (90 days), and flexible working hours. Moreover, in 2004, the Malaysian government introduced a 30 % quota policy for women in decision-making in the public sector. Consequently, the overall number of workers in Malaysia has increased very rapidly. According to Department of Statistics Malaysia (DOSM) (2023) the total number of workers in August was 16.13 million; 9.91 million were male, and the rest, 6.22 million, were female. The labour force participation rate is in progress, as it was 85.3% of males and 44.5% of females in the 1980s, then enlarged in 1995 to 86% of males and 46.5% of females. In 2022, the labour force participation rate will be 68.6%, with a high rate of 0.9% males and only 55.5% females (Department of Statistics Malaysia (DOSM), 2023). These figures are in line with the World Bank (2024) as stated that the labour force participation rate reached 69.4%, with a high rate of 82% male and only 56% female. It is important to note that the number of women holding decision-making positions has increased, as it stood at 36.1% in 2018 and jumped to 38.2% in 2021, even beyond the quota target (Department of Statistics Malaysia (DOSM), 2023). This implies that Malaysia has shown clear progress regarding female labor force participation rate. According to 2018 data, there were more women than men employed in traditionally "female" sectors such as education (65.4%), health and social work (68.7%), and household work (92%) (World Bank, 2019).

The above-mentioned figures indicate that Malaysia has made positive progress in addressing gender disparity. It has become one of the top 26 countries in the world that have achieved full parity in education and shares this position with only New Zealand in the region of East Asia and the Pacific (World Economic Forum, 2023). This success in education has impacted positively on labour force participation. No one denies that Malaysia has made some progress regarding the participation of female in the labour force, but not as well as in education. Malaysia is better than India (24%), Nepal (29%), the Philippines (46%), and Indonesia (53%). However, it scored less than Korea's 70%, Vietnam's 69%, Singapore's 63%, China's 61%, and Thailand's 59% (World Bank, 2023).

This implies that at least 46% of women of working age are facing difficulties in accessing jobs. This led the World Economic Forum survey (WEFs) to classify Malaysia among the low-performing countries in terms of gender gap, as it scored 68.2%, placing it at number 102 above only 46 countries (World Economic Forum, 2023). Moreover, within the nineteenth countries of the East Asia and Pacific region, Malaysia ranked number thirteen, with only five countries left behind (Salleh & Mansor, 2022). In this light, even though women's educational attainment has significantly improved, their participation in the labour force remains low, particularly when compared to male. There is an inverse relationship between how people get educated and their participation in the labour force. According to Elhadary and Samat (2023) the percentage of male students enrolled in higher education is 38.94%, compared to 61.06% of female students. In contrast, 61.1% of males participated in the labour force compared to (38.9%) of females. Not only that, females represent the majority of those outside of the labour force, but within the 7.2 million populations outside the labour force, 68.6 percent were women (Department of Statistics Malaysia (DOSM), 2023).

It is unfortunate to know that 40% of the outsiders gained secondary education, while approximately 20% obtained higher education certificates. Thus, the aim of this paper is to trace the progress made by Malaysian successive governments to increase the rate of female labour force participation and to uncover statistically the mismatch between higher education attainment and Female Labour Force Participation FLFP. The paper assumes that the ability of employers to assess the productivity of female workers improves with the level of education. Therefore, the paper employed two independent samples, the T-test and the Mann-Whitney test, to measure the differences between males and females in labour, along with the Kruskal-Wallis test to uncover if there were any differences between GDP and the massive enrolment of females in higher education. The paper is divided into five distinct sections. Section one is an interdictory, highlighting the problems and the objective of the paper. Section two focuses on the literature review, discussing some concepts related to the paper, like "massification." Section three is about the methodology and materials used in this paper. The result and analysis are discussed in Section 4, while Section 5 offers concluding remarks and recommendations for further studies.

2. LITERATURE REVIEW

The term massification mentioned in the title of this paper has entered the arena of higher education since the late 1960s. It explains the rapid enrolment of students in higher education and the increase in the regional distribution of national universities. According to Trow (1973) there are three stages regarding student's enrolment in higher education: elite, mass, and universal. Within these stages, the transition depends on the percentage of the gross enrolment ratio (GER) measure. This measure is calculated by dividing the number of students enrolled in tertiary education regardless of age by the population of the age group (17-23 year), which officially corresponds to tertiary education, and multiplying by 100 (World Bank, 2023). Based on the results, the "elite" enrolling less than 15% of students within the age cohort; a "mass" ranged between 15 and less than 50%; and a "universal" when the enrolment exceeded 50% (Elhadary & Samat, 2023; Marginson, 2016; Mve, 2021; Scott, 2019). The elite systems are viewed as systems merely opened to privileged and talented groups, while mass systems are opened to those having the right and qualifications to enroll in higher education, and universal systems to all categories (Mve, 2021). In some countries, like Sudan, the term "revolution" in higher education is used as a synonym for "massification" (Elhadary, 2010). Moreover, Scott (2019) assigned massification both a precise and a loose definition. The term precise refers to the middle stage of Trow's three-level typology of higher education systems. The loose sense, in turn, refers to the global phenomenon of highly expanding student numbers within universities and colleges. It is important to highlight that massification of higher education has addressed equity and brought significant opportunities to the female and disadvantaged groups (Bills, 2018; Mve, 2021).

As argued by Mve (2021) massification is addressing equity related issues through the democratization of higher education access. This led Muftahu, Anmmali, and Xiaoling (2023) to declare that the massification has implications for students' equity and diversity. This linking is debatable owing to the fact that not all students of the same age

have equal access to higher education due to the uneven distribution of resources within a region (urban and rural) in the country.

As highlighted in the above section, massification itself cannot guarantee equity among the entire population of the country. To ensure equity in the stage of massification, the governments have to adopt flexible policies for facilitating those with socioeconomic barriers (disadvantage groups) and those living in remote areas (rural areas) to access higher education. Thus, the shift from elite to mass should not be taken for granted; some socioeconomic improvement and political will are needed. As highlighted in the introduction section, Malaysia has adopted several policies to ensure that no one is left behind due to gender, religion, and socioeconomic barriers. As indicated by [Elhadary and Samat \(2023\)](#) Malaya has implemented several plans to achieve gender parity in education and tackled barriers that hinder students from pursuing their studies. These plans include the Malaysian National Higher Education Strategic Plan (2007–2020), Eleventh Malaysia Plan (2016–2020), Malaysian Education Blueprint MEB (2013–2025), Malaysian Education Blueprint MEB for higher education (2015–2025), and later the twelve Malaysia Plan 12MP. The overall objective of these plans is to ensure equal access to higher education, stipulate equity, and address all issues that interrupt access to education, such as socio-economic disadvantages and geographical barriers ([Sirat & Wan, 2022](#)). It is important to note that under the Twelfth Malaysia Plan (12MP), supportive social policies are introduced to encourage women to participate in home-based economic activities while continuing with household responsibilities ([Department of Statistics Malaysia \(DOSM\), 2023](#)).

