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Analysis of Preferences in Choosing Upper Secondary Schools Among Private MTs Students Using a Multinomial Logistic Regression Model

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ABSTRACT
For MTs students, the selection of higher secondary school (SMA, SMK and MA) is a considerable decision that can be affected by a combination of several academic and non-academic aspect. The purpose of this study is to find out the determinants of higher educational choices in Private MTs students. The analysis method used is multinomial logistic regression to determine the factors that influence the choice of Private MTs students in Pinang District, Tangerang City with a sample of 226 students. Based on the results of the analysis, there is one variable that influences the selection of a top-level advanced school for Private MTs students in Pinang District, Tangerang City, which is tuition fees (P-value < 0.05). Tuition fees affect students' choice between high school and vocational school, and other variables do not show statistically significant effects.

Keywords:
Multinomial logistic regression; preference; Private MTs

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INTRODUCTION

Education has a significant role in shaping quality human resources. To enhance the equity and quality of education, the Government of Indonesia is constantly making various efforts through school facilities and infrastructure development and curriculum updating such as Independent Curriculum (IK). Nonetheless, opportunities for equitable access and quality of education are still challenged by limited facilities, inconsistent teacher distribution, and zoning policy in PPDB which presents a dilemma for students to choose their school in accordance with their interests and potential. SMP Students or Junior high school come from various junior high schools and the MTs, especially with respect to different curriculum (syllabus) so that after graduating from the SMP/MTs they are dealing with high schools, vocational high schools, and MA whose academic and vocational characteristics which are also varying. Just like high school the goal of MA is also to enable students transition into public universities as well as Islamic universities Finally, vocational schools target more at producing middle-level workforce (Awliya, 2007).

Internationally, school choice research frames the decision as a household utility problem in which families weigh the costs and benefits of available educational tracks, with tuition, income, and time constraints acting as key determinants alongside social and peer influences (Nandi et al., 2023; Zwier, 2026). In the Indonesian context, secondary school track selection has been shown to carry long-term consequences: SMK graduates tend to enter the labor market earlier, while SMA graduates pursue different post-secondary trajectories, so the choice between tracks is not merely a short-term preference but a decision with lasting economic implications (Ariansyah et al., 2024; Hutabarat et al., 2023). Most Indonesian studies employing multinomial

logistic regression on school choice, however, have focused on public school or general junior-secondary populations, leaving the decision-making of private Islamic junior-secondary (MTs) students comparatively unexamined.

Data from BPS provides the appearance of a greater likelihood to increase the number of students who attend high school and vocational school than MA, this indicates that there is usually a preference in the selection of higher schools (BPS 2023). Particularly regarding students attending private MTs, things like report card scores, family socio-economics conditions, distance to school along with interest and familial support become non-academic factors impacting on school choice. While previous investigations on these factors were conducted, it was still restricted to junior high or public school students. This gap is important because private MTs students face a distinct combination of religious-curriculum background and, in many cases, lower household resources, which may shape their post-secondary decisions differently from their public-school peers. Thus, this study aims to determine the determinants of advanced school selection among Private MTs students in Pinang District using multinomial logistic regression. This study is among the first to examine this issue among Private MTs students, and its findings are expected to serve as a basis for consideration by schools, parents, and policymakers in assisting students to determine their educational pathway after junior secondary school.

METHOD

This research uses a quantitative method with an explanatory design to analyze the effect of predictors on the selection of high school (high, vocational and MA). The population in this research is private MTs grade IX students at Pinang District who continue their study to high school, vocational school or MA. Based on existing data, in Pinang District there are five private MTs (MTs Al-Manshuriyah Cipete, MTs Daarul Muqorrobin, MTs Nurul Iman, MTs Al-Mubarok and MTs Nurul Huda). The two stage cluster random sampling method was used for selecting samples.

In the first stage, two schools MTs Daarul Muqorrobin and MTs Al-Mubarok were selected using simple random sampling. In the second stage, grade IX was selected as the sampling unit from the three grade levels (VII, VIII, and IX) within each school. This resulted in seven grade IX classes across the two schools, with a total of 226 students serving as respondents.

Data were collected using a closed-ended questionnaire distributed through Google Forms. The questionnaire covered the following variables: continuing school choice (SMA, SMK, or MA), parents' last education, monthly parental income, parents' occupation, number of dependent family members, average student score, family support, student interest, travel distance to school, school accreditation, school environment/facilities, and tuition fees. The raw data were coded numerically to form the primary dataset, which was subsequently processed using statistical software.

