

Gender differences in household education expenditure in Malaysia

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Abstract

Purpose – The objective of this study is to examine gender differences in the allocation of household expenditure on education in Malaysia.

Design/methodology/approach – This study examines the determinants of expenditure on education using a double hurdle model, where the decision to incur education expenditure is modelled first and followed by the decision on how much to spend on education.

Findings – The results show evidence of significant gender differences in the allocation of expenditure on education. For young children (4–12 years) and adult (18–23 years), this bias tends to favour females, while for secondary-aged children, the bias is pro-male.

Practical implications – These findings may reflect a cultural shift in attitudes towards female education, although the effects are likely to be compounded by a lower completion rate of boys in upper secondary education, a growing concern that cannot be ignored by the government, policymakers or households.

Originality/value – This study utilises the Malaysia Household Expenditure Survey (HES) 2022 dataset to make two important contributions. First, conditional on enrolment, it investigates the extent to which there are gender differences at the household level in the allocation of expenditure at every level of education. Second, it examines the model by region and includes intergenerational effects in examining its indirect effects on the gender gap.

Keywords Gender differences, Expenditure, Education, Culture shift

Paper type Research paper

Introduction

Girls and boys have equal rights to education. Despite this, in many countries around the world, gender disparities exist. Although girls have traditionally been at a disadvantage, in recent years, a gender gap has also emerged which disadvantages boys. This has happened in Malaysia, where females are now more likely to be enrolled in education than males, especially at the tertiary level, and consistently outperform males at all levels of education (World Bank Group, 2024a). These changes have arisen, at least in part, due to improvements in access to education, which has increased substantially since the early 1990s. However, what we observe may also reflect a tendency for families to prioritise their daughters' education over that of their sons, and we investigate the extent to which this is the case in what follows using data from a rich source for Malaysia.

Investment in education and ensuring equal access for all is vital for development. Education improves households' social and economic development (see, Becker, 1994; Cattaneo *et al.*, 2022; Al-Humairi, 2024), reduces child mortality (see, Cochrane, 1979; Shorette and Burroway, 2022; Moradhvaj and Samir, 2023) and improves economic growth (see, Hanushek and Woessmann, 2012; Valero, 2021). It follows from this, that understanding how households distribute spending on education is crucial for government and policymakers alike when making spending allocation decisions.

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In recent years, the Malaysian government has made a concerted effort to improve access to education. Despite this, student outcomes are often inequitable. Boys' enrolment rates have declined, and many are leaving school early. Fewer are continuing to higher levels of education, with a 7.3% decrease between 2016 and 2023 (Williams, 2024). This suggests that the education system is not meeting the basic requirements of many boys (Nasri *et al.*, 2023; Surianshah, 2022). This underlying paper may become an important guideline for the ministry in updating the next phase of Malaysia's education blueprint plan on the issue.

This paper uses the recent Malaysia Household Expenditure Survey (HES) 2022 dataset to examine the extent of gender disparities in education expenditure in Malaysia using household level data. It makes two important contributions to the literature in this area. First, conditional on school enrolment decision, we investigate the extent to which there exist gender differences in the allocation of household education expenditure by level of education. Second, we examine the impact of regional and intergenerational effects in determining education expenditure, and how this contributes to the gender gaps. Following Kingdon (2005) and Kenayathulla (2016), we estimate the determinants of expenditure on education using the double hurdle model, where the decision to incur education expenditure is modelled separately from the decision as to how much money to spend on education.

This paper finds evidence of a pro-male bias in education expenditure for households in rural areas among children aged 13–17 years, while there is a pro-female bias for households in urban areas with children aged 4–12 years; and households in rural areas with children aged 18–23 years. Investigating these effects further, we found that households' socio-economic background and intergenerational effects may explain some of the observed gender differences. Specifically, we find that households with a higher socioeconomic status, i.e. with a higher income per head and highly educated parents tend to spend more on education. In addition, households that are ethnically Bumiputera, female-headed or have a larger number of siblings tend to allocate a large proportion of their expenses to education.

This pro-female bias in education expenditure, especially at the tertiary level, might reflect improved access to education for girls, and a shift in attitudes by both households and employers towards female education. Parents are increasingly relying on their daughters, rather than their sons, for welfare support in old age (Wang and Chen, 2024), which may also help to explain why disparities at the household level are favouring girls. However, what we observe also arises due to the low completion rates of boys in upper secondary education, a growing trend that cannot be ignored (UNICEF Malaysia, 2023).

The remainder of this paper is organised as follows. Section 2 presents an overview of the literature on education expenditure, while in Section 3, we present the data and the descriptive analysis. Section 4 outlines the empirical strategy and the main empirical results, and in Section 5, we conclude.

Background and literature

The Malaysia education system

Since Malaysia achieved independence from Britain in 1957, the Malaysian government has invested heavily in its education system with noticeable results. At the time of independence, over 50% of the population had no formal education, while only 6% of children were educated to secondary level and only 1% had a post-secondary level of education (Ministry of Education Malaysia, 2013).

Since 1996, primary school education has been compulsory, and the World Bank Group has reported that in 2022, enrolment at the primary level was nearly universal at 98% (World Bank Group, 2024b). Enrolment at the secondary and tertiary levels have also improved – gross enrolment rates at the secondary level have increased from 69% in 1994 to 85% in 2022, while enrolment at the tertiary level has increased from 11% in 1994 to 40% in 2022 (World Bank Group, 2024c, d). Although these rates are higher than in many developing countries, they are still much lower than in high-performing education systems like Singapore and South Korea.

