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Factors Affecting the Eligibility of Zakat Assistance to University Students During COVID-19: A Case Study in Universiti Teknologi MARA (UiTM)

Azlan Abdul Aziz*, Nor Azriani Mohamad Nor,
Wan Nurshazelin Wan Shahidan, Siti Nor Nadrah Muhamad
**Corresponding Author*

Kolej Pengajian Pengkomputeran, Informatik dan Media, Universiti Teknologi MARA Cawangan Perlis, Perlis, Malaysia
Statistical Analytics, Forecasting & Innovation (SAFI) Research Interest Group, Universiti Teknologi MARA Cawangan Perlis, Perlis, Malaysia

azlan172@uitm.edu.my
Tel: +6049882891

Abstract
The Unit Zakat, Sedekah & Wakaf (ZAWAF) Universiti Teknologi MARA (UiTM) Cawangan Perlis has offered Islamic financial assistance such as Zakat Sara Diri, Zakat Yuran Pengajian, and Zakat Komputer Riba to students during online pandemic COVID-19. Therefore, ZAWAF needs to identify factors contributing to the eligibility for Zakat assistance. The Binary Logistic regression model was used to determine the significant factors. Stepwise selection procedures are used to yield the most appropriate regression equation. Wald statistics were used to determine the significant factors. Four factors significantly are the Head of a family's monthly income, mother's monthly income, family dependents, and gender.

Keywords: zakat; COVID-19; Binary Logistic Regression; ZAWAF

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1.0 Introduction

According to Lembaga Zakat Selangor (LZS) (2022) and Majlis Agama Islam Dan Adat Melayu Terengganu (MAIDAM) (2022), zakat is derived from the Arabic word "al-Zakat", which means holy, blessing, blessing, bloom, fertilize, grow and charity. The definition of zakat in Islamic law is the issuing of a certain amount of property to the asnaf, who are entitled to receive it after fulfilling the conditions set by the law. From the point of view of Islamic beliefs, zakat is one of the five pillars of Islam. The order to pay zakat has been written in the Qur'an, which explains that a Muslim must pay zakat (*The Qur'an 2:110*, 2022; *The Qur'an 24:56*, 2022; *The Qur'an 9:103*, 2022; *The Qur'an 9:60*, 2022). The zakat is then distributed to eight groups of asnaf, as explained in the holy book (*The Qur'an 9:103*, 2022). According to (PPZMAIWP, 2022) there are eight groups of zakat recipients, 1) Fakir - a person who does not have any property or job or receives income from other sources that does not reach 50 percent of his daily needs and the needs of his dependents and does not reach 50 percent of the living expenses of a person who simple life and dependents, 2) Poor - Someone who has a job or business that only partially meets their basic needs but is not enough to cover their daily needs and also cover their dependents, 3) amil - Those who are directly involved with zakat institutions whether individuals or organizations to manage and administer zakat affairs including collection, distribution, financial affairs, 4) Muallaf - those whose hearts are expected to accept Islam, 5) Al-Riqab - freeing Muslims from the grip of slavery and conquest either in terms of physical or mental grip such as grip n ignorance and shackled under the control of certain people, 6) Al-Gharimin - Those who are in debt to meet the basic needs for the benefit of themselves, their dependent families or the community who need an immediate solution and allowed by the Islamic law, 7) Fisabilillah - any person or party who engages in an activity to defend and preach the religion of Islam and its virtues, and 8) Ibnu Sabil - any person traveling for purposes approved by Islamic law from any state or country that needs assistance. In summary, the

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wisdom of the law is to pay zakat not only to purify the property and soul of Muslim individuals but also to help the poor people (asnaf) eligible to receive zakat distribution. Zakat is an effective instrument in eradicating poverty and improving the socio-economic status of society if the process of collecting and distributing zakat to the asnaf is done efficiently and effectively.

