ANALYSIS OF CIGARETTE DEMAND AMONG POOR HOUSEHOLDS IN INDONESIA: AN ISLAMIC ECONOMIC APPROACH

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Abstract

Increasing Indonesia's health and economic burdens generated by smoking habit require immediate stakeholder responses to reduce cigarette consumption. This study aims to examine and compare the changes in smoking behavior (i.e., the smoking status and the number of cigarettes consumed monthly) among zakat recipients (*mustahik*) and zakat payers (*muzaki*) caused by cigarette prices and income changes. Using a dataset from SUSENAS 2018 and conducted under *kifayah* approach (a poverty line approach in Islamic economics that will allow the observers to differentiate between *muzaki* and *mustahik*), this study employed two-part regression models. Results showed that an increasing income escalated cigarette consumption (ß = 0.761; 95% CI = 0.761, 0.762), but increasing cigarette prices reduced cigarette consumption (ß = -0.682; 95% CI = -0.683, -0.682). *Mustahik* household is more responsive toward changes as compared to *muzaki* ones. *Mustahik* household sensitivity towards cigarettes has important implications for zakat institutions in ensuring and monitoring zakat funds utilization among mustahik.

Keywords: Cigarette consumption, demand elasticity, *had kifayah*, *mustahik* household, two-part model.

Abstrak

Meningkatnya beban kesehatan dan ekonomi akibat merokok di Indonesia menuntut tanggapan segera dari seluruh pemangku kepentingan dalam mengurangi konsumsi rokok. Penelitian ini bertujuan untuk mengkaji perubahan perilaku merokok pada penerima zakat (mustahik) yang disebabkan oleh perubahan harga rokok dan pendapatan. Menggunakan dataset dari SUSENAS 2018 dan memiliki pendekatan had kifayah, penelitian ini menggunakan regresi model dua bagian dan menemukan bahwa peningkatan pendapatan menyebabkan peningkatan konsumsi rokok, sedangkan kenaikan harga rokok menurunkan konsumsi rokok. Rumah tangga mustahik lebih responsif terhadap perubahan. Kepekaan rumah tangga mustahik terhadap rokok memiliki implikasi penting bagi lembaga zakat dalam memastikan dan memantau pemanfaatan dana zakat di kalangan mustahik.

Keywords: *Konsumsi rokok; elastisitas permintaan; had kifayah; rumah tangga mustahik; two-part model.*

INTRODUCTION

Data has shown that two-third smokers reside in low- and middle-income countries (LMICs). Indonesia has been known as an LMIC with high smoking rates at global scale. In 2016, smoking rates on Indonesia ranked 1st in the Southeast Asia region (Lian and Dorotheo, 2018). The Indonesia's Basic Health Research (*Riset Kesehatan Dasar/*RISKESDAS) showed 33.8% population aged above 15 years accounted is smokers, in which XX.X% smokers are male (Kemenkes, 2019).

Smoking harms health and economic aspects both for first-hand and second-hand smokers. In Indonesia, the number of death caused by tobacco consumption could reach up to 14.7% per year (WHO, 2018). Moreover, the economic loss caused by tobacco-related diseases borne by The Indonesian National Health Insurance (BPJS Kesehatan) could reach up to Rp 375 Trillion (Ramadhan and Maryati, 2019). To prevent the increasing burden of increasing cigarette consumption, Indonesia has consistently increased the tobacco excise tax to decrease cigarette affordability.