Despite this progress, student access and outcomes are often inequitable. Males are less likely to attend school or university than females, which is often described as a “reverse” gender gap (World Economic Forum, 2024). Indeed, according to the Global Gender Gap Index Report 2024, in terms of enrolment in tertiary education, Malaysian females outnumber males by 11.33% (World Economic Forum, 2024).

The Global Gender Gap Index Report 2024 also shows that girls consistently outperform boys in school assessment including in Science, Technology, Engineering and Mathematics (STEM). Whereas in public universities, women surpass men in seven out of the eight fields of courses, including courses in which women are traditionally underrepresented such as Mathematics and Science (Tienxhi, 2017). There is a concern that this gender imbalance is likely to have serious socio-political and economic implications for Malaysia (Tienxhi, 2017). Children from households of lower socioeconomic status are also less likely to perform well, as are those from states with a higher proportion of rural schools (Suriashah, 2021).

In comparison to many of its Southeast Asia neighbours, public schools are government-funded and are free of charge at the primary and secondary level, while education at tertiary level public institutions is heavily subsidised by the government, with students typically only having to pay 10% of the full fees (UNICEF Malaysia, 2019). Despite this, many households are still likely to incur some expenses when sending their children to school or university. This might include expenditure on school supplies (e.g. exercise books, pens), learning material, school uniforms, private tutoring, school fees (for those attending private institutions), fees for university and indirect costs, such as transportation costs (Chuwei, 2022; Chern, 2024). These costs are likely to make it difficult for some households to afford to send their children to school or university, and we investigate the extent to which this is the case in the analysis that follows.

Literature on expenditure on education

Over the years, many researchers have examined the allocation of household resources, especially spending on education. Seminal work by Becker and Tomes (1986) argued that parents are altruistic, subject to their preferences and constraints in deciding how much to invest in their children’s education. In other words, human capital levels are not only determined by endowments and government spending on education but also by the extent to which parents are willing to invest in their child’s education. This can lead to inequality, especially gender inequality, in the intra-household allocation of spending on education.

Kingdon (2005), for example, using data for India from 1994 found evidence of a pro-male bias in household decisions to enrol children in school, which implies no household expenditure on education for girls. Follow-up work by Azam and Kingdon (2013) found that although between 1993 and 2005 significant progress had been made in achieving gender equality in education, pro-male bias remained, especially in rural areas. This bias arose mainly due to differential spending on sons and daughters in the primary and middle school age groups, through the decision to enrol boys rather than girls in secondary education. In contrast, recent studies, such as those by Rashmi *et al.* (2022) and Singh *et al.* (2023), have shown that factors like the types of educational institutions (public or private) significantly contributed to the largely pro-male gap among school children in India. Other recent studies found similar results. See *inter alia*: Khanal (2018) for Nepal; Pasha (2024) for Pakistan.

This pattern is expected if households prioritise boys’ education when resources are scarce due to pro-son bias or perceived higher returns, with households only investing in girls’ schooling if they have sufficient income (Singh *et al.*, 2023). In addition, Wang and Cheng (2021) have shown that a decrease in the gender wage gap may have a positive effect on boys’ relative to girls’ education expenditure.

In contrast, Wongmonta and Glewwe (2017) and Khajikhan (2021) found evidence of a pro-female gap in education expenditure particularly within rural households in Thailand and Mongolia, respectively. They argued that this reflects culture changes, whereby it is now

becoming more common for daughters to work and as such they are expected to provide support to their elderly parents. In addition, if a household resides in the countryside while the head of the household is employed in the agriculture sector, the opportunity for women to receive higher education is higher than for men. This in turn gives parents an economic incentive to invest in their daughter's education to ensure their future welfare.

Finally, for Malaysia, although evidence is scarce, [Kenayathulla \(2016\)](#) found that although nationally there was no evidence of a gender gap in education expenditure, a pro-female gap emerged in certain regions for children aged 5 to 9 and 10 to 14, as well as for Bumiputera (Malay and Indigenous) children aged 15–19 years. She argued that this gap might have reflected changing attitudes and forms of support towards education in Malaysia. In recent years, the Malaysian government has provided financial assistance aimed at encouraging students from low-income families to remain in school, making it easier for households to devote resources towards their daughters [1]. At the same time, better employment opportunities and job benefits for females (i.e. child-care and paid maternity leave) have encouraged families to invest in their daughter's education. [Kenayathulla \(2016\)](#) also argued that this emerging pro-female bias may reflect a gradual cultural shift, whereby it is becoming more common for married daughters to provide both financial and old-age support to their parents, thereby encouraging households to target resources towards girls.

The previous literature has also examined the effect parental background has on investment in children's education. Researchers found evidence of strong intergenerational correlations in education ([Hanushek et al., 2021](#); [Burger and Mortimer, 2021](#)), where children's educational levels are often linked to their parents, often mothers. [Akresh et al. \(2023\)](#) found that mother's education was associated with increased schooling for her children, with a greater effect at secondary and higher education levels. Whereas, [Ahmed et al. \(2019\)](#) argued that parents' educational attainment indirectly affects children's education through parents' attitudes and behaviour towards their children's education. This mechanism may provide differential effects within and outside the home environment for children.