Also in the 12MP, Malaysia is targeting increasing women's labour force to 60% within a decade ([The Star, 2023](#)). As a consequence of these plans, the number of students enrolled in higher education has expanded very rapidly during the last few decades. The gross enrolment in tertiary education has increased from 24% in 2000 to 40% in 2022 ([World Bank, 2023](#)). The GER for males has increased from 26% to 35%, compared to 26% and around (46%) for females for the same years. According to the [World Economic Forum \(2023\)](#) Malaysia has almost achieved gender parity in education, as it scored one and ranked number one among the 146 countries on the list ([World Economic Forum, 2023](#)). This finding is also supported by [Elhadary and Samat \(2023\)](#) who stated that the gender gap in education has almost closed, and even today, there are more females than males in higher education institutions. With regard to the [Trow \(1973\)](#) model, Malaysia has left the elite stage since 1995, is currently enjoying the massification era, and is currently proceeding to the universal stage. The secret of this success is due to the rapid expansion of female enrollment in higher education and to the political commitment to achieve gender parity ([Elhadary & Samat, 2023](#)).

The above section confirmed that Malaysia is currently in the massification stage, with females outnumbering males in higher education institutions. The question that needs to be answered is: What happens after massification? In other words, does the educational attainment of women affect their participation in the labour force? Thus, this paper aims to uncover the connection between the massive enrolment of women and their participation in the labour force, as the relation is always debatable. Several authors, like [Becker \(1964\)](#), [Khanie \(2019\)](#) and [Shuangshuang, Zhu, Mughal, Aparcana, and Muda \(2023\)](#) reputed that an increase in the gross enrolment in tertiary education, especially for females, will lead to an increase in the rate of participation in the labour force. [Shuangshuang et al. \(2023\)](#) argued that accessing higher education would enhance female labour force participation, thus leading towards economic growth. [Beton \(2023\)](#) illustrates that in Turkey, education facilities are increasing female labour force participation as they are favorably connected.

In addition, [Khanie \(2019\)](#) acknowledged that having a university degree is a substantial element in improving FLFP. In contrast, empirical studies confirmed that there is no direct connection between female's education and labour force participation. [Nagac and Nuhu \(2016\)](#) found that in Nigeria, the effect of education on female labor force participation falls under the inverse "U shape" pattern, increasing up to high school but then decreasing with a higher education degree. In the same vane, [Joyner \(2023\)](#) argued that despite the rise of female educational attainment, it is clear that this is not reflected in female labor force participation. In addition, [Bhalla and Meher \(2019\)](#) stated that

even though women's educational level is constantly increasing, employment rates have not improved at a similar speed. Safdar (2022) claimed that despite the fact that women outperform men in higher education, this does not translate into better economic opportunities due to workplace discrimination and physical insecurity. The situation is alarming if it is known that out of 57% of women who received tertiary education worldwide, only 33% participate in the labor force (International Labour Organization, 2020). These figures vary among countries, with 43% of women holding a Bachelor compared to 80% for men in Egypt, while in Iran only 33 percent of women with a Bachelor's relative to 66.5% of men with a Bachelor's participate in the labor force (International Labour Organization, 2020). Some authors, like Hossain, Ghimire, Valeva, and Harriger-Lin (2022) distinguished between developed and developing countries. Their findings indicated that female education consistently correlated with Female Labour Force Participation FLFP negatively for low- and middle-income countries, while for the high-income group, the correlation was positive. This is due to the fact that women in high-income countries do part-time jobs besides their education, so we see a positive relationship there.

In Malaysia, like other developing countries, the rate of labour force has improved due to the massive attainment of females in higher education. The percentage of graduates with at least Bachelor degree or equivalent has reached 13.4%, compared to 11.4% for males (World Bank, 2023). The graduated female has narrowed the unemployment rate gap with men in Malaysia (The Strait Times, 2022). The overall jobless rate for 2.476 million women graduates in the country declined to 4.3 per cent in 2021, versus 4 per cent for men. In 2022, the labor force participation rate for residents with no formal education in Malaysia was 56.1 percent, primary 67.8%, and secondary 67.5% (Statista, 2023). By comparison, residents with tertiary education had a labour force participation rate of 74.1 percent. This figure highlighted the positive role of education in escalating the rate of the country's labor force, as only 25% of graduates were not accessing jobs in 2023. Because females outnumber male graduates in higher education, one can assume that their participation rate is higher than that of males, but the reality is different. According to Statista (2023) the labor force participation rate for females with tertiary education was 66.2 percent, compared to 82.6 percent for males. This is also in line with The Star (2023) which stated that despite a higher percentage of women in Malaysia having tertiary education (47.3%) compared to men (35.8%), their labour force participation rate is significantly lower at 66.2%, in stark contrast to men (82.6%). Therefore, the aim of this paper is to statistically trace the mismatch between the massification of higher education and the lower participation of female in the labour force compared to male.

3. METHODOLOGY AND MATERIALS

Most of the statistical data included in this article came from international sources such as (United Nations, 2022; World Bank, 2022, 2023; World Economic Forum, 2006, 2021, 2023) and government agencies in Malaysia such as the (Department of Statistics Malaysia (DOSM), 2018). As shown in the methodical framework (Figure 1), it also contains a critical evaluation of a few recent papers and reports related to higher education and labour force published in and around Malaysia. The figure begins by illustrating the paper's main goal, which is to examine the relation between female enrolment in higher education and their engagement in labor force. Next, we examine the diverse sources of the collected data, categorized into two groups: textual documents and statistical types. The paper used the Statistical Package of Social Science SPSS 23 software for data analysis, employing statistical tests such as the independent samples T-test, Mann-Whitney test, and Kruskal-Wallis test to compare the higher education attainment and labor force participation rate. The paper has some concluding remarks, as education is not the only factor in expanding female labor force participation in Malaysia.

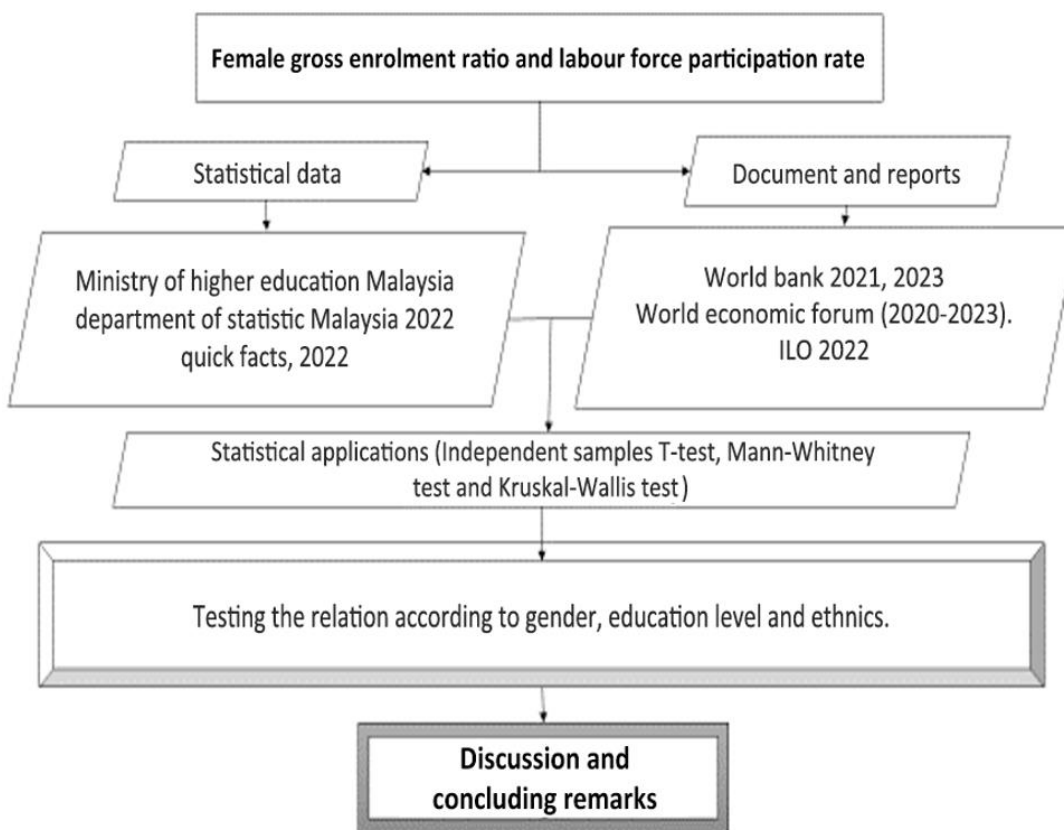


Figure 1. Methodological framework.