The Movement Control Order (MCO) implementation on 18 March 2020 (MKN, 2020) following the sharp increase in COVID-19 cases in Malaysia has resulted in the closure of all public and private higher education institutions (IPTs). Students at all levels of education are instructed to undergo online distance learning (ODL) sessions (KPM, 2020). ODL makes students difficult, especially those from low-income families, as they need facilities such as laptops and internet connection previously provided at their universities (Khairuddin et al., 2020; Mathew & Chung, 2020; Nasir & Mansor, 2021; Rabindarang & Arjunan, 2021; Saifudin & Hamzah, 2021). Aware of the problems experienced, the Unit Zakat, Sedekah dan Wakaf (ZAWAF) Universiti Teknologi MARA (UiTM) Cawangan Perlis, Malaysia, has opened special financial assistance such as *Zakat Sara Hidup*, *Zakat Bantuan Yuran Pengajian* and *Zakat Bantuan Komputer Riba*. A total of 28 lecturers from various faculties have volunteered to interview zakat applications. The approval of the zakat application will be evaluated based on several factors, such as the parent's monthly income, the type of sponsorship obtained, and the student's academic achievement. Even though there are past studies related to zakat, the scope of the study is more focused on zakat collection and management. The literature search results found no studies have been conducted to identify the eligibility factors for zakat assistance, especially during the COVID-19 pandemic. Therefore, this study aims to identify factors that are significant to the eligibility of zakat assistance so that it can guide ZAWAF and interviewers in the future.

2.0 Literature Review

A previous research search was conducted to identify publication patterns related to zakat. The process started with a search for the keyword "zakat" in the Scopus database from 1969 to 2023. Thus, the search query TITLE-ABS-KEY ("zakat") has been performed. The search results found that 928 documents were published, and the earliest study (Apte, 1969) titled "The Nature and Scope of the Records from Peshwa Daftar with Reference to Zakat System". There is an upward movement in terms of the trend of publications related to "zakat" (Fig. 1). Malaysia and Indonesia are the countries that produce the most publications related to "zakat" with 357 and 271 publications, respectively. Out of the 928 documents obtained, a total of 213 documents were published related to "zakat" and "distribution". This process uses the search query TITLE-ABS-KEY ("zakat" AND "distribution") on the same database. Among the studies that have been carried out is the use of zakat financial assistance to the transgender or LGBT community in the rehabilitation process (Usman, 2023). In fact, there is also a study on the use of zakat for UNHCR Refugees in Canada where UNHCR utilizes Islamic finance tools like zakat and sadaqah to meet the humanitarian needs of forcibly displaced people (Asaker, 2022). Various modeling methods have been used to help launch the zakat distribution process, such as the use of the Analytical Network Process (AHP) method to identify the best zakat recipients based on health and wealth criteria (Haryanti et al., 2022), and the use of Artificial Intelligence (AI) to help victims and groups in need from the COVID-19 outbreak (Raza Rabbani et al., 2022). The authors used AI and NLP-based Fintech models to collect and distribute zakat aid to the needy, poor, COVID-affected, and vulnerable sections of society. When the COVID-19 pandemic hit the world, a total of 44 publications studied the role of zakat in helping affected groups such as the study conducted by (Chotib, 2021), where this study wants to analyze the zakat empowerment concept from the perspective of health and welfare during a pandemic. The study results found that the COVID-19 pandemic can be categorized as a *maslahah hajiyah* and the zakat empowerment concept in the health and economic sector should be validated in legal regulation when the pandemic occurs. Another study conducted found the need for close cooperation between zakat donators (*muzakki*) and zakat recipients (*mustahik*) to strengthen the fundraising capability in Islamic social finance institutions during COVID-19 (Herianingrum et al., 2022). The outcomes of the study found that unaffected zakat donators need to continue paying zakat to help zakat recipients, but if there are *muzakki* (zakat donators) who are affected, they can reduce the zakat payment rate.