In addition to health and economic loss, cigarette consumption also violates certain Islamic law. Indonesia Islamic Civil Based Organization (CBO) such as *Majelis Ulama Indonesia* (MUI), *Nahdlatul Ulama* (NU), and *Muhammadiyah* have also shared their *fatwa* (Islamic law) on cigarette consumption where this is seen as either *makruh* (a disliked or an offensive act) or *haram* (completely prohibited act) (Byron et al., 2015). Cigarette consumption became *haram* since it contradicts *maqashid al-sharia'* (the objectives of Islamic law). *Maqashid al-sharia'* includes five dimensions that must be maintained by each individual and household and interrelated, namely religion (*Dien*), soul (*Nafs*), mind (*Aql*), wealth (*Maal*), and generation (*Nasl*) (Rahman and Fitrah, 2018). Therefore, this study uses an Islamic economic approach to categorize income or the poverty line. This is because there is a difference or gap between the amount of their decent minimum standard of living established by the Central Bureau of Statistics and the Indonesian National Zakah Board. *Had kifayah* (the minimum threshold to define whether a household falls in the category of zakat receivers) and *zakat nishab* (the minimum amount that a Muslim must possess in his/her wealth before being obliged to pay zakat) includes both the minimum total income of an individual as well as the basic necessity of his/her family (Rahman and Fitrah, 2018), within the framework of *maqashid al-sharia'* (Azman et al., 2017).

This study adds to the literature of cigarette consumption patterns across income groups where a lack of studies discussed the cigarette consumption across income groups using the *had kifayah* approach. *Had kifayah* approach is useful in determining the consumption pattern among zakat receivers (*mustahik*) (Puskas BAZNAS, 2018). The result of this study has important implications for zakat institution as zakat allocation will increase the disposable income among *mustahik* (BAZNAS, 2019). Therefore, with the existence of a positive relationship between income and cigarette consumption, leaving zakat utilization unmonitored could lead to increasing cigarette consumption among *mustahik* (Byron et al., 2015, Herdianto, 2019).

Cigarettes are tobacco products using paper rolled into a cylindrical shape of the little finger is then consumed in a way that there are smoking addictive substances. Smoking has been a common leisure activity globally. It is estimated that in 2025 the number of smokers will rise to more than 1.6 billion(Jha et al., 2000). In Indonesia, efforts to control cigarette consumption have been made through various programs and policies, such as laws and government regulations.

As time evolves, human needs to fulfill their needs and wants, including consumption of necessities and cigarettes (for smokers). Consumption is defined as a household activity in consuming goods and services to maximize welfare (Pindyck & Rubenfield, 2013). This concerns the individuals' purchase parity, preference, and opportunity, within rational and reasonable considerations (Pindyck & Rubenfield, 2013). Regarding the

demand curve, any price changes will cause a movement along the curve, whereas income changes will shift the demand curve.

Other than through mathematical equations and economic curve, there is the concept of elasticity or sensitivity that is used to determine the causal relationship (Rahardja & Manurung, 2014). While the concept of demand elasticity is used to determine the causality between variables and the percentage of dependent variable responsivity in responding to the changes of the independent variable. As in this study, there are two dependent variables, two independent variables, and eight control variables. Thus, when the elasticity value is lower, it will be possible to increase the price of goods even higher.

Whereas in Islam, economic activity is part of the human activities in worshipping God and seeking God-interest. Al-Ghazali stated that the purpose of human life is to increase social welfare or *maslahah*. Consumption behavior of a Muslim seeks to maximize utility, both worldly needs and wants, as well as spiritual needs within the framework of religious values and norms (Chapra, 1995 in Hossain, 2014). In sharia-compliance consumption decisions, it is necessary to consider the halal status of a commodity, as well as commitments and consequences of consuming the commodity in achieving *maslahah* (benefits by Islamic law) and avoiding *mudharat* (harmful actions). Moreover, the demand elasticity in Islam is slightly different as it considers a Muslim consumer sensitivity in maximizing *maslahah* rather than utility. Demand will not increase if the increase in the consumption of the commodity does not increase *maslahah*, even if there is a change in income or prices (P3EI, 2014).

To determine social welfare, there should be seven basic commodities to be fulfilled: food, clothing, housing, *ibadah* (Islamic servitude/worship activities), education, healthcare, and transportation. The calculation of *had kifayah* or Islamic poverty line aims to determine individual and household positions within zakat instruments approach (Kinanti, 2019). A household is categorized as *mustahik* (zakat receivers) if the individual and or household income falls below *had kifayah* or falls below the category of *ashnaf* (the groups of people who are entitled to receive zakat). Whereas if the individual and or household income is above the *had kifayah* level, that individual and or household is categorized as *muzaki* (zakat payers).