Besides education, household income is also another factor that can be considered in intergenerational effects. A systematic review by [Cooper and Stewart \(2021\)](#) found strong support for the hypothesis that household income has a positive causal correlation to children's education, particularly in low-income households. The impact of the association of an individual's income and education with their family background can also be discussed using four conclusive approaches which are (1) intergenerational mobility; (2) intergenerational effects; (3) sibling correlation and (4) equality of opportunity ([Bjorklund and Jantti, 2020](#)).

In summary, the evidence on the effect of gender composition of children in household on education expenditure is mixed. Until recently, spending on education in many developing countries tended to favour boys, especially in poorer rural areas. However, there is tentative evidence that this pattern is starting to change, particularly in Southeast Asia countries like Malaysia. Although this may reflect improvements in access to education that makes it easier for girls to attend school, it may also reflect a change in attitudes by households towards their children's education. Using data for Malaysia, we investigate the extent to which this trend continues. The dataset and empirical strategy used to address these questions are described in the next section.

Data

This paper uses data from the Malaysian HES 2022, a cross-sectional survey dataset conducted at five-yearly intervals by the Department of Statistics Malaysia. In general, the sample is stratified, clustered and selected in two stages. It covers all 13 states (as well as three federal territories), including urban and rural areas.

The HES consists of questions for the head of the household and its members including demographic characteristics, education, activity status (e.g. employer, government employees, students, etc.) and household income. It also contains detailed expenditure data,

including the total amount of education expenditure by level of education, which among others includes expenditure on school fees (government and private), examination fees, tuition fees, membership fees and fees for higher institution learning (including public, private-local or private-overseas institutions).

It should be noted that as is often the case with data of this kind, expenditure is attributed to the households as a whole rather than individuals. In terms of education expenditure, this means we do not know how much the household spends on each child and therefore in the analysis that follows, we use household-level data.

For the purpose of this paper, we restrict the data to households that have at least one child or individual (which can include grandchild, sibling of the head of household/spouse, or unrelated members living in the household) between the ages of 4 and 23, which gives us a final sample of 17,138 households. The lower age-limit represents the minimum age at which children can enter pre-primary education; while the upper bound of 23 represents the age at which most adult will have finished tertiary education and are starting to live independently, especially in Malaysia.

Given the richness of the dataset, this paper also carefully matches age groups with their total education expenditure in the school/university age group level to examine the incidence of gender differences for the particular targeted age groups and prevent potential bias in estimates. We also estimate the models on all samples and disaggregate by region (rural/urban) to reflect differences in economic development between households.

Summary statistics

Table 1 shows descriptive statistics for the full sample and by region of residence, rural and urban.

Table 1 shows that the average monthly expenditure on education is MYR98 (\$21.45 in US dollars as of September 2022), which represents 2.07% of total household expenditure. Despite this, a large disparity exists between urban and rural areas, with expenditure on education in urban areas being more than double that of households in rural areas. Expenditure on education represents around 2.22% of total monthly expenditure in urban areas compared to 1.5 in rural areas. Next, according to the level of education, 60% of household education expenses are pre- and primary school education expenses, followed by secondary education and tertiary education.

However, to note that a common attribute of this type of expenditure data is that it usually contains a large number of missing observations, often including households who do not enrol their children in school or who do not report their expenditure, Table 1 shows that about 10% of households have children aged 4–23 years but have not enrolled them in school, while the proportion of households that do not report any expenditure on school items is approximately 40%. We return to this issue later in the paper.

In terms of parental characteristics, on average the majority of household heads and spouses of household heads have secondary education or higher. They are in their early 30s–50s and live in nuclear households, consisting of two parents and at least one child. Household heads tend to be male, and, on average, households are ethnic Bumiputera (especially in rural areas) and consist of at least two income earners.

Empirical strategy

As is standard in the literature, we employ the augmented Working-Leser expenditure function (see Deaton, 1987) to examine whether there are gender differences in the allocation of household education expenditure, as follows:

$$w_{p,i} = \alpha + \delta \ln \left(\frac{Y_i}{T_i} \right) + \sum_{k=1}^m \lambda_k \left(\frac{N_{k,i}}{N_i} \right) + \gamma D_i + \varepsilon_i \quad (1)$$

Table 1. Descriptive statistics

Variables	All Mean	SD/n	Rural Mean	SD/n	Urban Mean	SD/n	<i>p</i> -value
Household total education expenditure (monthly)	98.89	276.70	51.86	132.88	118.43	315.82	0.000
Household total expenditure (monthly)	4770.70	4190.17	3374.35	1836.99	5329.95	4705.84	0.000
Household total income (monthly)	7582.40	7848.64	4946.00	3599.60	8638.29	8785.62	0.000
Income per income recipient (MYR)	4677.58	4940.44	3085.96	1861.64	5315.03	5601.37	0.000
Share of education expenditure (Pre and primary)	0.61	0.46	0.60	0.45	0.61	0.46	0.525
Share of education expenditure (Secondary)	0.28	0.42	0.33	0.43	0.26	0.41	0.000
Share of education expenditure (Post-secondary and tertiary)	0.12	0.31	0.07	0.25	0.14	0.33	0.000
Not enrolled in school (=1)	0.12	0.33	0.16	0.37	0.11	0.31	0.000
<i>Head education level</i>							
Post-secondary and tertiary	0.32	0.47	0.15	0.35	0.39	0.49	0.000
Secondary	0.50	0.50	0.51	0.50	0.50	0.50	0.041
Pre and primary	0.10	0.30	0.18	0.38	0.07	0.26	0.000
None	0.08	0.27	0.16	0.37	0.05	0.21	0.000
<i>Spouse education level</i>							
Post-secondary and tertiary	0.20	0.40	0.09	0.29	0.24	0.43	0.000
Secondary	0.37	0.48	0.36	0.48	0.37	0.48	0.550
Pre and primary	0.07	0.25	0.12	0.32	0.05	0.22	0.000
None	0.36	0.48	0.42	0.49	0.34	0.47	0.000
Head age	47.87	13.98	50.30	14.58	46.90	13.61	0.000
Spouse age	31.99	23.67	33.12	24.66	31.54	23.24	0.000
<i>Types of family</i>							
Nuclear	0.53	0.50	0.53	0.50	0.53	0.50	0.633
Single head	0.11	0.31	0.14	0.34	0.10	0.30	0.000
Extended	0.19	0.40	0.20	0.40	0.19	0.40	0.563
Others	0.16	0.37	0.13	0.34	0.18	0.38	0.000
Female head (=1)	0.18	0.39	0.18	0.39	0.18	0.39	0.629
Rural (=1)	0.29	0.45					
No. income recipient	1.76	0.88	1.70	0.90	1.78	0.87	0.000
Bumiputera (=1)	0.69	0.46	0.88	0.33	0.62	0.49	0.000
Observations	17,138		4,901		12,237		17,138