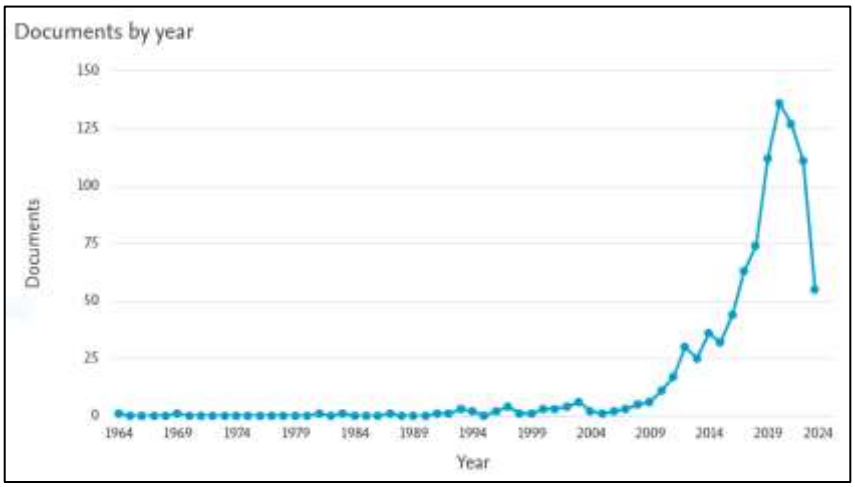

Fig. 1: Trend of Publication Related to "Zakat"
(Source:) Scopus Database (2023)

3.0 Methodology

Three phases were used in this study: 1) Data Acquisition, 2) Exploration Data Analysis, and 3) Data Analysis. Data from the Unit Zakat, Sedekah, and Wakaf (ZAWAF) of UiTM Cawangan Perlis have been obtained in the first phase . Zakat application information since the COVID-19 pandemic from March 2020 until February 2022 has been recorded through Google Forms and Google Spreadsheet (Azlan, 2023b, 2023c, 2023a, 2023d). A total of 1934 data throughout four semesters have been screened, and the details of the variables are as follows:

Table 1. Data acquisition from ZAWAF

Session	Semester	N
1	Mac – August 2020	490
2	October 2020 – February 2021	530
3	Mac – August 2021	495
4	October 2021 – February 2022	419
	Total	1934

(Source: Unit Zakat, Sedekah, and Wakaf (ZAWAF) of UiTM Cawangan Perlis)

Table 2. Variables Description

Id	Variable Name	Description	Variable Type
1	*studentId*	Student ID	Continuous
2	*sesi*	Session	Categorical
3	*markah*	Interview evaluation score	Categorical
4	*kelayakan*	Eligibility status of zakat application (Eligible; Not Eligible)	Categorical
5	*jantina*	Gender	Categorical
6	*negeri*	State	Categorical
7	*fakulti*	Faculty	Categorical
8	*program*	Programme	Categorical
9	*semester*	Semester programme	Categorical
10	*cgpa*	Cumulative Grade Point Average	Continuous
11	*statusPelajar*	Student marital status	Categorical
12	*pekerjaanKetua*	Father's occupation	Categorical
13	*hubungan*	Relationship	Categorical
14	*statusKetua*	Father's marital status	Categorical
15	*jumlahPendapatanKetua*	Father's monthly income	Continuous
16	*jumlahPendapatanIbu*	Mother's monthly income	Continuous
17	*lain2Pendapatan*	Other monthly income	Continuous
18	*tanggungan*	Dependents of the head of the Family	Categorical
19	*tajaan*	Sponsorship of student's studies	Categorical
20	*jumlahTajaan*	Amount of sponsorship	Continuous
21	*penerimaZakat*	Zakat receipients	Categorical

Exploratory Data Analysis (EDA) was conducted in the second phase to check missing values and outliers. The R programming language version 4.2.2 and RStudio version 2022.12.0+353 have been used to analyze the dataset. The *na.omit* function in R language has identified and removed several missing values and outliers. The Chi-square Test of Independence and Point Biserial Correlation were used to examine the relationship between the *kelayakan* (dependent variable) and the independent variables. The Chi-square Test of Independence is suitable for studying the relationship between two qualitative variables (Gaur & Gaur, 2006; Kozak, 2015; Weaver et al., 2017). Meanwhile, Point Biserial Correlation best checks the association between qualitative and quantitative variables (Cody, 2019; Corder & Foreman, 2014; Hadd & Rodgers, 2020).