As indicated in Figure 1, several statistical methods have been applied to test the below hypothesis:

- a. There are no statistically significant differences between the gross enrolment ratios in higher education in Malaysia by gender.
- b. There are no statistically significant differences in labour force participation in Malaysia by gender.
- c. There are no statistically significant differences between labour force participation and tertiary education in Malaysia by gender.
- d. There are no statistically significant differences between the levels of education (no formal education, primary, secondary, or tertiary).

To test the hypotheses, the paper used some statistical data regarding gross enrolment and labour force participation by gender over the period ranging from 2010 to 2021. To confirm or reject the above-mentioned hypotheses, the paper employed some statistical methods to compare the above-mentioned variables, like the Independent Samples t-test. This measure is considered one of the parametric tests. It used to compare two groups whose averages were not dependent on one another. This measure is elaborated on in the next section:

Let \bar{x} and \bar{y} denote the mean of x and y samples, with standard deviation for each sample s_x and s_y . The standard test to test is based on the t statistic:

$$T = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{s_x^2}{n_1} + \frac{s_y^2}{n_2}}} \quad (1)$$

Where:

\bar{x} : average of x sample,

s_x : standard deviation of x sample,

n_1 : size sample of x sample,

\bar{y} : average of y sample

s_y : standard deviation of y sample

n_2 : size sample of y sample

Under the hypothesis:

$$\begin{aligned} H_0: \mu_x &= \mu_y \\ H_a: \mu_x &\neq \mu_y \end{aligned} \quad (2)$$

The test statistic T has t-distribution with $n_1 + n_1 - 2$ degrees of freedom (df).

To use the two independent samples t-test, samples are independent (Gio & Rosmaini, 2018) assume that the data from both samples are normally distributed and they have the same variances, $\sigma_x = \sigma_y$ (Xu et al., 2017).

Where:

σ_x : standard deviation of x population, σ_y : standard deviation of y population

3.1. Levene's Test

The equality of variances is tested using Levene's F-test before performing a T-test, The Levene's test hypothesis is defined as (Ahmed & Hamarai, 2022).

$$\begin{aligned} H_0: \sigma_1^2 &= \sigma_2^2 \\ H_1: \sigma_1^2 &\neq \sigma_2^2 \end{aligned} \quad (3)$$

The Mann-Whitney test is a commonly used non-parametric test alternative to the independent samples two t-test (Perme & Manevski, 2019) and is used in cases where the assumptions of the t-test are not met (Ergin & Koskan, 2023). The Mann-Whitney test features robustness to outliers and good small sample performance (Dehaene, De Neve, & Rosseel, 2021) and it requires few assumptions (Fay & Malinovsky, 2018).

Mann Whitney test that tests the following hypothesis (Zeina, Miari, & Anan, 2022):

$$\begin{aligned} H_0: \theta_i &= \theta_j \\ H_1: \theta_i &\neq \theta_j \end{aligned} \quad (4)$$

Using test statistic:

$$Z = \frac{U - \bar{U}}{std_U} \quad (5)$$

Where:

$$\bar{U} = \frac{n_i n_j}{2} \quad (6)$$

$$\bar{U} = \frac{n_i n_j}{2} \quad (7)$$

$$std_U = \sqrt{\frac{n_i n_j (n_i + n_j + 1)}{12}} \quad (8)$$

$$U = \min \left(n_i \cdot n_j + \frac{n_i(n_j+1)}{2} - R_i, n_i \cdot n_j + \frac{n_j(n_i+1)}{2} - R_i \right) \quad (9)$$

Mann-Whitney test statistics are calculated through the follow Equations:

$$n_A > n_B: U = T_A - \frac{n_A(n_A+1)}{2} \quad (10)$$

$$n_A < n_B: U = T_B - \frac{n_B(n_B+1)}{2} \quad (11)$$

The above formula's value determines whether to accept or reject the null hypothesis. It will rejected H_0 hypothesis if the Mann-Whitney test statistic value is greater than the critical value. This implies that the means of the two groups do not represent the same population (Ergin & Koskan, 2023).

To study the differences among three or more independently sampled groups, researchers use the Kruskal-Wallis test, a non-parametric statistical test. On a single variable distributed non-normally (McKight & Najab, 2010) they use a non-parametric alternative to One-way analysis of variance ANOVA. The Kruskal-Wallis test is used for analyzing randomized one-way designs with treatment groups $T_j [T_1, T_2, \dots, T_k]$. The null hypothesis $H_0: F_1 = F_2 = \dots = F_k$ is against the alternative hypothesis, at least $H_1: F_i \neq F_j$ (Ludwig, 2023).

The test is based on $\chi^2(c - 1)$ distribution using test statistic:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^c \frac{R_i^2}{n_i} - 3(N-1) \quad (12)$$

Where:

$c \equiv$ Number of samples.

$n_i \equiv$ Number of observations in the i^{th} group.

$N = \sum n_i \equiv$ Number of observations in all samples.

$R_i \equiv$ Sum of ranks for the i^{th} group (Zeina et al., 2022).

4. RESULT AND DISCUSSION

4.1. The Gross Enrolment Ratio (GER) in Higher Education of Malaysia by Gender

As stated in the first hypothesis, there are no statistically significant differences between the gross enrolment ratios in higher education in Malaysia by gender. Therefore, this section employed data collected from the World Bank (see Appendix 1) and used some statistical methods to compare between females and males attaining higher education, aiming to confirm or reject the hypothesis. Table 1 provides detailed information about the normality test of the collected data on the gross enrolment in higher education by gender for the last eleven years. For group sample sizes (N) less than 50, we commonly use the Shapiro-Wilk test to test for normality, while Kolmogorov-Smirnov proves useful for sample sizes greater than 50 (Ahmed & Hamarai, 2022).

Table 1. Data normality test.

| Tests of normality | | | | | | | |
|--------------------------------|--------|---------------------------------|----|--------|--------------|----|-------|
| Variable | Sex | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Tertiary gross enrolment ratio | Male | 0.171 | 11 | 0.200* | 0.920 | 11 | 0.315 |
| | Female | 0.138 | 11 | 0.200* | 0.963 | 11 | 0.814 |

Note: *. This is a lower bound of the true significance.
a. Lilliefors significance correction.