Note(s): All financial values are in Malaysian ringgit (MYR). The share of education expenditure is the ratio of total household education expenditure in an age group to total household education expenditure. Spouse refers to the household head spouse, which is restricted to households with only one spouse

Source(s): Authors' own work

where $w_{p,i}$ is the share of total household expenditure on education for level p in household i , Y_i is total household income, T_i is the number of income recipients, N_i is household members ranges from 4 to 23 years old, $N_{k,i}$ is the number of household members in the k th school/university age-gender group, D_i is the vector of household head and spouse and household characteristics, and ε_i is the error term.

The share of total household expenditure represents the relationship between total expenditure on each education level (i.e. pre and primary education; secondary education; tertiary education) to total education expenditure. This suggests that there is a linear

relationship between the share of expenditure on each education category and the total expenditure on education. Deaton and Muellbauer (1980) argued that such a relationship has the theoretical advantage of being consistent with the utility function of consumer demand and that this form conforms to the data in a variety of situations (Deaton, 1989, 1997).

However, given censoring of the dependent variable (the budget share on education) at zero for a large percentage of households, an important estimation issue is the choice of an appropriate statistical model. The use of OLS on censored data will produce biased parameter estimates (Deaton, 1997; Aslam and Kingdon, 2008), while the Tobit model assumes that a single mechanism determines the choice between zero and positive education expenditure.

Instead, following Kingdon (2005) and Kenayathulla (2016), we adopt the double-hurdle model, which was originally formulated by Cragg (1971) to explain the demand for durable goods. The advantage of this approach compared to the Tobit model is that it does not require the assumptions of homoscedasticity and normality to achieve consistency (Cameron and Trivedi, 2010). To observe a positive level of expenditure, two separate hurdles must be passed (see Equations (2) and (3)).

In the first-stage, latent variables are used to model the decision process, with a probit model to determine decision participation as follows:

$$y_i^* = Z_i\beta + v_i \quad (2)$$

While the second-stage, the amount incurred due to the decision, which can be written as follows:

$$w_{p,i}^* = \alpha + \delta \ln\left(\frac{Y_i}{T_i}\right) + \sum_{k=1}^m \lambda_k \left(\frac{N_{k,i}}{N_i}\right) + \gamma D_i + u_i \quad (3)$$

where y_i^* is the latent variable explaining the household's decision to incur education expenditure, $w_{p,i}^*$ is the latent variable explaining the household's expenditure on education for p education level, Z_i is the vector of variables or selection variables explaining the participation decision, v_i and u_i are the respective error terms which are assumed to be independent; v_i has a standard normal distribution and u_i has a truncated normal distribution. The remaining variables are as described in Equation (1). If $y_i^* > 0$ and $w_{p,i}^* > 0$ then $w_{p,i}$ is an observed dependent variable (share of household expenditure on education for p education level).

Results

The results of the two-step hurdle model for each school/university age level which are 1) pre and primary; 2) secondary; and 3) tertiary are presented in Table 2.

Of most interest, from the point of view of the central question about gender bias, is how education expenditure varies by gender. To investigate this effect, we take the difference in the marginal effects (DMEs) between girls and boys in each age group for the second-stage results or the share of education model of section A of Table 2. The approach is like the one featured in Kenayathulla (2016). The last row of Table 2 presents the DME p -values for the respective age groups.

Table 2 shows that in line with expectations, the first-stage results (section B of Table 2) suggest that households with a higher proportion of school/university-age children who are out of school are more likely to incur low expenditure on education, and the effect is greater for urban than rural households (see Table 3). However, household expenditure on lower than tertiary education increases as the proportion of out-of-school children increases compared to households with enrolled children in school with school age 4–23 years. These findings indicate that households tend to consider only higher education as a luxury good. In terms of family background factors, the effect is positive for households in urban areas that have nuclear-type families and have children of pre- and primary school age. A positive effect was