Most previous literature examining the price and income elasticities of cigarette consumption across income groups found consistent results showing that price inversely related to cigarette consumption, whereas income is positively related to cigarette consumption. The study done in other countries such as Uganda, Argentina, Tanzania, European Union, and China consistently found that increase in cigarette prices will reduce cigarette consumption whereas an increase in income tends to increase cigarette consumption (Kidane, et al., 2015; Rodriguez-Iglesias, et al., 2017; Yeh, et al., 2017; Li & Supakankunti, 2018; Chelwa & Van Walbeek, 2019). However, the magnitudes of the impact are different across countries and across income groups. Lower-income groups tend to allocate a higher proportion of their income for cigarette consumption and are more sensitive towards cigarette price and income changes.

Whereas the previous studies in Indonesia implied slightly different results. The previous studies found that cigarette price does not have a significant impact on cigarette consumption (Afif, 2018). However, poverty was found to be one of the determinants of cigarette consumption in Indonesia. Contrary to this finding, the study by Sari & Seftarita (2018) found that price, education, ages, number of household members, and the smoker environment are among the determinants of cigarette consumption. The determinants of cigarette consumption among poor households are households' income and household spending on education and health (Sari, Syahnur, & Seftarita, 2017).

This study adds to the current literature on cigarette price and income effects on cigarette consumption in Indonesia. This research is using the Islamic economic framework with *had kifayah* approach which allows this research to examine the cigarette consumption patterns among *mustahik* and *muzaki*. *Had kifayah* approach differs from the

mainstream poverty line approach as it follows Islamic economic approach to differentiate between *dharruriyat* (primary), *hajiyyat* (secondary), and *tahsiniyat* (tertiary) needs in defining the commodities baskets and therefore it is more commonly applied to categorize *mustahik* and *muzaki* in Indonesia. This research also employed SUSENAS 2018 data, which is rarely used in previous literature. Majority of previous studies in Indonesia are using either primary data or Indonesian Family Life Survey (IFLS) – the latest available data was 2014. Moreover, this study adds the possession of health insurance as one of the control variables. This variable is important to examine smoking behavior – or behavior that adds to health risk factors in general – as a potential moral hazard among health insurance owners.

METHODS

Data and Sample

This study aims to provide evidence concerning the impact of cigarette price and household income on cigarette consumption in *mustahik* household. This research employed the secondary data of the Indonesian National Socio-Economic Survey (*Survei Sosial Ekonomi Nasional*/SUSENAS) in March 2018 that consists of a core questionnaire (KOR) and Consumption Module for both individual and household level. The sampling was done with a frequency weighted sampling method to represent the actual Indonesian population in 2018. The sample used in this study consists of all households' sample available in SUSENAS March 2018 with no missing observations on both main dependent and independent variables as well as the control variables. The total observation count is 295,155 households. By using the frequency weighted sample, this number represents 69.9 million households in Indonesia. Out of this number, 60.6% were identified as cigarette consumer households (i.e, a household that has spending allocated for cigarette consumption, indicating at least one smoker household member). In determining the socio-demographic characters of the households, this study used the head of the household as the representatives.