The questionnaire items in this study were developed by the researcher based on a literature review, without undergoing a formal adaptation process from a previously validated instrument. Instrument testing was carried out using the Pearson product-moment validity test, which was performed by calculating the correlation

between each item's score and the total instrument score (the sum of scores across all items). An item was considered valid if its correlation with the total score was high. Reliability testing, meanwhile, was aimed at determining the consistency of the research instrument. Instrument reliability can be tested using Cronbach's Alpha,

Multinomial logistic regression was used to analyze the data, as it is a regression model where the response variables have one or more predictor variable (Vittinghoff, 2005). The second model is reducing the response modifier into three categories (SMA, SMK, and MA) where SMK category is used as a comparison category resulting in two logite functions. Likelihood Ratio Test is used for doing parameter testing simultaneously and Wald test is used for partial testing. Deviance Statistics (Likelihood Ratio Test) tests the suitability of models. Interpretation of the model results was performed according to odds ratio (OR) value as representational measure and describes how changing a variable influences the choice of advanced school.

According to Hosmer & Lemeshow (2000), the general multinomial logistic regression model using the logit function is:

$$g_j(x_i) = ln\left[\frac{\pi_j x_i}{\pi_0 x_i}\right] = = \beta_{j0} + \sum_{k=1}^{p} \beta_{jk} x_{ki}$$

Where:

$g_j(x_i)$ = the logit function of the response variable for category -j on predictor variable - k expressed as vector x

β_{jk} = the model coefficient for predictor variable j and predictor variable -k

x_{ki} = the value of predictor variable k at observation i

j = 0, 1, 2, …., $j-1$; j is the number of categories of the response variable

k = 1, 2, … p ; p is the number of predictor variables

The hypotheses for testing are as follows:

H_0 : $\beta_{j1} = \beta_{j2} = \ldots = \beta_{jp} = 0$; $\beta_{jk} = 0$, the predictor variable has no effect on the response variable.

H_1: at least one $\beta_{jk} \neq 0$, meaning at least one predictor variable has an effect on the response variable.

The test statistic used to simultaneously test the parameters of the multinomial logistic regression model is the G^2test statistic, or likelihood ratio test, expressed as follows:

$$G^2 = -2\ ln\left(\frac{L_0}{L_0}\right) = -2\ [ln(L_0) - ln(L_1)] = -2(\ell_0 - \ell_1)$$

According to Hosmer & Lemeshow (2000), the G-test can generally be written as follows:

$$G = -2ln\left[\frac{\prod_{j=0}^{J-1}\left(\frac{n_{jk}}{n}\right)^{n_{jk}}}{\prod_{i=1}^{n}\ [\pi_j(x_i)^{y_{ji}}]}\right] \sim X^2(s-r)$$

Where:

n_{jk} = the number of observations in category j of predictor variable k

$\pi_j(x_i)$ = the probability of the response variable category j at observation i

y_{ji} = the binary response variable value (0,1) for category j and observation i

s = the number of estimated parameters for the full model
R = the number of estimated parameters for the reduced model

Reject H_0 if $G \geq X^2_{\alpha(s-r)}$ or $P\left(X^2_{(s-r)} > G\right) < \alpha$. This means that at least one predictor variable has an effect on the response variable.

To test the significance of each independent variable in the model, the Wald Test can be used. The Wald Test is obtained by comparing the maximum likelihood estimate of the parameter $\beta_1, \beta_2, \ldots \beta_k$ with the estimate of the standard error (Hosmer & Lemeshow, 2000).

$$wald = \frac{\hat{\beta}_k}{SE(\hat{\beta}_k)}$$

Where $SE(\hat{\beta})$ is the standard error of the maximum likelihood estimate.
$\hat{\beta}_k$ is the estimate of parameter β_k.
$H_0 : \beta_k = 0$, with h =1,2,3,… (independent variable k has no effect on the dependent variable)
$H_1 : \beta_k \neq 0$, with h =1,2,3,… (independent variable k has an effect on the dependent variable). If the P-value is smaller than the significance level, then reject H_0 and it can be concluded that the independent variable has a significant effect. The rejection region for H_0 is if $|W| > X_{\propto/2}$ *or* $W^2 > X^2$with degrees of freedom v.

The model fit test in this study uses the Deviance Statistic (Likelihood Ratio Test) by comparing the deviance value of the full model with the model without predictors.