The sampling size is very essential in determining the appropriate method for testing the normality of data set dissemination. The Shapiro-Wilk test is widely used when the sampling data is small, like in our case. The paper used the Shapiro-Wilk test with less than 50 samples to verify the normality of the data. Table 1 reveals that the values for both groups are greater than 0.05, as the sig value is equal to 0.315 for males and 0.814 for females. This result suggests a systematic distribution of the data between the two groups. As a result, the paper employed parametric tests to analyze the data, specifically an independent sample T-test.

Table 2. Descriptive statistics.

| Variable | Sex | N | Mean | Std. deviation | Std. error mean |
|--------------------------------|--------|----|--------|----------------|-----------------|
| Tertiary gross enrolment ratio | Male | 11 | 36.382 | 4.331 | 1.306 |
| | Female | 11 | 46.755 | 3.452 | 1.041 |

Table 2 shows the descriptive statistics of the gross enrolment ratio (GER) in Malaysia by gender and has come out with the following notes:

1. Male: A sample size of 11 observations with a mean of 36.3818, a standard deviation of 4.33124, and a standard error of 1.30592.
2. Female: A sample size of 11 observations with a mean of 46.7545, a standard deviation of 3.45177, and a standard error of 1.04075.

The following section is about testing the differences between the two groups, as shown in Table 3.

Table 3. Differences between groups by using independent samples T test.

| Variable | | Levene's test for equality of variances | | t-test for equality of means | | | | |
|--------------------------------|-----------------------------|---|-------|------------------------------|-------|-----------------|-----------------|-----------------------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean difference | Std. error difference |
| Tertiary gross enrolment ratio | Equal variances assumed | 1.344 | 0.260 | -6.212 | 20 | 0.000 | -10.373 | 1.670 |
| | Equal variances not assumed | | | -6.212 | 19.05 | 0.000 | -10.373 | 1.670 |

Table 3 indicates that the Levene Statistic value is equal to 1.344, with a significant level of 0.260 and a value greater than 0.05. This confirmed the homogeneity of the variance for both males and females, allowing for the first row results (equal variances assumed). It found that the value of (t) equals -6.212 with a level of significance of 0.000 and a value of less than 0.05. Figure 2 clearly represents these statistically significant differences between males and females. The chart confirms that females are more likely to attain higher education than males, thereby rejecting hypothesis (a).

The above findings primarily showed a rapid increase in students enrolled in higher education over the last few decades. This increase is due to the increasing number of females enrolled in higher education (Elhadary & Samat, 2023). Secondly, it indicates that females are currently outnumbering males in higher education institutions. Most developing countries, including Malaysia, are witnessing this phenomenon. This suggests that the hypothesis positing a greater number of females pursuing higher education than males based on gender is indeed valid. Currently, the gross enrolment ratio of females is higher than that of males, as it reached 48.4% versus 37%, respectively, in 2020, while overall it is 42.6%. According to the Trows theory, Malaysia is currently in the "massification" stage, with a gross enrolment ratio of more than 15% to less than 50%. It has already passed the elite stage since 1995, and it is on the way to reaching the "universal" stage. The unprecedented increase of females compared to males led to what is known as "changing gender disparity" (Alam & Saadat, 2020; Elhadary & Samat, 2023; Saadat, Alam, & Rehman, 2022). Employers expected higher productivity from educated workers compared to those with less or no education. We need to inquire about the extent to which the labor force reflects "massification". The following section aims to investigate the relationship between education and female participation in the labor force.

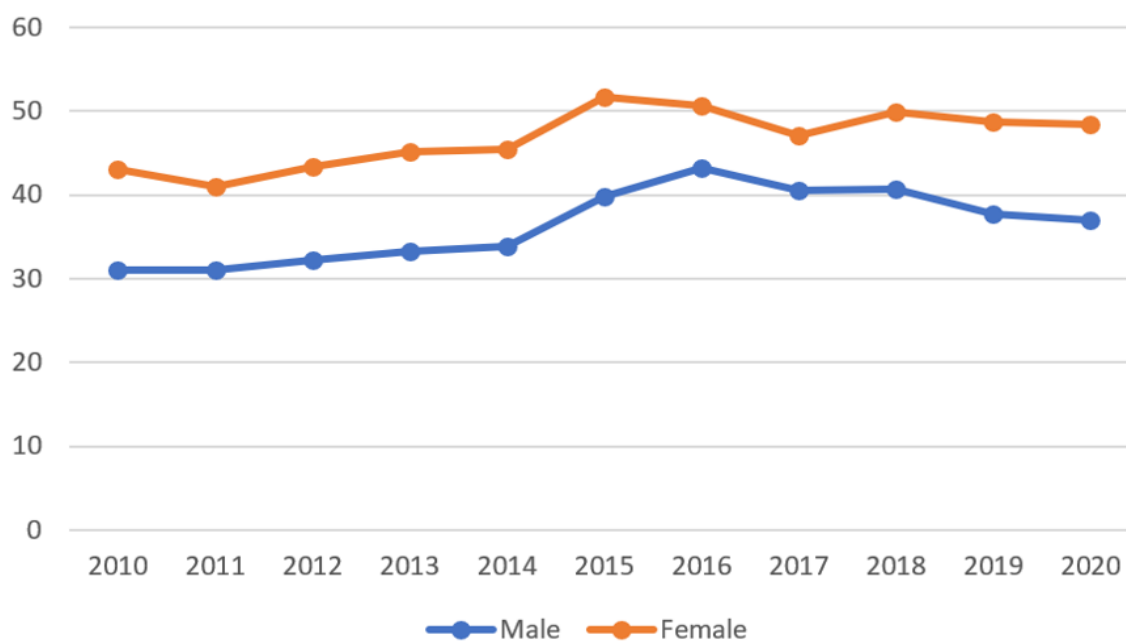


Figure 2. Data distribution of male and female.

4.2. Labour Force Participation in Malaysia by Gender

The aim of this section is to test the link between educated female and their participation in the labour force (see Appendix 2). As argued by Elhadary and Samat (2023) the more attainment in higher education the more in labour force. In the following, the paper employed some statistical methods to accept or reject this notion. The following provides detailed information on the labour force participation rate by gender for the last twelve years. Table 4 highlights the descriptive analysis of the collected data about the participation of the two groups in the labour force market.

Table 4. Descriptive statistics.

| Variable | Sex | N | Mean | Std. deviation | Std. error mean |
|--|--------|----|--------|----------------|-----------------|
| Labour force participation in Malaysia | Male | 12 | 80.392 | 0.498 | 0.144 |
| | Female | 12 | 52.942 | 3.093 | 0.893 |

Table 4 indicates the following:

1. Male: A sample size of 12 observations with a mean of 80.3917, a standard deviation of 0.49810, and a standard error of 0.14379.
2. Female: A sample size of 12 observations with a mean of 52.9417, a standard deviation of 3.09294, and a standard error of 0.89286.

As a consequence of the above result, where the sample size in each group is less than 50, the paper employed the Shapiro-Wilk to test the differences between the two groups, as shown in Table 5.

Table 5. Data normality test.

| Tests of normality | | | | | | | |
|--|--------|---------------------------------|----|--------|--------------|----|-------|
| Variable | Sex | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Labour force participation in Malaysia | Male | 0.173 | 12 | 0.200* | 0.914 | 12 | 0.237 |
| | Female | 0.264 | 12 | 0.021 | 0.801 | 12 | 0.010 |

Note: *. This is a lower bound of the true significance.
a. Lilliefors significance correction.