Measures

The dependent variables in this study are smoking status and the number of cigarettes consumed. The smoking status is a dummy variable with 1 for a household with a smoker and 0 otherwise. Household with a smoker in this research are defined as a household that has spending allocated for cigarette consumption, indicating at least one smoker household member. Whereas spending on cigarette consumption is measured in terms of natural log of pack of cigarettes consumed monthly by the household. As SUSENAS only has information on number of sticks consumed weekly, we calculated this variable by using the following equation 1 (assuming that a pack of cigarette consists of 16 sticks):

$$Pack\ of\ Cigarettes\ Consumed\ Weekly =$$

$$\frac{total\ cigarette\ consumed\ daily\ (in\ sticks) \times \frac{(30)}{7}}{16}$$

$$(1)$$

Our main independent variables consist of cigarette prices and total income. The cigarette price is measured using the natural log (ln) of cigarette prices per pack. However, the cigarette price is not available on the SUSENAS database; therefore, we manually calculated the retail cigarette prices based on the following equation 2 (assuming that a pack of cigarettes consists of 16 sticks). Furthermore, we differentiated the cigarette prices at municipality level.

$$Cigarette\ Price$$
$$= \frac{total\ expenditure\ on\ cigarette\ consumption}{total\ cigarette\ consumed\ daily\ (in\ sticks)}\ x\ 16$$

$$(2)$$

As for total income, we used the natural log (ln) of total monthly household expenditure as there is no estimation on income by SUSENAS estimation and therefore we proxied it using the total expenditure.

In addition, we also investigated the price and income elasticities of demand for cigarette. Price elasticity of demand is a measurement that measures the effect of changes in prices on demand. Whereas the

income elasticity of demand is estimated based on the changes in the probability of households to consume cigarette or the number of cigarettes the household consume given the changes in household income coefficient.

In the categorization of income groups, this study used the data from the report of the Center for Strategic Studies of Indonesian National Zakah Board (*Pusat Kajian Strategis BAZNAS*/PUSKAS BAZNAS) in 2018 using *had kifayah* approach in respective provinces. Hence, when the household income falls below *had kifayah* it will be categorized as *mustahik*, vice versa. The seven dimensions

(tabel 1) of measuring the *had kifayah* then calculated using equation 3 below:

$$HK = \sum_{i=1}^{7} X_i$$

(3)

where HK is the total *had kifayah* or Islamic poverty line and Xi is the HK amount.

Table 1. The Dimension of Had Kifayah, Indonesia 2018

Dimension	Measurement	Average (monthly)
Food and Beverages	- The minimum of 3,000 kcal per day per capita - The consumption of rice, meat, fish, eggs, nuts, dairies, sugar, frying oil, and vegetables	Rp 461,306.11
Clothes and Apparels	Using some of the Apparels Commodity Items as Defined by Central Bureau of Statistics	Rp 21,316 (children); Rp 40,052 (female); Rp 42,466 (male)
Living and Accommodation	- The minimum sales price for an adequate landed house and household facilities - Electric and gas costs	Rp 650,826
Religious Activities	- The equipment for religious activities and education - The spending on religious equipment and or zakat given to others	Rp 22,177 (children); Rp 21,012 (female); and Rp 23,341 (male)
Education	- The cost of minimum of 9 years of education - The investment, operational, and personal costs on education	Rp 104,167 (elementary school); Rp 145,833 (junior secondary school); and Rp 183,333 (religious and secondary school) or 200,000 (conventional senior secondary school)
Health	- The minimum cost to obtain primary health services - The health insurance subsidized by the government	Rp 19,225 or Rp 300,000 (person with disabilities)
Transportation	- The minimum costs for transportation and fuel for daily activities - The price of fuel for land, marine, and air transportation	Rp 17,771

Source: Modified from BAZNAS, 2018

Statistical Analysis

This study is a replication from the previous research by Adioetomo and Djutaharta (2005) and Ahsan and Tobing (2008) in which both research also used SUSENAS data. The model and data analysis technique refers to the two-part model as the result of Tobit model advancement and has been applied in studies by Hu et al. (2005), Khair (2015) and Kidane et al. (2015).