The test statistic used is:

$$G^2 = -2ln\left(\frac{L_0}{L_1}\right)$$

The testing hypotheses are as follows:
H_0: The model fits the data (there is no significant difference between the model and the observed data).
H_1: The model does not fit the data.

The decision is made by comparing the deviance statistic value with the Chi-Square table value or based on the p-value. If the p-value > 0.5, then H_0 is not rejected, so the model is considered fit and suitable for interpretation.

RESULTS AND DISCUSSION

In the variable test, there were several significant variables ($p < 0.05$).

Table 1. Partial Parameter Test

Variable		Logit 1 High School vs Vocational School			Logit 2 MA vs SMK		
		$\hat{\beta}_{jk}$	Std. Error	P – value	$\hat{\beta}_{jk}$	Std. Error	P – value
Intersep	-	-2.324	-1.158	0.247	0.577	0.153	0.879
Father's last education (X_1)	Elementary/Equivalent	-0.556	-8.590	0.390	-12.012	-1.078	0.000
	Junior High School/Equivalent	-0.013	-0.027	0.978	0.306	0.257	0.797
	High School/Equivalent	0	0	0	0	0	0
	Colleges	0.579	1.254	0.210	0.152	0.185	0.853
Mother's last education (X_2)	Elementary/Equivalent	0.113	0.194	0.846	-0.701	-0.480	0.631
	Junior High School/Equivalent	-0.078	-0.189	0.850	-1.053	-0.890	0.373
	High School/Equivalent	0	0	0	0	0	0
	Colleges	1.500	1.561	0.119	3.961	2.718	0.007
Monthly parental income (X_3)	<2 million	0.123	3.254	0.745	-22.976	-2.288	0.000
	2 million – 5 million	0	0	0	0	0	0
	>5 million	-0.381	-0.778	0.436	-0.377	-0.373	0.706
Father's work (X_4)	Not working/Unsteady job	-0.301	-0.473	0.636	1.070	0.721	0.471
	Farmer/Fisherman/Labourer	-0.162	0.290	0.773	-0.694	-0.457	0.647
	Entrepreneur/Trader	-0.378	-0.950	0.342	0.380	0.468	0.639
	Foreigners/Private Employees	0	0	0	0	0	0
Mother's work (X_5)	Not working/Unsteady job	0	0	0	0	0	0
	Farmer/Fisherman/Labourer	-0.770	-0.917	0.359	1.034	0.610	0.542
	Entrepreneur/Trader	0.070	0.181	0.856	0.150	0.175	0.861
	Foreigners/Private Employees	0.085	0.175	0.861	-1.181	-1.141	0.254
Number of dependent family members (X_6)	1	-0.240	-0.381	0.703	0.948	0.794	0.427
	2	0.363	0.899	0.369	1.102	1.207	0.228
	3	0	0	0	0	0	0
	More than 4	0.814	2.045	0.041	0.574	0.664	0.507
Average value (X_7)	< 75	0.065	0.173	0.863	-0.576	-0.651	0.515
	> 75	0	0	0	0	0	0
Family support (X_8)	-	0.332	0.761	0.442	0.264	0.266	0.790
Student Interest (X_9)	-	-0.541	-1.284	0.199	-1.083	-1.156	0.248
Distance travel time (X_{10})	-	0.313	0.783	0.434	-0.375	-0.460	0.646

Variable		Logit 1 High School vs Vocational School			Logit 2 MA vs SMK		
		$\hat{\beta}_{jk}$	Std. Error	P – value	$\hat{\beta}_{jk}$	Std. Error	P – value
School accreditation (X_{11})	-	-0.559	-1.334	0.182	0.921	1.070	0.285
School Environment Facilities (X_{12})	-	0.073	0.226	0.821	-0.796	-1.020	0.308
Tuition fees (X_{13})	-	0.887	2.457	0.014	0.454	0.618	0.536

Based on table 1 of the results of the p-value, the resulting model is as follows:

Logit 1

$$g_1(x_i) = -2.324 - 0.556x_{1i}(0) - 0.013x_{1i}(1) + 0.579x_{1i}(2) + 0.113x_{2i}(0) - 0.078x_{2i}(1) + 1.500x_{2i}(2) + 0.123x_{3i}(0) - 0.381x_{3i}(1) - 0.301x_{4i}(0) - 0.162x_{4i}(1) - 0.378x_{4i}(2) - 0.770x_{5i}(0) + 0.070x_{5i}(1) + 0.085x_{5i}(2) - 0.240x_{6i}(0) + 0.363x_{6i}(1) + 0.814x_{6i}(2) + 0.065x_{7i} + 0.332x_{8i} - 0.541x_{9i} + 0.313x_{10i} - 0.559x_{11i} + 0.073x_{12i} + 0.887x_{13i}$$