Like the Linear Regression Model, the Logistic Regression Model aims to determine the best and simplest model and to unearth the relationship between the dichotomous variable, *Y* and the independent variable *X*'s (Hilbe, 2009). In Data Science, Logistic Regression Model were categorized under the Supervised Machine Learning algorithm (Molnar, 2020). The Logistic Regression Model equation (Hosmer Jr et al., 2013) is as follows:

$$\log\left[\frac{p_i}{1-p_i}\right]=\beta_0+\beta_1 x_{i1}+\beta_2 x_{i2}+\ldots+\beta_k x_{ik} \tag{1}$$

where p_i is the probability that $P\left(Y_i=1\right)$. The expression on the left-hand side is usually known as the logit or log odds. Then, it can solve the logit equation for p_i to obtain

$$p_i=\frac{exp\left(\beta_0+\beta_1 x_{i1}+\beta_2 x_{i2}+\ldots+\beta_k x_{ik}\right)}{1+exp\left(\beta_0+\beta_1 x_{i1}+\beta_2 x_{i2}+\ldots+\beta_k x_{ik}\right)} \tag{2}$$

it can simplify further by dividing both the numerator and denominator by the numerator itself:

$$p_i = \frac{1}{1 + exp\left[-\left(\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_k x_{ik}\right)\right]} \quad (3)$$

in mathematical expression, this formula is called the logistic function and can be written as:

$$f(z) = \frac{1}{1 + e^{-z}} \quad (4)$$

where

$$z = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_k x_{ik} \quad (5)$$

The stepwise selection procedure has been used to determine a best-fit model with only significant independent variables. The selection criteria for independent variables are based on the Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC) and Deviance measurements. In addition, the Wald statistic, with a Chi-square distribution, will be used to check whether the coefficient for that independent variable is significantly different from zero (Hosmer Jr et al., 2013). If the coefficient significantly differs from zero, we assume that the independent variable contributes significantly to the dependent variable. In this sense, it is analogous to the student t-test found in Linear Regression Model. To assess the "goodness-of-fit" of the model, the Hosmer-Lemeshow (HL) test, Pseudo R-Squared and Classification Table will be used. The HL test calculates if the observed event rates match the expected event rates in population subgroups. The model is considered a good fit if the Chi-square p-value is large (usually above 5 per cent)(Hastie et al., 2021; Hosmer Jr et al., 2013). Several Pseudo R-Squared has been identified, such as McFadden's R-Squared, and McFadden's (Adj.) R-Squared, Cox & Snell R-Squared, and Nagelkerke R-Squared. The Pseudo R-Squared range between 0 and 1. The closer the value is to 1, the better the model is (Hastie et al., 2021; Hilbe, 2009; Hosmer Jr et al., 2013). The Classification Table is measured using sensitivity, specificity and accuracy. Sensitivity measures the proportion of actual positives which are correctly identified. In contrast, specificity measures the proportion of correctly identified negatives—the percentage of correctly classified observations over all observations. A model with a high percentage of sensitivity and a low in specificity is good and can be used for prediction. Data from Sessions 1 to 3 (Table 1) were used as training and Session 4 as a test for evaluation purposes.

4.0 Results

Up to February 2022, a total of 1476 students of UiTM Cawangan Perlis are eligible and have received zakat financial assistance with a total amount of RM513,600. Based on Table 3, most of the students are female, and most come from the states of Kedah, Kelantan and Perak. Students from the Faculty of Applied Science and the Faculty of Computer Science and Mathematics are the highest applicants for zakat financial assistance. The applicant's Cumulative Grade Point Average is between 2.98 - 3.28. Most of the applicants are sponsored by the National Higher Education Fund Corporation (PTPTN). The average household income of the applicant's family is between RM1506.17 to RM1644.39, this applicant is from the B40 group which means the household income is less than RM4,360.00. The study also found that most family heads are self-employed, retirees, labourers, housewives, and rubber tappers. Ninety-seven head of families lost their jobs due to the closure of the employment sector due to the COVID-19 epidemic. The income of the head of the family is between RM478.10 to RM1500, and the average income of the mother is RM320.60. The number of dependents of the head of the family is 3 - 4 people.

Table 4 and Table 5 show the analysis results of the relationship between *kelayakan* (dependent variable) and independent variables. The study found that the variable *tajaan* (p-value = 0.014), *penerimaZakat* (p-value = 0.015), *jumlahPendapatanKetua* (p-value = 0.000) and *jumlahPendapatanIbu* (p-value = 0.000) have a significant relationship towards *kelayakan* since the p-value is less than 5 per cent significance level.