The first-part model aimed to estimate the participation of the household in cigarette consumption. The first-part model hence uses probability or logistic regression model. The Logit regression model in this study can be shown in equation 4 below:

$$Prob(CS_i = 1) = \frac{1}{1 + e_1^{-(C_1 + \alpha_1 lnP + \alpha_2 lnExp + \alpha_n X_n + e_1)}}$$

(4)

where $Prob(CS_i=1)$ is the probability of the household to consume cigarette (CS_i represents household smoking status, 1 = smoking, 0 = otherwise). α_1 and α_2 captured the parameters of interests in measuring the coefficient estimates of natural log of a pack of cigarette price (*lnP*) and household monthly expenditure (*lnExp*) on smoking status of household. Whereas X_n is a matrix of socio-demographic character variables, and e_1 is the standard error. The result of the logit regression coefficient in equation 4 above could not be directly interpreted in terms of number; hence, interpretation of the marginal effect estimates will be used.

The second-part model as a conditional demand function which is the household's cigarette consumption frequency is measured by the number of monthly pack of cigarettes consumed per capita per household (cigarette consumption on individuals aged 15 and above). To estimate the equation, OLS method and multiple linear regression are used in the equation 5 below:

$$ln(Q_i/CS = 1) = C_2 + \beta_1 \ln P_1 + \beta_2 lnExp$$
$$+ \beta_n X_n + e_2$$

(5)

where ln(Q/CS=1) is the natural log of pack of cigarettes consumed by the households, β_1 and β_2 captured the parameters of interests in measuring the coefficient estimates of natural log of a pack of cigarette price (*lnP*) and household monthly expenditure (*lnExp*). on the frequency of cigarette consumption by the household. X_n is a matrix of socio-demographic character variables, and e_2 is the standard error.

Both equations 4 and 5 generated coefficients that could be used to estimate the price and income elasticities of demand in both smoking status, frequency, and overall cigarette consumption measurements. The mathematical equation for the demand elasticity could be defined in equation 6 below:

$$Total\ Elasticity = \left(1 - p(CS = 1)\right) \times \alpha_1 + \beta_1$$

(6)

where p(CS=1) is the smoking prevalence (percentage of smoking households per total observations), α_1 is the elasticity of smoking status (for all households) and β_1 is the elasticity of cigarette consumption frequency (for the household with a smoker only). The equation 6 above presents the calculation for both price elasticity of demand (E_p) and income elasticity of demand (E_i) for cigarette consumption. The sample size differs across equations. In equation 3 (the first-part model) we used all households (69,954,912 households). Whereas for equation 4 and 5 (the second-part model and elasticity calculation) we only used the households with a smoker (42,416,202 households).

RESULTS

Descriptive Statistics

Table 2 below describes the descriptive statistics of dependent, independent, as well as

socioeconomic status (SES) control variables. Table 2 shows that the smoking prevalence (as shown by the mean of household's smoking status) is slightly higher among *mustahik* (61.3%) as compared to *muzaki* (60.2%). Whereas the average price of cigarette consumed per pack is also substantially lower among *mustahik* (Rp 12,288.80) compared to *muzaki* (Rp 18,178.44). However, in terms of frequency, the packs of cigarette consumed monthly by *muzaki* household is higher (28.571 packs per month) as compared to *mustahik* (21.6 packs per month).

Table 2. Descriptive Statistics by Zakat Status

	Muzaki			*Mustahik*		
	n	Mean	SD	n	Mean	SD
Dependent Variables						
HH Smoking Status	41,983,623	0.602	0.490	27,971,289	0.613	0.487
Cigarette Price	41,983,623	18,178.44	5175.114	27,971,289	12,288.80	4218.843
Independent Variables						
Pack(s) of Cigarette Consumed Monthly by HH	25,268,772	28.571	20.681	17,147,430	21.6	16.286
Monthly HH Expenditure	41,983,623	5,321,886	4,819,044	27,971,289	2,165,806	1,025,727
Socioeconomic Status (SES) Controls						
Sex (1 = male, 0 = otherwise)	41,983,623	0.838	0.363	27,971,289	0.855	0.352
Age (in years)	41,983,623	47.366	13.715	27,971,289	49.186	14.159
Years of Schooling	41,983,623	8.539	5.764	27,971,289	5.129	4.331
Urban/Rural (1 = urban, 0 = otherwise)	41,983,623	0.624	0.484	27,971,289	0.433	0.495
Marital status (1 = unmarried; 2 = married; 3 = divorce; 4 = widow/widower)	41,983,623	2.249	0.739	27,971,289	2.276	0.691
Number of HH Members	41,983,623	3,468	1.541	27,971,289	4.22	1.703
Working Status (1 = not working; 2 = working in informal sector; 3 = working in formal sector)	41,983,623	2,557	1.682	27,971,289	2.508	1.732
Possession of Health Insurance (1 = has health insurance, 0 = otherwise)	41,983,623	0,699	0.459	27,971,289	0.641	0.480