Logit 2

$$g_2(x_i) = 0.577 - 12.012x_{1i}(0) + 0.306x_{1i}(1) + 0.152x_{1i}(2) - 0.701x_{2i}(0) - 1.053x_{2i}(1) + 3.961x_{2i}(2) - 22.976x_{3i}(0) - 0.377x_{3i}(1) + 1.070x_{4i}(0) - 0.694x_{4i}(1) + 0.380x_{4i}(2) + 1.034x_{5i}(0) + 0.150x_{5i}(1) - 1.181x_{5i}(2) + 0.948x_{6i}(0) + 1.102x_{6i}(1) + 0.574x_{6i}(2) - 0.576x_{7i} + 0.264x_{8i} - 1.083x_{9i} - 0.375x_{10i} + 0.921x_{11i} - 0.796x_{12i} + 0.454x_{13i}$$

The best model was selected using the backward elimination method. This technique is used to discover the simplest best-fitting model while still having an adequate explanative capability of the reponse variables by dropping unimportant predictor variables, finding important predictors which affect advanced school choice.

Table 2. Estimator of the parameters of the best model of multinomial logistic regression.

		Logit 1 High School vs Vocational School			Logit 2 MA vs SMK		
		$\hat{\beta}_{jk}$	Std error	p-value	$\hat{\beta}_{jk}$	Std error	p-value
intersep	-	-3.034	1.110	0.006	-2.369	1.900	0.212
Monthly parental income (X_3)	<2 million	-0.148	0.312	0.635	-11.216	91.576	0.902
	>5 million	-0.283	0.437	0.517	-0.048	0.658	0.941
Tuition fees (X_{13})	-	0.744	0.276	0.007	0.218	0.480	0.650

Thus, the optimal multinomial logistic regression model was obtained that is a model consisting of variables X3 and X13 with 1 significant variable tuition fees. The best

multinomial logistic regression model formed by an equation from table 2 in logit yield is as follows:

1st logit function (SMA)

$$g_1 x_i = \text{-}3.034 - 0.148_{X3I(0)} - 0.283_{X3I(1)} + 0.744_{X13I(0)}$$

2nd logit function (MA)

$$g_2 x_i = -2.368 - 11.216_{X3I(0)} - 0.048_{X3I(1)} + 0.218_{X13I(0)}$$

The following is a model for the best multinomial logistic regression opportunities that are formed, namely:

Multinomial logistic regression opportunities for vocational schools:

$$\pi_0(x_i) = \frac{1}{1 + exp(-3.034 - 0.148_{X3I(0)} - 0.283_{X3I(1)} + 0.744_{X13I(0)}) + exp(-2.368 - 11.216_{X3I(0)} - 0.048_{X3I(1)} + 0.218_{X13I(0)})}$$

Multinomial logistic regression opportunities for high school:

$$\pi_1(x_i) = \frac{\exp(-3.034 - 0.148_{X3I(0)} - 0.283_{X3I(1)} + 0.744_{X13I(0)})}{1 + exp(-3.034 - 0.148_{X3I(0)} - 0.283_{X3I(1)} + 0.744_{X13I(0)}) + exp(-2.368 - 11.216_{X3I(0)} - 0.048_{X3I(1)} + 0.218_{X13I(0)})}$$

multinomial logistic regression opportunities for MA:

$$\pi_2(x_i) = \frac{\exp(-2.368 - 11.216_{X3I(0)} - 0.048_{X3I(1)} + 0.218_{X13I(0)})}{1 + exp(-3.034 - 0.148_{X3I(0)} - 0.283_{X3I(1)} + 0.744_{X13I(0)}) + exp(-2.368 - 11.216_{X3I(0)} - 0.048_{X3I(1)} + 0.218_{X13I(0)})}$$

The next step is to test the suitability of the model to see whether the multinomial logistic regression model formed is appropriate or not.

Table 3. Model Fit Test Results

	Statistics Deviance (Likelihood Ratio Test)
Chi-Square	22.73673
df	6
p-value	0.0008896226

Two variables monthly parental income and tuition fees were retained in the final model after backward elimination, although only tuition fees was statistically significant. Notably, the second logit function (MA vs. SMK) contained no significant predictors. Based on the model parameter estimates, the following section interprets the results using the odds ratio (OR).