Table 2. Household education expenditure

	(1) Total	(2) Pre and primary	(3) Secondary	(4) Tertiary
<i>A) Share of education model</i>				
Ratio of individuals (Base: Females 4–23 years)				
Males 4–23 years	3.228 (8.379)			
Ratio of age-sex (Base: Females ^a)				
Males 4–12 years		–0.008 (0.016)	–0.111*** (0.011)	–0.211*** (0.017)
Females 4–12 years		^a	–0.093*** (0.011)	–0.215*** (0.017)
Males 13–17 years		–0.117*** (0.012)	0.026 (0.016)	–0.193*** (0.017)
Females 13–17 years		–0.110*** (0.013)	^a	–0.183*** (0.017)
Males 18–23 years		–0.140*** (0.012)	–0.113*** (0.013)	–0.050** (0.023)
Females 18–23 years		–0.157*** (0.011)	–0.118*** (0.012)	^a
Log income per income recipient	71.311*** (9.057)	0.013*** (0.004)	0.003 (0.004)	0.021*** (0.004)
Head education level (Base: pre and primary)				
Post-secondary and tertiary	14.513 (11.042)	–0.010 (0.010)	–0.015 (0.010)	0.006 (0.008)
Secondary	3.800 (7.562)	0.006 (0.009)	–0.002 (0.009)	0.006 (0.006)
None	15.980 (29.202)	–0.005 (0.013)	–0.003 (0.014)	0.001 (0.008)
Spouse education level (Base: pre and primary)				
Post-secondary and tertiary	50.611*** (10.087)	0.014 (0.012)	0.001 (0.011)	0.036*** (0.008)
Secondary	19.467*** (6.136)	0.003 (0.010)	0.008 (0.010)	0.028*** (0.007)
None	51.320** (24.248)	–0.020 (0.014)	–0.011 (0.012)	0.003 (0.007)
Head age	–0.577 (0.537)	–0.001*** (0.000)	0.000 (0.000)	0.001*** (0.000)
Spouse age	0.589 (0.528)	0.000 (0.000)	–0.000 (0.000)	0.000 (0.000)
Female head (=1)	–16.956* (9.525)	0.004 (0.007)	0.006 (0.008)	0.015** (0.007)
Bumiputera (=1)	–50.212*** (9.548)	0.010* (0.006)	0.018*** (0.005)	0.012*** (0.005)
<i>B) Selection model</i>				
Not enrolled in school (=1)		0.015 (0.010)	0.029*** (0.010)	–0.046*** (0.007)
Types of family (Base: Extended family)				
Nuclear		0.029 (0.019)	–0.076*** (0.017)	0.001 (0.013)
Single head		–0.035 (0.024)	0.005 (0.021)	0.017 (0.015)
Others		–0.032 (0.027)	–0.007 (0.025)	0.061*** (0.016)

(continued)

Table 2. Continued

	(1) Total	(2) Pre and primary	(3) Secondary	(4) Tertiary
No. income recipient		−0.002 (0.005)	−0.016*** (0.005)	0.019*** (0.003)
Observations	8,053	7,749	7,749	7,749
Difference test (<i>p</i> -value)	0.700			
4–23				
4–12		0.63		
13–17			0.10	
18–23				0.03

Note(s): The share of education expenditure is the ratio of total household education expenditure in an age group to total household education expenditure. The ratio of males (females) is defined as the relative number of males (females) in each age group relative to the total members aged 4–23. “Females^a” refers to the ratio of females in each tested age group. ^a is the base variable for the category or an omitted variable due to collinearity. Column (1) is the baseline model estimated using multiple linear regression. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source(s): Authors’ own work

also found for households with a high number of income recipients, particularly those with children aged 18–23 years.

Conditional on the selection variables, Tables 2 and 3 show that most of the gender-age composition variables of interest, relative to the base age group (noted as females^a), are statistically significant. However, prior to segregation, regardless of age group, this study found no significant differences (column 1 of Table 2). In the model for the share of education in pre-primary and primary education, the *p*-value of the difference test provides little evidence of a significant pro-female gap in urban residences. However, a gender gap is present in the share of education in tertiary education, particularly in rural areas. The pro-female gap in tertiary education is also much larger than what was found in previous studies on Malaysia (see Kenayathulla, 2016). Specifically, the results show that an increase in the ratio of males aged 18–23 years leads to a 0.09 unit decrease in the share of education expenditure in tertiary education, compared to an increase in the same age group. In contrast, for the secondary education model, there is a pro-male bias, especially when intergenerational effects are considered (see Table 4). The result shows that an increase in the ratio of males aged 13–17 years leads to a 0.03 unit increase in the share of education expenditure on secondary education, compared to an increase in the ratio of females in the same age group.

The pro-female bias, especially at the tertiary level, might arise due to the low completion rate of male students in upper secondary education. On the other hand, it may also reflect improved access to education for girls, and changing attitudes by both households and employers towards female education. As already mentioned, parents are increasingly relying on their daughters, rather than their sons, for welfare support in old age (Kenayathulla, 2016), which may also help to explain why disparities at the household level start to favour girls.

In terms of socio-economic status of the household, we found that households with a higher income per income recipient (i.e. average income) and households with a highly educated head of household (notably the spouse of the head of household) are more likely to spend a greater amount of money on education. These positive outcomes are higher for the share of tertiary education model than others, especially in rural regions. The finding is in line with Rashmi *et al.* (2022), among others who show that the education of the household head can reduce the gender gap in household educational spending.