Source: author's calculation based on SUSENAS 2018 (2020)

Table 3 shows that the average retail cigarette price in overall households is Rp 15,823 per pack (1 pack = 16 sticks), with higher prices among the higher-income group (*muzaki*). The average cigarette consumption is 5.7 packs or equal to 92 sticks per capita per household in a month, with a higher number of consumptions among *muzaki* compared to *mustahik*. The cigarette consumption percentage as of total consumption among *mustahik* is higher compared to *muzaki*. *Mustahik* allocated 9.6% of their consumption for cigarettes whereas *muzaki* allocated 8.2% for cigarette consumption.

Table 3. Cigarette Prices and Consumption per Capita per Month

Zakat Status	HH with a Smoker (%)	Retail Prices (Rp/pack)	Cigarette Consumption (Pack per Capita)	Cigarette Consumption/Total Consumption (%)
Overall	0.61	15,823.48	5.72	8.76
Mustahik	0.61	12,288.80	4.44	9.64
Muzaki	0.60	18,178.44	6.58	8.17

Source: author's calculation based on SUSENAS 2018 (2020)

Estimates for the First-Part Model

Based on the estimation result showed in Table 4, changes in income (proxied by total household expenditure) have positive and statistically significant impacts on the probability to have a smoker in the household.

An increase by 1% in household income would increase the odds of having a smoker in the household by 13% for overall household. The impact is higher among *mustahik* whereby an increase by 1% in household income would increase the odds of being a cigarette

consuming household by 28.7% - substantially higher as compared to *muzaki* (3.6%). Whereas the increase in price would reduce the odds of having a smoker in the household. An increase by 1% in cigarette price would decrease the odds of having a smoker in the household by 7.8%. This is also higher among *mustahik* whereby an increase by 1% in household income woul decrease the odds of having a smoker in the household by 10.8% - higher compared to *muzaki* (5.8%). This shows that *mustahik* households are more sensitive towards income and price changes as compared to *muzaki*.

In terms of socioeconomic characteristics, our estimate in table 4 shows that all socioeconomic determinants statistically significant in determining the odds of having a smoker in the household. Having a male as the head of household increases the odds of having a smoker in the household. Whereas having older head of household decreases the odds of having a smoker in the household. In terms of education, having a head of household to complete a certain level of education negatively correlates with the odds of having a smoker in the household. The magnitude of the coefficient is higher following the increase in the level of education. Living in urban area is also presenting negative correlation with the odds of having a smoker in the household. However, among *mustahik* household, the case is different. *Mustahik* living in urban area are more likely to have a smoker in the household as presented by table 4.

Across all households, having a married head of household is negatively correlated with the odds of having a smoker in the household. Whereas larger household size increases the odds of having a smoker in the household. Having an employed head of household, either in informal or formal sectors, is positively correlated with the odds of having a smoker in the household. Finally, having a health insurance decreases the odds of having a smoker in the household.