Table 4. Odds Ratio For Logit Model 1

Logit 1	Variable	$\hat{\beta}_{jk}$	Std errors	Odds Ratio	P-value	Remarks
High School vs Vocational School	Tuition fees (X_{13})	0.744	0.276	2.105	0.007	Significant

As seen in table 4, p-value =0.007 < 0.05 has an odds ratio of 2,104, meaning that for a unit increase in tuition fees, students are 2,105 times more likely to prefer high school to vocational school ceteris paribus.

CONCLUSION

The best model, obtained through the backward elimination method, retained two predictor variables, monthly parental income (X3) and tuition fees (X13) although only tuition fees showed a statistically significant effect on school choice (p = 0.007). Students facing higher tuition fees were 2.105 times more likely to choose SMA over SMK, holding other variables constant. This finding indicates that, among Private MTs students in Pinang District, the cost of education is the primary determinant distinguishing the choice between general (SMA) and vocational (SMK) education pathways. This result is in line with research by Mulyasa (2013) and Walangitan et al. (2022) previous studies emphasizing the role of education cost in shaping school choice.

This pattern of tuition fees emerging as the dominant, near-exclusive determinant is consistent with the household utility perspective on school choice, in which families facing binding budget constraints weigh direct costs more heavily than qualitative or non-academic considerations once a minimally acceptable set of alternatives is available (Nandi et al., 2023). It also mirrors labor-market evidence from Indonesia showing that the SMA-SMK choice carries real economic consequences after graduation, such as differences in time-to-first-employment (Ariansyah et al., 2024; Hutabarat et al., 2023), which may lead financially constrained families to treat tuition as a proxy for the affordability of the pathway that best matches their expected returns. A plausible explanation for the limited role of the remaining variables is the relative homogeneity of private MTs households in Pinang District: because most respondents share a similar religious-school background and a comparatively narrow income range, there may be too little variation in these variables for their effects to be statistically detectable, even if they matter in a more heterogeneous population.

Monthly parental income remained in the final model as a result of the backward elimination procedure but did not reach statistical significance (p = 0.635 and p = 0.517 for Logit 1 and Logit 2, respectively). This suggests that income alone does not directly determine school choice once tuition fees are accounted for; rather, tuition fees may act as the more immediate financial consideration for families, regardless of income level.

The remaining ten variables are parental education, parental occupation, number of dependents, average grades, family support, student interest, distance to school, school accreditation, and school facilities did not show statistically significant effects. This is consistent with several previous studies (Subekti, 2013; Scott, 2017; Sullivan et al., 2010; Sutiana et al., 2017; Istifarani, 2016; Febriani, 2019; Kristanto & August, 2025; Salfiah et al. 2022) suggesting that non-academic and social factors often play a smaller role relative to direct financial considerations in this context. The relatively homogeneous characteristics of the sampled population — all drawn from

Private MTs within a single sub-district may also have limited the variability needed to detect the effects of these factors.

This study has several limitations that should be considered when interpreting the findings. First, the sample was drawn from only two of five Private MTs in Pinang District, which may limit the generalizability of the results to the broader population of Private MTs students. Second, the cross-sectional design captures school choice intentions at a single point in time and does not account for how preferences may evolve. Third, data were collected through self-reported questionnaires, which may be subject to response bias, particularly for sensitive items such as household income.

These findings suggest that tuition-related financial burden is a key barrier influencing whether Private MTs students pursue general versus vocational secondary education. Schools, local education offices, and policymakers may consider targeted tuition subsidies or scholarship schemes for SMA track students from lower-income households to reduce financial barriers to their preferred educational pathway.

More specifically, these findings suggest that the Ministry of Religious Affairs and local education offices could prioritize need-based tuition subsidies or Program Indonesia Pintar-style assistance for MTs graduating cohorts intending to pursue SMA, given evidence that similar assistance programs in Indonesia have measurably improved access for financially constrained households (Sitompul & Iskandar, 2024). Schools could also complement financial assistance with early, transparent information on the total cost of each pathway (SMA, SMK, and MA), since tuition appears to function as the clearest signal families use when comparing options.

Future research is encouraged to expand the sampling frame to cover all Private MTs in the district, incorporate qualitative approaches to better understand the role of non-academic factors, and consider potential multicollinearity among predictors before finalizing the model.

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