Large differences in ethnicity and gender of household heads also appear in this setting. We find that conditional on the selection criteria, the share of expenditure on education is

Table 3. Household education expenditure by region

	(1) Pre and primary		(2) Secondary		(3) Tertiary	
	Rural	Urban	Rural	Urban	Rural	Urban
<i>A) Share of education model</i>						
Ratio of age-sex (Base: Females ^a)						
Males 4–12 years	0.033 (0.025)	-0.029 (0.020)	-0.093*** (0.019)	-0.118*** (0.014)	-0.200*** (0.030)	-0.215*** (0.020)
Females 4–12 years	^a	^a	-0.088*** (0.019)	-0.095*** (0.014)	-0.212*** (0.030)	-0.215*** (0.020)
Males 13–17 years	-0.066*** (0.019)	-0.145*** (0.016)	0.044 (0.029)	0.019 (0.019)	-0.185*** (0.031)	-0.195*** (0.021)
Females 13–17 years	-0.058*** (0.021)	-0.137*** (0.016)	^a	^a	-0.193*** (0.031)	-0.180*** (0.020)
Males 18–23 years	-0.068*** (0.021)	-0.174*** (0.015)	-0.095*** (0.024)	-0.121*** (0.015)	-0.090** (0.038)	-0.032 (0.028)
Females 18–23 years	-0.123*** (0.018)	-0.179*** (0.014)	-0.097*** (0.024)	-0.125*** (0.014)	^a	^a
Log income per income recipient	0.012 (0.010)	0.013*** (0.005)	-0.003 (0.009)	0.007 (0.005)	0.018** (0.007)	0.022*** (0.005)
Head education level (Base: pre and primary)						
Post-secondary and tertiary	-0.006 (0.018)	-0.006 (0.013)	-0.022 (0.018)	-0.001 (0.014)	0.020 (0.014)	-0.004 (0.012)
Secondary	-0.010 (0.013)	0.017 (0.012)	-0.013 (0.013)	0.012 (0.013)	0.013* (0.008)	-0.003 (0.010)
None	0.002 (0.017)	-0.008 (0.020)	-0.012 (0.017)	0.010 (0.020)	0.015 (0.011)	-0.019* (0.012)
Spouse education level (Base: pre and primary)						
Post-secondary and tertiary	-0.004 (0.020)	0.015 (0.016)	0.009 (0.019)	-0.000 (0.015)	0.050*** (0.016)	0.034*** (0.012)
Secondary	0.017 (0.015)	-0.005 (0.014)	0.016 (0.015)	0.005 (0.014)	0.025*** (0.009)	0.029*** (0.011)
None	-0.040** (0.018)	0.001 (0.021)	-0.018 (0.017)	-0.003 (0.017)	0.001 (0.009)	0.006 (0.013)
Head age	-0.001** (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Spouse age	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Female head (=1)	0.001 (0.013)	0.004 (0.009)	0.015 (0.015)	0.001 (0.010)	0.018* (0.010)	0.012 (0.009)
Bumiputera (=1)	0.034** (0.015)	0.006 (0.006)	0.045*** (0.012)	0.010* (0.006)	0.012 (0.009)	0.013** (0.005)
<i>B) Selection model</i>						
Not enrolled in school (=1)	0.051*** (0.018)	-0.001 (0.012)	-0.015 (0.017)	0.044*** (0.012)	-0.033*** (0.009)	-0.046*** (0.010)
Types of family (Base: Extended family)						
Nuclear	-0.007 (0.032)	0.045* (0.024)	-0.053* (0.030)	-0.081*** (0.021)	0.014 (0.017)	-0.011 (0.016)
Single head	-0.025 (0.040)	-0.042 (0.029)	0.005 (0.037)	0.007 (0.026)	-0.006 (0.022)	0.026 (0.020)
Others	-0.023 (0.048)	-0.033 (0.032)	0.018 (0.045)	-0.015 (0.029)	0.041* (0.022)	0.064*** (0.020)

(continued)

Table 3. Continued

	(1) Pre and primary		(2) Secondary		(3) Tertiary	
	Rural	Urban	Rural	Urban	Rural	Urban
No. income recipient	0.002 (0.009)	-0.004 (0.006)	-0.032*** (0.009)	-0.008 (0.006)	0.010*** (0.004)	0.023*** (0.004)
Observations	2,349	5,400	2,349	5,400	2,349	5,400
Difference test (<i>p</i> -value)						
4–12	0.18	0.14				
13–17			0.12	0.33		
18–23					0.02	0.26

Note(s): The share of education expenditure is the ratio of total household education expenditure in an age group to total household education expenditure. The ratio of males (females) is defined as the relative number of males (females) in each age group relative to the total members aged 4–23. “Females^{***}” refers to the ratio of females in each tested age group. ^a is the base variable for the category or an omitted variable due to collinearity. Standard errors in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01

Source(s): Authors’ own work

higher in ethnic Bumiputera than in non-Bumiputera (i.e. Chinese, Indian, and other households), particularly in rural areas. This occurs even though the Malaysian government has devoted significant universal assistance to eradicating poverty and redistributing wealth between Bumiputera and non-Bumiputera (Lee, 2024). Finally, we show that female-headed households are more likely to spend money on tertiary education than male-headed households. It urges the government to address the educational attainment of female heads in securing higher education and family-sustaining employment to benefit the children (see, Gault *et al.*, 2018; Zunaidi and Maghfiroh, 2021).

Household expenditure on education: intergenerational effects

Here, we examine the extent to which some gender differences in education spending are driven by household intergenerational effects. To the best of our knowledge, no other study has investigated this issue for the gender gap in education for Malaysia. In Tables 4 and 5, we present the results of: (1) intergenerational mobility; (2) intergenerational socioeconomic and (3) sibling correlations, for all samples and by rural and urban households, respectively.