Table 5 summarized the results of the two groups; it shows that the sig value is equal to 0.237 for males and 0.010 for females. Since there is only one significant value among the groups that is less than 0.05, the data does not follow a normal distribution. As a result, the paper used nonparametric tests to analyze the data, specifically the Mann-Whitney test, as shown in Table 6.

Table 6. Ranks of Mann-Whitney test.

| Variable | Sex | N | Mean rank | Sum of ranks |
|--|--------|----|-----------|--------------|
| Labour force participation in Malaysia | Male | 12 | 18.50 | 222.00 |
| | Female | 12 | 6.50 | 78.00 |
| | Total | 24 | | |

In Table 6, the number of observations (N=12) for male and female, mean rank for male is 18.50 and for female is 6.5, while the sum of ranks is equal to 222 for male and 78 for female. We use Mann-Whitney to test the differences; Table 7.

Table 7. Results of Mann-Whitney test.

| Test statistics ^a | |
|--------------------------------|--|
| Variable | Labour force participation in Malaysia |
| Mann-Whitney U | 0.000 |
| Wilcoxon W | 78.000 |
| Z | -4.161 |
| Asymp. sig. (2-tailed) | 0.000 |
| Exact sig. [2*(1-tailed Sig.)] | 0.000 |

Note: a. Grouping variable: Sex.
Not corrected for ties.

Table 7 shows that the Mann-Whitney test equals 0.000, Wilcoxon W equals 78, $Z = -4.161$, and the significant value (Sig) equals 0.000 with a value of less than 0.05. Table 4 and Figure 3 clearly represent the statistically significant differences between males and females, indicating the rejection of hypothesis (b)

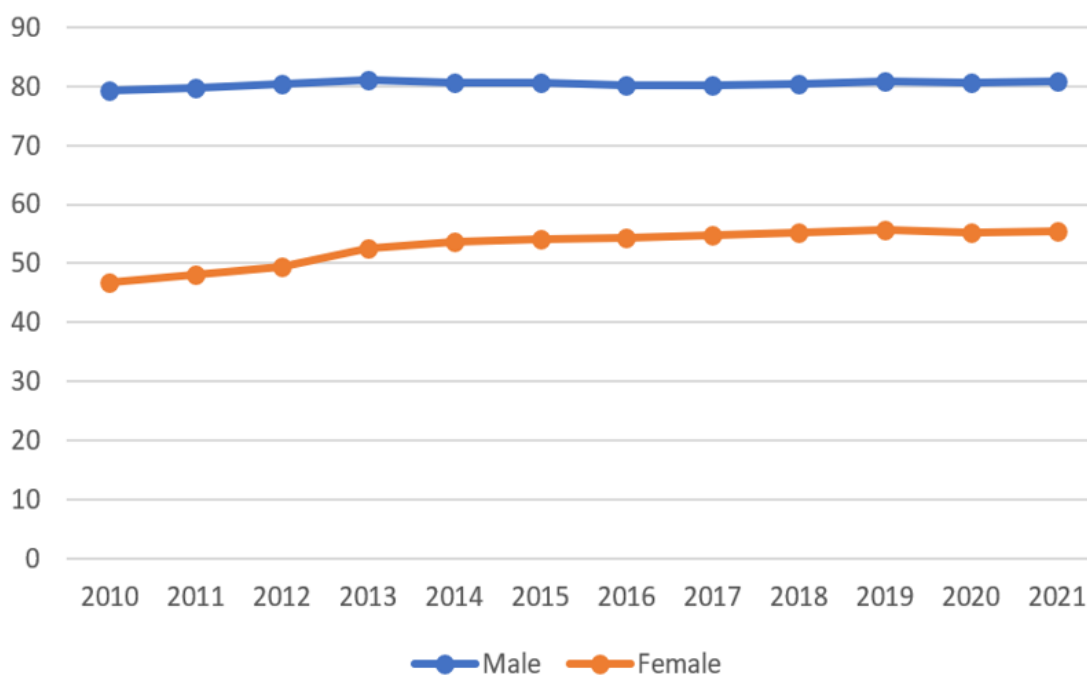


Figure 3. Data distribution of male and female.

Figure 3 confirms that the rate of females in the labor force has slightly increased over the past decade. Several factors have contributed to this progress, including education. Nagac and Nuhu (2016) confirmed that in Nigeria, education is positively associated with female participation in the labour force. In the same vein, Amaina, Catlina, and Ana (2019) argued that the rising rates of the female labor force are due to an increase in education. On the contrary, the chart clearly highlights that males are more prevalent in the labor force than females. This led several authors to reject the positive connection between education and female participation in the labour force. Thaddeus et al. (2022) related the increase in female labour force participation rates to the decline in male labour force participation rates rather than an increase in female labour participation rate. According to the World Bank (2016) the gender participation gap is due to a worldwide decline in the male labor force rather than a significant increase in the female labor force. The section below elaborates on the link between higher education and the participation of the labour force in Malaysia.

4.3. Labour Force Participation in Malaysia and Tertiary Education by Gender

Table 7 only focuses on general labor force participation, including all levels of education. The section below highlights the link between tertiary education and labour force participation in relation to gender (see Appendix 3).

Both Table 8 and 9 indicated that there are statistically significant differences between males and females; these differences are for males.

Table 8. Data normality test.

| Tests of normality | | | | | | | |
|--|--------|---------------------------------|----|--------|--------------|----|-------|
| Variable | Sex | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Labour force participation in Malaysia with tertiary education | Male | 0.243 | 9 | 0.134 | 0.844 | 9 | 0.064 |
| | Female | 0.170 | 9 | 0.200* | 0.933 | 9 | 0.510 |

Note: *. This is a lower bound of the true significance.
a. Lilliefors significance correction.

Table 8 provides detailed information on this issue for the last nine years. This finding indicates that the sample size in each group is less than 50; therefore, using the Shapiro-Wilk test is more suitable. The test confirmed that the sig value is equal to 0.064 for males and 0.510 for females. Moreover, there are two values greater than 0.05, which means a normal distribution of the data in the two groups. Consequently, the paper used parametric tests to analyze the data, specifically the independent sample T-test as highlighted in Table 9.

Table 9. Descriptive statistics.

| Variable | Sex | N | Mean | Std. deviation | Std. error mean |
|--|--------|---|--------|----------------|-----------------|
| Labour force participation in Malaysia with tertiary education | Male | 9 | 73.589 | 2.411 | 0.804 |
| | Female | 9 | 63.544 | 2.677 | 0.892 |

Table 9 shows the descriptive statistics of Labour Force Participation in Malaysia with tertiary education by gender percentage and comes with following:

1. A male sample size of nine observations had a mean of 73.5889, a standard deviation of 2.41062, and a standard error of 0.80354.
2. Female: A sample size of nine observations with a mean of 63.5444, a standard deviation of 2.67727, and a standard error of 0.89242.

As a consequence of the above result, the paper employed Levene's Test for equality of variances to test the differences, as shown in Table 10.