Seventeen potential independent variables were investigated to identify variables significant to the *kelayakan* (dependent variable). The stepwise selection procedure was used, and only four independent variables were significant based on the lowest AIC and BIC values (Table 6.). The variable is the *jumlahPendapatanKetua* (Father's monthly income), *jumlahPendapatanIbu* (Mother's monthly income), *tanggungan* (Dependents of the head of the family) and *jantina* (gender).

Table 3. Descriptive Analysis

		Mac – August 2020	Oktober 2020 – Februari 2021	Mac – August 2021	Oktober 2021 – Februari 2022
Gender					
	Male	145	176	153	118
	Female	351	356	342	308
State					
	Johor	12	20	16	12
	Kedah	143	158	113	106
	Kelantan	86	87	88	66
	Melaka	5	4	6	4

Negeri Sembilan	9	7	7	8
Pahang	20	20	18	18
Perak	71	85	89	74
Perlis	33	27	32	31
Pulau Pinang	39	41	47	46
Sabah	3	3	4	1
Sarawak	3	3	4	3
Selangor	45	45	38	32
Terengganu	20	23	25	18
Wilayah Persekutuan (Kuala Lumpur)	7	9	8	7
Faculty				
Fakulti Pengurusan Perniagaan	29	51	77	55
Fakulti Perakaunan	6	11	11	20
Fakulti Perladangan dan Agroteknologi	89	87	62	45
Fakulti Sains Gunaan	129	137	123	102
Fakulti Sains Komputer dan Matematik	122	96	83	80
Fakulti Sains Sukan dan Rekreasi	60	66	70	58
Fakulti Seni Bina, Perancangan dan Ukur	61	84	69	66
Semester				
Semester 1	7	0	37	48
Semester 2	141	23	83	18
Semester 3	16	191	45	89
Semester 4	210	24	188	45
Semester 5	30	234	23	171
Semester 6	76	30	103	23
Others	16	30	16	32
Cumulative Grade Point Average (CGPA)				
Mean	3.19	3.28	3.03	2.98
Median	3.23	3.37	3.37	3.40
Mode	3.30	3.45	0.00	0.00
Standard Deviation	0.42	0.44	1.05	1.13
Sample Variance	0.17	0.19	1.11	1.28
Sponsorship				
JPA	6	17	25	27
Kerajaan Negeri	18	16	18	15
Lain-Lain	38	25	24	34
PTPTN	375	408	334	268
Dependent				
Mean	3.79	3.86	4.00	4.07
Median	4.00	4.00	4.00	4.00
Mode	3.00	4.00	3.00	4.00
Standard Deviation	1.94	1.94	1.96	2.01
Sample Variance	3.75	3.77	3.83	4.05
Household Income				
Mean	1644.39	1567.53	1565.29	1506.17
Median	1200.00	1200.00	1200.00	1200.00
Mode	1000.00	1000.00	1000.00	1500.00
Standard Deviation	1524.46	1386.63	1106.62	1148.45
Sample Variance	2323964.16	1922755.30	1224616.86	1318940.02
Interview Evaluation Mark				
1	25	7	13	17
2	8	6	8	6
3	62	38	27	24
4	122	86	88	83
5	279	395	359	296
Amount of Zakat Approval				
RM100	25	8	8	8
RM200	102	49	38	34
RM300	127	115	76	70
RM400	215	351	360	295
Tidak Layak	27	9	13	19
Elligible for Zakat Assistance	94.6%	98.3%	97.4%	95.5%

Table 4. Chi-square Test of Independence

	jantina	*Negeri*	*fakulti*	*semester*	*statusPelajar*	*statusKetua*	*tajaan*	*penerimaZakat*
kelayakan (Dependent variable)	2.087	9.796	9.417	0	0	3.895	12.468	5.889
p-value	(0.149)	(0.711)	(0.224)	(1)	(1)	(0.273)	(0.014)	(0.015)