The results show that the existence of gender differences in education expenditure at each education level remains unchanged, but the effect size by gender widens. Looking at intergenerational effects, many gender differences in education were found to be driven by sibling correlation effects. Regardless of region, an increase in the number of siblings per person will increase at least 0.02-unit points of education expenditure for pre-primary and primary education and 0.01-unit points for secondary and tertiary education. These effects are pronounced in urban areas particularly.

As for the effect of intergenerational mobility, which is the income per income recipient squared and years of schooling squared, the effect is U-shaped but not statistically significant. While, for socioeconomic effects, only grandparents’ education (i.e. either father or mother of the head of the household, with selection criterion for individuals with the highest education) shows a marginal positive significant effect, with households in rural areas likely to increase their education expenditure in pre and primary education expenditures.

Socio-economic policy implications

Taken together, we find strong evidence of significant gender bias in education spending, especially at the tertiary level which tends to favour girls. The evidence appears clearer when we include intergenerational effects. It is likely to reflect a cultural shift in attitudes towards women’s education and employment (Ang and Lai, 2023), apart from the lack of male students completing school. It is apparent for households in rural areas that may arise because schools in these regions

Table 4. Household education expenditure including intergenerational effects

	(1)	(2)	(3)	(4)
	Total	Pre and primary	Secondary	Tertiary
<i>A) Share of education model</i>				
Ratio of individuals (Base: Females 4–23 years)				
Males 4–23 years	1.482 (8.313)			
Ratio of age-sex (Base: Females ^a)				
Males 4–12 years		–0.011 (0.015)	–0.101*** (0.011)	–0.207*** (0.017)
Females 4–12 years			–0.083*** (0.011)	–0.211*** (0.017)
Males 13–17 years		–0.114*** (0.012)	0.027* (0.016)	–0.190*** (0.017)
Females 13–17 years		–0.105*** (0.013)		–0.180*** (0.017)
Males 18–23 years		–0.139*** (0.012)	–0.111*** (0.013)	–0.050** (0.023)
Females 18–23 years		–0.153*** (0.011)	–0.112*** (0.012)	
Log income per income recipient squared	28.575*** (10.268)	–0.004 (0.003)	0.005 (0.004)	0.001 (0.003)
Head years of schooling	37.544*** (11.434)	0.010 (0.013)	–0.016 (0.014)	0.014 (0.012)
Head years of schooling squared	–1.187*** (0.407)	–0.000 (0.000)	0.001 (0.000)	–0.000 (0.000)
Spouse years of schooling	–19.101*** (7.232)	–0.008 (0.005)	–0.010** (0.005)	–0.002 (0.004)
Spouse years of schooling squared	0.739*** (0.253)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Head occupation level (Base: Non- professional)				
Professional	1.062 (8.576)	0.010 (0.006)	–0.007 (0.006)	0.006 (0.005)
None	42.502** (21.560)	–0.008 (0.008)	–0.017* (0.010)	–0.001 (0.009)
Spouse occupation level (Base: Non-professional)				
Professional	26.816*** (10.101)	–0.004 (0.010)	–0.001 (0.008)	0.003 (0.008)
None	–29.212*** (6.320)	–0.018*** (0.007)	–0.004 (0.006)	–0.005 (0.005)
Grandparents' education	1.875 (2.620)	0.004** (0.002)	0.000 (0.001)	0.000 (0.001)
No. of siblings	13.994*** (2.938)	0.018*** (0.002)	0.013*** (0.002)	0.007*** (0.002)
Observations	8,053	7,749	7,749	7,749
Difference test (<i>p</i> -value)				
4–23	0.85			
4–12		0.46		
13–17			0.08	
18–23				0.02

Note(s): The share of education expenditure is the ratio of total household education expenditure in an age group to total household education expenditure. The ratio of males (females) is defined as the relative number of males (females) in each age group relative to the total members aged 4–23. “Females^a” refers to the ratio of females in each tested age group. ^a is the base variable for the category or an omitted variable due to collinearity. Column (1) is the baseline model estimated using multiple linear regression. Other variables in the main model and selection model are included but omitted in the above table for brevity. Standard errors in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01

Source(s): Authors' own work

Table 5. Household education expenditure by region including intergenerational effects