Table 10. Differences between groups by using independent samples t-test.

| Variable | | Levene's test for equality of variances | | t-test for equality of means | | | | |
|--------------------------------|-----------------------------|---|-------|------------------------------|--------|-----------------|-----------------|-----------------------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean difference | Std. error difference |
| Tertiary gross enrolment ratio | Equal variances assumed | 0.017 | 0.898 | 8.364 | 16 | 0.000 | 10.044 | 1.201 |
| | Equal variances not assumed | | | 8.364 | 15.827 | 0.000 | 10.044 | 1.201 |

Table 10 demonstrated that the Levene statistic value is equal to 0.017, with a significant level of 0.898 and a value greater than 0.05. This result verified that the variance was homogeneous for both males and females. As a result, the first row, which is the (Equal variances assumed), was chosen. The table also showed that, at the significant level of 0.000 and a value of less than 0.05, the value of (t) is 8.364. Therefore, we rejected hypothesis (c) due to statistically significant differences between males and females, as illustrated clearly in Figure 4.

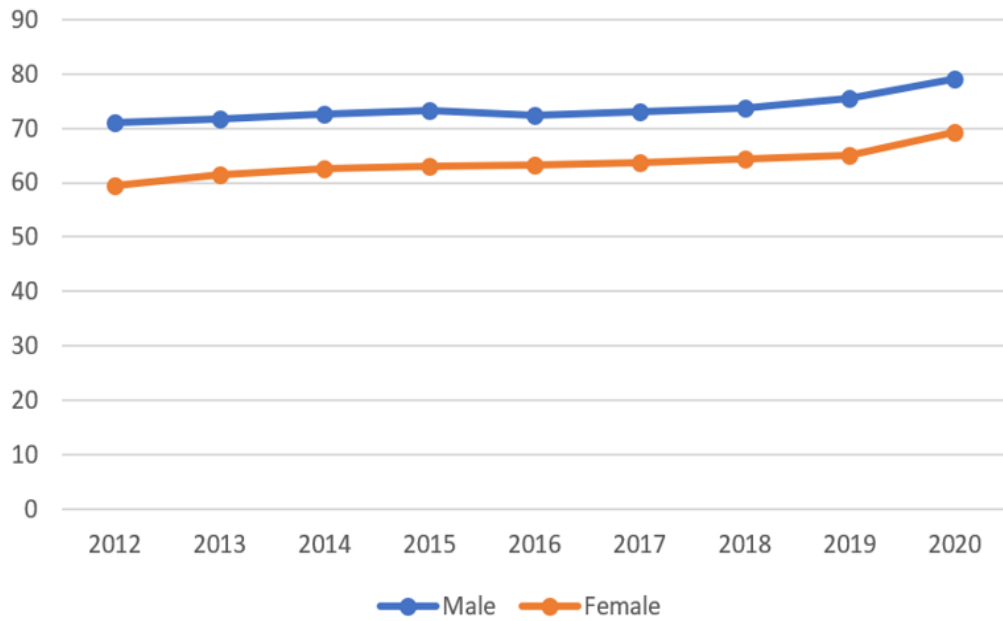


Figure 4. Data distribution of male and female.

This section confirmed that men still dominate the labour market, despite the fact that more women are enrolled in higher education. It is true to say that an increase in education has opened the door for women to increase their participation in the labour force. As mentioned by [Nielsson and Steingrimsdottir \(2018\)](#) the old notion of employers mastering the minds of female has now changed. Employers' observations of women's productivity are noisier than those of men, but the precision of their observational abilities improves with increased worker education. Therefore, less female holding university degrees are outside labour force compared to on-educated people. Looking at the females outside of labour force by highest certificate obtained, about 40 percent gained secondary education, while approximately 20 percent had a minimum post-secondary education level ([Department of Statistics Malaysia \(DOSM\), 2023](#)).

Despite the above positive facts, our data has confirmed that there is a mismatch between education and participation of female in labour force. This is not only in Malaysia, but it has also become a worldwide phenomenon. As stated by the [World Bank \(2022\)](#) Female Labour Force Participation rate FLFPR reached 50% in 1990, then declined to 47% in 2021, compared to 80% in 1990 and 73% in 2021 for males. This figure evidently indicates that the gender gap in labour force participation is falling at an alarming rate during the last decades, despite the rise of females in higher education levels. This situation creates a paradox that deviates from the human capital theory, where a rise in education is expected to facilitate women's getting better skills that would eventually help their participation in the labour force ([Pal & Chaudhuri, 2020](#)). The section below elaborates on the link between the level of education and the labour force to highlight the impact of each level.

4.4. Labour Force by Levels of Education in Malaysia

The aim of this section is to test the relation between levels of education and the female participation rate in the labour force. The overall objective is to uncover the differences within and between the four groups (no formal, primary, secondary, and tertiary) as detailed in the following [Table 11](#) (see [Appendix 4](#)).

Table 11. Data normality test.

| Tests of normality | | | | | | | |
|--------------------|---------------------|---------------------------------|----|--------|--------------|----|-------|
| Variable | X | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Y | No formal education | 0.160 | 12 | 0.200* | 0.929 | 12 | 0.366 |
| | Primary | 0.162 | 12 | 0.200* | 0.937 | 12 | 0.458 |
| | Secondary | 0.218 | 12 | 0.119 | 0.831 | 12 | 0.022 |
| | Tertiary | 0.156 | 12 | 0.200* | 0.932 | 12 | 0.404 |

Note: *. This is a lower bound of the true significance.

a. Lilliefors significance correction.

Table 11 shows that the sig values equal 0.366, 0.458, and 0.404 for no formal, primary, and tertiary, respectively, greater than 0.05. Since there is one significant difference between the secondary groups that is less than 0.05, this means that the data is not following a normal distribution. In contrast, the sig value of the secondary group is 0.022, less than 0.05. Since there is one significant value among the groups that is less than 0.05, this means that the data is not following a normal distribution. Owing to that, the paper employed nonparametric tests to analyze the data, specifically the Kruskal-Wallis test as shown in Table 12.

Table 12. Ranks of Kruskal-Wallis test.

| Education level | N | Mean rank |
|---------------------|----|-----------|
| No formal education | 12 | 6.50 |
| Primary | 12 | 18.50 |
| Secondary | 12 | 42.50 |
| Tertiary | 12 | 30.50 |
| Total | | 48 |

Table 12 summarizes the number of observations (N=12) for all education levels, with a mean rank of 6.50 for no formal education, 18.50 for primary, 42.50 for secondary, and 30.50 for tertiary. This result led the paper to use Kruskal-Wallis to uncover the differences, as shown in Table 13.

Table 13. Results of Kruskal-Wallis test.

| Test statistics ^{a,b} | |
|--------------------------------|--------|
| Test name | Y |
| Chi-square | 44.084 |
| df | 3 |
| Asymp. sig. | 0.000 |

Note: a. Kruskal Wallis test.
b. Grouping variable: X.

Table 13 revealed that the chi-square value is equivalent to 44.084 with df equal to 3, Asymp. Sig. = 0.000, and a value of less than 0.05. As a result, hypothesis (d) was rejected as it shows there are statistically significant differences across education levels. The study employed multiple comparison tests using Mann-Whitney test to determine the differences between pairs, (for further information, see Table 14 and Figure 5).