Table 5. Point Biserial Correlation

	cgpa	*jumlahPendapatanKetua*	*jumlahPendapatanIbu*	*tanggungan*
kelayakan (Dependent variable)	0.017	0.197	0.179	-0.042
p-value	(0.516)	(0.000)	(0.000)	(0.102)

Table 6. Stepwise Summary

Variable	AIC	BIC	Deviance
jumlahPendapatanKetua	362.536	373.188	358.536
jumlahPendapatanIbu	340.856	356.833	334.856
tanggungan	335.709	357.012	327.709
jantina	333.196	359.825	323.196

In the Linear Regression Model, one of the methods to assess the model's performance is to look at the Coefficient of Determination (R^2 or Adjusted R^2). However, in the Logistic Regression Model, Pseudo R^2 will be used. All Pseudo R^2 reported in Table 7 show that this model fits the data between 4.4 - 55.4 per cent. The Hosmer-Lemeshow test shows that the model is good-fit since the Chi-square p-value (0.5550) is greater than the 5 per cent significance level. The model produces a high percentage of accuracy (97.17 per cent) with sensitivity 6.98 per cent and specificity 99.8 per cent.

Table 7. Model Fit Statistics

Hosmer-Lemeshow statistics			Pseudo R^2			
Chi-square	DF	p-value	MCFadden's R^2	MCFadden's Adj. R^2	Cox-Snell R^2	Nagelkerke R^2
6.8310	8	0.5550	0.5550	0.149	0.044	0.193

Table 8. Classification Table

	Eligible	Not Eligible
Eligible	1473	40
Not Eligible	3	3
Sensitivity	0.0698	
Specificity	0.9980	
Accuracy	0.9717	

Table 9 shows model parameter estimates and Wald-statistics test for each independent variable. The results show that the Wald statistics p-value is less than 5 per cent. Thus, all four independent variables are significant towards *kelayakan* (dependent variable). The final equation is as follows:

Table 9. Model Parameter Estimates

Variable	Estimate	Odds Ratio	Wald statistic	p-value
(intercept)	-4.6330			
jumlahPendapatanKetua	0.0007	1.0007	27.2577	0.0000
jumlahPendapatanIbu	0.0006	1.0006	28.0466	0.0000
tanggungan	-0.2578	0.7727	6.72992	0.0096
Jantina(Perempuan)	0.8672	2.3803	3.83584	0.0500

The final equation is as follows:

$$P(Y=1) = P(Eligible) = \frac{1}{1+e^{-z}} \tag{6}$$

where

$$z = -4.633 + 0.0007 jumlahPendapatanKetua + 0.0006 jumlahPendapatanIbu - 0.2578 tanggungan + 0.8672 Jantina(Perempuan) \tag{7}$$

According to Table 9, the parameter estimates for *jumlahPendapatanKetua* (Father's monthly income) and *jumlahPendapatanIbu* (Mother's monthly income) are 0.0007 and 0.0006 respectively, indicating that the log odds of eligibility for zakat assistance increase by 0.0007 and 0.0006 for every one Malaysia Ringgit (MYR) increase in father's and mother's monthly income. In addition, the log odds of receiving zakat assistance decrease by 0.2578 for an increase in the number of dependents (*tanggungan*) in a family. And lastly, female students are two times more likely as their male counterparts to receive zakat assistance.

5.0 Conclusion

In summary, this study found four factors that affect eligibility for *zakat* assistance: *jumlahPendapatanKetua* (Head of a family's monthly income), *jumlahPendapatanIbu* (mother's monthly income), *tanggungan* (family dependents), and *jantina* (gender). Therefore, the Unit Zakat, Sedekah, and Wakaf (ZAWAF) of UiTM Cawangan Perlis can use these four factors as one of the criteria to be considered before deciding the amount of zakat assistance that should be given to the applicant. This study has achieved the desired objective and based on the Hosmer-Lemeshow value (Chi-square = 6.8310 with p-value 0.555), the specificity value

(99.80%) and overall percentage accuracy (97.17%), this model can be used by the ZAWAF to predict the eligibility and amount of zakat assistance for the next semester. However, some issues need to be considered, such as using cross-validation on imbalanced data and examining other factors that could not be carried out in this study.

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