	(1)		(2)		(3)	
	Pre and primary Rural	Urban	Secondary Rural	Urban	Tertiary Rural	Urban
<i>A) Share of education model</i>						
Ratio of age-sex (Base: Females ^a)						
Males 4–12 years	0.026 (0.023)	-0.032* (0.019)	-0.081*** (0.019)	-0.110*** (0.014)	-0.197*** (0.030)	-0.211*** (0.020)
Females 4–12 years			-0.076*** (0.019)	-0.087*** (0.014)	-0.208*** (0.031)	-0.212*** (0.020)
Males 13–17 years	-0.062*** (0.019)	-0.140*** (0.015)	0.046 (0.029)	0.020 (0.019)	-0.184*** (0.031)	-0.192*** (0.021)
Females 13–17 years	-0.055*** (0.021)	-0.130*** (0.016)			-0.191*** (0.031)	-0.176*** (0.020)
Males 18–23 years	-0.075*** (0.020)	-0.168*** (0.015)	-0.090*** (0.024)	-0.118*** (0.015)	-0.091** (0.038)	-0.031 (0.028)
Females 18–23 years	-0.126*** (0.018)	-0.171*** (0.014)	-0.092*** (0.024)	-0.118*** (0.014)		
Log income per income recipient squared	-0.013 (0.012)	-0.004 (0.004)	-0.003 (0.010)		0.000 (0.011)	0.002 (0.004)
Head years of schooling	-0.019 (0.025)	0.028* (0.017)	0.006 (0.025)	-0.011 (0.018)	0.026 (0.022)	0.009 (0.015)
Head years of schooling squared	0.001 (0.001)	-0.001* (0.001)	-0.000 (0.001)		-0.001 (0.001)	-0.000 (0.000)
Spouse years of schooling	-0.006 (0.007)	-0.004 (0.007)	-0.006 (0.008)	-0.009 (0.006)	-0.003 (0.007)	-0.001 (0.005)
Spouse years of schooling squared	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Head occupation level (Base: Non- professional)						
Professional	0.012 (0.014)	0.009 (0.007)	-0.007 (0.013)	-0.005 (0.006)	0.005 (0.013)	0.006 (0.006)
None	-0.018 (0.014)	-0.004 (0.010)	-0.023 (0.016)	-0.009 (0.012)	-0.010 (0.014)	0.004 (0.013)
Spouse occupation level (Base: Non- professional)						
Professional	-0.029 (0.022)	0.003 (0.011)	0.004 (0.023)	0.002 (0.009)	0.003 (0.021)	0.004 (0.008)
None	-0.024** (0.012)	-0.016* (0.008)	-0.029** (0.013)	0.006 (0.007)	-0.006 (0.009)	-0.004 (0.006)
Grandparents' education	0.011*** (0.004)	0.002 (0.002)	0.001 (0.003)	-0.000 (0.001)	0.000 (0.002)	-0.000 (0.001)
No. of siblings	0.021*** (0.003)	0.017*** (0.002)	0.009*** (0.003)	0.015*** (0.002)	0.005* (0.002)	0.008*** (0.002)
Observations	2,349	5,400	2,349	5,400	2,349	5,400
Difference test (<i>p</i> -value)						
4–12	0.26	0.09				
13–17			0.11	0.29		
18–23					0.01	0.26

Note(s): The share of education expenditure is the ratio of total household education expenditure in an age group to total household education expenditure. The ratio of males (females) is defined as the relative number of males (females) in each age group relative to the total members aged 4–23. “Females^{ab}” refers to the ratio of females in each tested age group. ^a is the base variable for the category or an omitted variable due to collinearity. Other variables in the main model and selection model are included but omitted in the above table for brevity. Standard errors in parentheses. * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

Source(s): Authors' own work

are often under-resourced, and therefore there may be greater challenges and not the same opportunities for parents to invest in their children's education as there are in rural areas (Surianshah, 2021). Besides, parental involvement in schooling is expected to be highly associated with their children's likelihood to complete schooling (Kantova, 2024). Hence, to reduce the potential factors contributing to low investment in boys' schooling, a more strategic social plan is needed. Additionally, initiatives from the Ministry of Rural and Regional Development (KKDW) to improve public welfare, including access to education, should be prioritised.

In terms of economic policy implications, the government and policymakers should continue to strengthen the endowment for women while improving their attention to male education to lessen the inequality in education. Besides, they can pay attention to households with female heads and large family members. This is because every increase in family size posits additional pressure on the household's current income, whereby resulting in diversion of consumption expenses (Casado *et al.*, 2024), a marginal propensity to consume effect. Afendi *et al.* (2024) showed the negative effects of entity consumption and its savings. However, many independent and women entrepreneurs in Malaysia nowadays gives the impression that they are able to contribute positively to children's education as well as other aspects of the household economy. Therefore, the government's current initiatives, such as those led by the Ministry of Entrepreneur Development and Cooperatives to empower women entrepreneurs, need to be continuously strengthened.

Finally, the role of households in improving education investment needs to be improved. This study suggests that income significantly affects education expenditure, and generation including the education of grandparents can have a positive effect on education expenditure especially in rural areas. Hence, to reduce inequality between rural and urban areas, initiatives such as those targeted in financial aids and lifelong education need to be implemented to achieve national targets for the next phase of the Education Blueprint Plan and global agenda Sustainable Development Goals – SDG 4 – quality education: ensure inclusive and equitable quality education and encourage lifelong learning opportunities for all.

Conclusion

This paper aims to examine gender differences in the allocation of household expenditure on education as a whole and by region. We find evidence of a pro-male bias in education expenditure for children aged 13–17 years, while there is a pro-female bias for children at the pre- and primary and tertiary levels. These differences are largely driven by rural households and the effect remains unchanged if we include household intergenerational effects. We find that, particularly for rural households, a better socio-economic background may help reduce some of the gender disparities in the region. On the other hand, sibling size is found significantly and indirectly associated with the gender gap in education, regardless of region.

In summary, we find strong evidence of a significant gender bias in education spending, which at the tertiary level tends to favour girls. However, it should be noted that even though girls are more likely to outperform boys' acquisition, especially at the tertiary level, this does not translate to gender parity in the labour market. Malaysia still has a significant pro-male gap in the workplace, for example, women's roles in STEM comprise only 28.2% of the STEM workforce compared to 47.3% in non-STEM sectors (World Economic Forum, 2024). If education is meant to provide opportunities in later life, it is being devalued when gaps – whether in Malaysia or in other countries facing similar issues – are not reduced.

Notes

1. These include schemes such as Supplementary Meal Plan, Tuition Aid Scheme, Poor Students Trust Fund and National Higher Education Fund Corporation.

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