Table 14. Multiple comparisons by Mann-Whitney test.

| Variable | X _i | X _j | Asymp. sig. (2-tailed) |
|-------------------|---------------------|---------------------|------------------------|
| Mann-Whitney test | No formal education | Primary | 0.000 |
| | | Secondary | 0.000 |
| | | Tertiary | 0.000 |
| | Primary | No formal education | 0.000 |
| | | Secondary | 0.000 |
| | | Tertiary | 0.000 |
| | Secondary | No formal education | 0.000 |

| Variable | X_i | X_j | Asymp. sig. (2-tailed) |
|----------|----------|---------------------|------------------------|
| | | Primary | 0.000 |
| | | Tertiary | 0.000 |
| | Tertiary | No formal education | 0.000 |
| | | Primary | 0.000 |
| | | Secondary | 0.000 |

The results of the Mann-Whitney multiple comparisons test display that there are four differences between four pairs. The result showed that the Sig value is 0.000, which is less than 0.05. This finding indicates that there are differences between the four levels of education (no formal education and primary, no formal education and secondary, no formal education and tertiary, primary and secondary, primary and tertiary, secondary and tertiary). Detailed information about the differences within levels of education and the labor force is highlighted in [Figure 5](#).

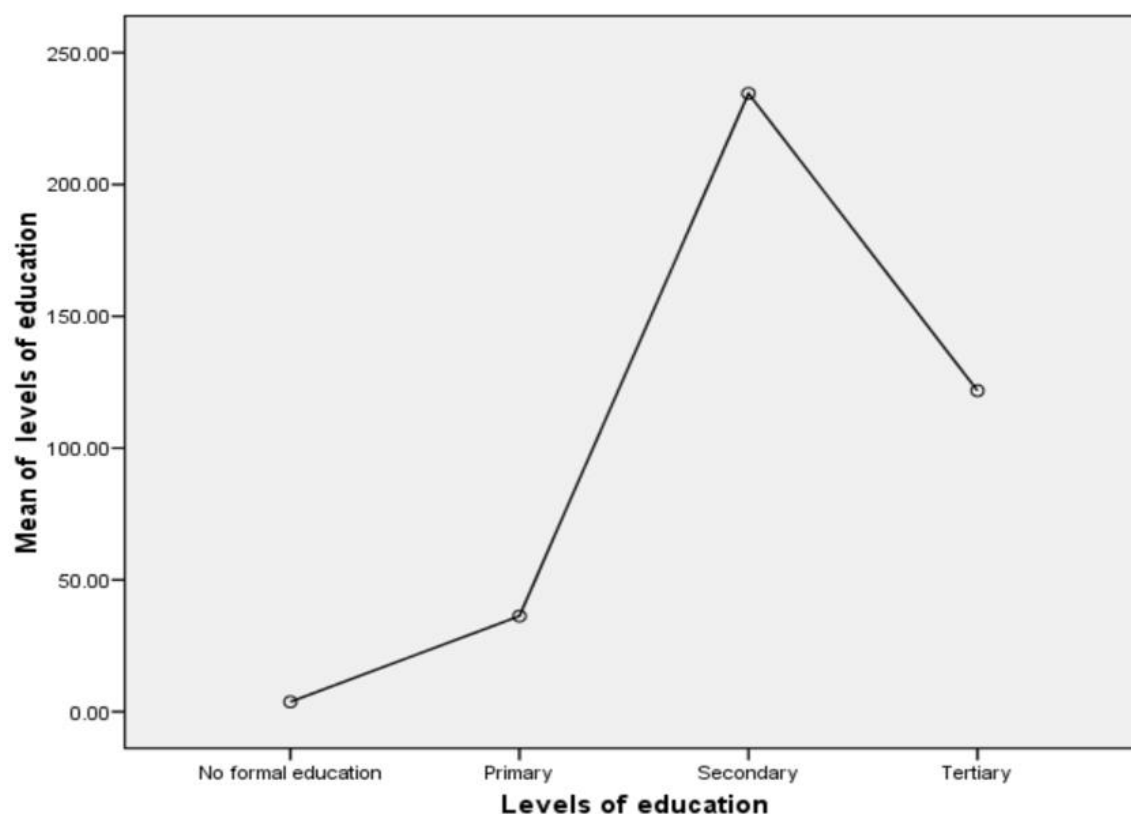


Figure 5. Data distribution of mean of levels of education.

The results confirmed that there are statistically significant differences between the levels of education and the female participation rate in the labour force. It demonstrates clearly that the female holding a secondary certificate is the highest among the four levels, while holding a tertiary degree comes next, followed by primary and non-formal education, respectively. These results align with the findings of the [Department of Statistics Malaysia \(DOSM\) \(2023\)](#) which indicated that 56.6 percent of employed individuals had a secondary education and 31.3 percent had a tertiary education. Employed persons with primary education and no formal education represented 9.1 percent and 3.0 percent, respectively. We need to emphasize two key points: First, an increase in education will lead to a higher proportion of females in the labor force; Second, not all graduates have equal access to job opportunities. As statistically approved, the relationship between females with non-formal and primary education and their participation is negative and statistically significant, while females with secondary and tertiary education are positive. Surprisingly, the percentage of females with secondary education is higher in the labor force than those with higher

education degrees. This result is even against the argument, which says there is a positive correlation between educating women and their participation in labour force, our finding is against this notion.

The outcome is in line with Halim, Aziz, and Samsudin (2016) who stated that the percentage of female with tertiary education participating in the labour force was lower as compared to their male counterparts. They argued that out of 70% of female students who successfully perused their studies at university, only 30% chose to participate in the labour force. Nagac and Nuhu (2016) labour force, compared to those with secondary certificates, stems from their low representation. They are pushing themselves out of the labour force because the reservation wage for educated females can be higher than the market wage. Why is there a discrepancy between the number of female graduates and their participation in the labor force, and where are 70% of these graduates heading? There are several answers to this question, but the most important is that entering the labor force is not an easy choice for females; it is almost a family matter, while it is a sole decision for males. Another significant reason for being outside the labour force is that women are shouldering home responsibilities and caring for kids and parents. Hossain, et al 2022 attributed the lower representation of females with higher education to the fact that most women with tertiary education are younger and are still in school, as female tertiary education is a relatively new phenomenon in many countries and only younger ones have had the opportunity. Since they are in school, they cannot be working. Moreover, some females rejected jobs that were located away from home and did not suit their aspirations.

4.5. The Relation between Labour Force Participation Rate and GDP Rate

Some academics contend that there is a substantial connection between economic development and female labor force participation. Others disagreed with this idea and approved that there was no relationship between the two variables. Bills (2018) claims that whereas economic development has increased in western countries, female participation in the labor market has not been as monotonic as countries develop. Both contradictory relationships were discovered, as in the case of India and Brazil. According to the World Bank (2016) India's Gross Domestic Product (GDP) increased from US \$275 to US \$1,572, but the female labour force participation rate FLPR decreased from 35 percent to 27 percent. In contrast, Brazil's female labor participation rate has increased from 45 percent in 1990 to 56 percent in 2016 (World Bank, 2016). Aguirre, Hoteit, Rupp, and Sabbagh (2012) claimed that raising female labor force participation to male levels is predicted to create 5 percent of GDP in the United States, 9 percent in Japan, 12 percent in United Arab Emirates, and 34 percent in Egypt. Because of this contradiction, the study employed some statistical techniques, as illustrated in Table 15, to either confirm or deny this relationship.

Table 15. Correlations between labour force participation in Malaysia by gender and growth.

| Variable | Test name | Female | Male | Total |
|----------|---------------------|--------|--------|--------|
| Growth | Pearson correlation | -0.430 | -0.353 | -0.433 |
| | Sig. (2-tailed) | 0.163 | 0.261 | 0.160 |
| | N | 12 | 12 | 12 |

Table 15 statistically confirmed the following:

1. The value of the correlation coefficient (Pearson Correlation) is equal to -0.430 without (*) or (**), indicating that there is no relationship between females and growth. This is evident by a significance level value (Sig. (2-tailed)) equal to 0.163 greater than 0.05.
2. The value of the correlation coefficient (Pearson Correlation) is equal to -0.353 without (*) or (**), signifying that there is no relationship between males and growth. This is confirmed by a significance level value (Sig. (2-tailed)) equal to 0.261, which is greater than 0.05.
3. The value of the correlation coefficient (Pearson Correlation) is equal to -0.433 without (*) or (**), implying that there is no relationship between total (females and males) and growth. This is confirmed by a significance level value (Sig. (2-tailed)) equal to 0.160 greater than 0.05.

The above result does not confirm the direct connection between economic growth and female participation in labour force as measured by GDP, as the relationship did not turn out to be significant. This result implies that there is no linear connection between the educational attainment of women and the economic growth of Malaysia. In 2018, Malaysia's economy experienced an annual growth in the gross domestic product (GDP) of 4.7 percent, with a constant GDP of 1361.5 billion, compared to a 9.0 percent annual growth of 106.0 billion in 1990 (Alias, Zamsuri, & Mohd Suradi, 2021). The result is not consistent with the findings of Fatima and Sultana (2009) who found that high economic development rates of 13.0 percent in 1993 to 43.0 percent in 2002 had driven Pakistani women to participate in the workforce. Our result enriches the literature by confirming that there is no linear relationship between an increase in GDP and female labour force participation. Thus, we need to revise the widely circulated notion that increased economic growth will improve female labour force participation or vice versa.

5. CONCLUSION

The paper concludes that because of massification, the percentage of female graduates has increased very rapidly, even higher than the share of male graduates in Malaysia. Currently, females with at least a bachelor's degree or equivalent have reached 13.4%, compared to 11.4% for males. Despite this positive remark, the participation of women in the labour force remains much lower compared to men. The percentage of male students enrolled in higher education is 38.94%, compared to 61.06% of female students. In contrast, 61.1% of males participated in the labour force, compared to 38.9% of females. Moreover, the paper clearly demonstrates that a female with a secondary certificate holds the highest education level among the four, followed by a tertiary degree, primary education, and non-formal education. This finding confirmed that education could improve the participation of female in the labour force, but it is not the sole factor in achieving gender parity in the workforce. Females face some socio-economic and political barriers that hinder their full participation in the labour force. Regarding economic growth, our analysis has shown there is no linear connection with the increase of female in the labour force. Therefore, we need to revise the widely circulated notion that increased female labour force participation will either lead to economic growth or vice versa. Therefore, planners and decision makers should formulate policies that facilitate female joining the labour force. We don't challenge the traditional belief that women's primary role is to care for their families, achieving gender parity in the workforce will remain an aspiration rather than a tangible reality. The paper recommended that without political will and enhancing awareness among local communities, education alone is inadequate to achieve gender parity in Malaysia and elsewhere in Muslim countries. The limitation is that the paper is based predominantly on a statistical analysis of the relation between the educational attainment of female and their participation in the labour force, ignoring the role of socioeconomic and demographic factors. Therefore, we need to conduct additional studies to address these issues. To have a comprehensive view of the factors affecting the participation of female in the labour force, future research should focus on the supply and demand of female in the workforce.

Funding: This research is supported by the King Faisal University, Saudi Arabia (Grant number: 6044).

Institutional Review Board Statement: Not applicable.

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Data Availability Statement: Upon a reasonable request, the supporting data of this study can be provided by the corresponding author.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: Written the methodology, analysis, and conclusion, Y.E.; statistical analysis and organized references, A.A. Both authors have read and agreed to the published version of the manuscript.

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APPENDICES

Appendix 1. Tertiary gross enrolment ratio (GER) in Malaysia by sex %.

| Year | Male | Female |
|------|------|--------|
| 2010 | 31 | 43 |
| 2011 | 31 | 41 |
| 2012 | 32.2 | 43.3 |
| 2013 | 33.2 | 45.2 |
| 2014 | 33.9 | 45.4 |
| 2015 | 39.8 | 51.7 |
| 2016 | 43.2 | 50.6 |
| 2017 | 40.5 | 47.1 |
| 2018 | 40.7 | 49.9 |
| 2019 | 37.7 | 48.7 |
| 2020 | 37 | 48.4 |

Source: World Bank (2022).

Appendix 2. Labour force participation in Malaysia by gender.

| Year | Male | Female |
|------|------|--------|
| 2010 | 79.3 | 46.8 |
| 2011 | 79.7 | 48 |
| 2012 | 80.5 | 49.5 |
| 2013 | 81 | 52.6 |
| 2014 | 80.6 | 53.7 |
| 2015 | 80.6 | 54.1 |
| 2016 | 80.2 | 54.3 |
| 2017 | 80.1 | 54.7 |
| 2018 | 80.4 | 55.2 |
| 2019 | 80.8 | 55.6 |
| 2020 | 80.6 | 55.3 |
| 2021 | 80.9 | 55.5 |

Source: Department of Statistics Malaysia 2010 – 2021.

Appendix 3. Labour force participation in Malaysia with tertiary education by gender.

| Year | Male | Female |
|------|------|--------|
| 2012 | 71.1 | 59.5 |
| 2013 | 71.7 | 61.4 |
| 2014 | 72.6 | 62.5 |
| 2015 | 73.2 | 63.1 |
| 2016 | 72.3 | 63.2 |
| 2017 | 73.1 | 63.6 |
| 2018 | 73.8 | 64.3 |
| 2019 | 75.4 | 65.1 |
| 2020 | 79.1 | 69.2 |

Source: Department of statistics Malaysia 2010 – 2020.

Appendix 4. Female participation rate in the labour force by levels of education.

| Year | No formal education | Primary | Secondary | Tertiary |
|------|---------------------|---------|-----------|----------|
| 2010 | 4.9 | 47.3 | 207.5 | 78.9 |
| 2011 | 4.2 | 43 | 211.8 | 84.2 |
| 2012 | 4.3 | 48.1 | 217.4 | 89 |
| 2013 | 3.8 | 48.8 | 234.7 | 91 |
| 2014 | 2.5 | 44.1 | 244.9 | 106.9 |
| 2015 | 4.7 | 37.2 | 242.7 | 117.8 |
| 2016 | 3.6 | 35 | 245.2 | 117 |
| 2017 | 4.1 | 30.3 | 239.5 | 136.3 |
| 2018 | 3.3 | 28.8 | 244.2 | 144.8 |
| 2019 | 2.8 | 30.4 | 247.2 | 152.6 |
| 2020 | 2.5 | 25.2 | 230.7 | 168.3 |
| 2021 | 4.4 | 17.1 | 248.2 | 174.4 |

Source: Department of Statistics Malaysia 2010 – 2020.

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