Table 4. Effect of Price and Income Changes on Smoking Status in Overall Observations and by Zakat Status. Logistic Regressions (Average Marginal Effects)

Explanatory Variable	Overall	Zakat Status	
		Muzaki	*Mustahik*
Price/pack (Log)	-0.078	-0.058	-0.108
	(0.003)***	(0.001)***	(0.002)***
Income/HH (Log)	0.130	0.036	0.287
	(0.004)***	(0.001)***	(0.001)***
Male (*dummy*)	0.341	0.312	0.246
	(0.004)***	(0.001)***	(0.002)***
Age	-0.003	-0.003	-0.002
	(0.000)***	(0.000)***	(0.000)***
Elementary School	-0.000	0.004	-0.013
	(0.002)***	(0.001)***	(0.001)***
High School	-0.145	-0.113	-0.140
	(0.003)***	(0.001)***	(0.001)***
Higher Education	-0.387	-0.303	-0.305
	(0.009)***	(0.001)***	(0.003)***
Urban (*dummy*)	-0.026	-0.042	0.010
	(0.002)***	(0.000)***	(0.001)***
Married (*dummy*)	-0.095	-0.071	-0.080
	(0.004)***	(0.001)***	(0.002)***
Household Size	0.048	0.053	0.009
	(0.001)***	(0.000)***	(0.000)***
Informal	0.074	0.073	0.038
	(0.003)***	(0.001)***	(0.001)***
Formal	0.062	0.050	0.041
	(0.003)***	(0.001)***	(0.002)***
Health Insurance (*dummy*)	-0.036	-0.037	-0.013
	(0.002)***	(0.015)***	(0.022)***
N	69,954,912	41,983,623	27,971,289
Log likelihood	-41,337,268	-24,729,626	-16,151,903
Mean of dependent variable	0.606	0.602	0.613

Note: * Significant at the 0.10 level, ** significant at 0.05 level, *** significant at the 0.01 level; Robust standard error at parentheses; source: author's estimation based on SUSENAS (2018)

Estimates for the Second-Part Model

Table 5 shows the changes in the level of consumption among households with smoking household member following the changes in cigarette price and household income. Table 5 shows that the increase in household income by 1% increases the number of cigarettes consumed by 0.76% in overall household. Consistent with the results in table 5, the magnitude is also higher in *mustahik* household (increases by 1.17% every 1% of household income increase) and lower for *muzaki* household (increases by 0.49% every 1% of household income increase).

The findings in table 5 also show that cigarette price increase negatively correlates with the number of cigarettes consumed. A 1% increase in cigarette price per pack reduces monthly pack of cigarettes consumed by 0.68% for overall households. Again, *mustahik* households are more sensitive as the magnitude is higher among *mustahik* households (0.83% decrease for every 1% increase in cigarette price per pack) as

compared to *muzaki* households (0.64 decrease for every 1% increase in cigarette price per pack).

The findings in this study also found that there are differences in the correlation between socioeconomic characters with the odds of having a smoker in the household (table 4) and the number of packed of monthly cigarette consumption by household (table 5). Having a male head of household increases the number of cigarette consumption by household. The case is also similar for having an older head of household and an employed head of household. Having a head of household who has completed certain level of education decreases the number of cigarettes consumed by household. The magnitude also increases following the increase in level of education completed. Living in urban area and having a married head of household also negatively correlate the number of cigarettes consumed by household. Finally, having a health insurance decreases the number of cigarettes consumed by household.

Table 5. Coefficient Estimate of Number of Packed of Monthly Cigarette Consumption by Household Among Households with Smoking Household Member, Overall Observations and by Zakat Status. Ordinary Least Square (OLS) Regression

Variable	Overall	Zakat Status	
		Muzaki	*Mustahik*
Price/pack (Log)	-0.682	-0.638	-0.829
	(0.000)***	(0.000)***	(0.000)***
Income/HH (Log)	0.761	0.489	1.171
	(0.000)***	(0.000)***	(0.001)***
Male (*dummy*)	0.187	0.197	0.103
	(0.001)***	(0.001)***	(0.001)***
Age	0.000	0.000	0.000
	(0.000)***	(0.000)***	(0.000)***
Elementary School	-0.005	-0.005	-0.021
	(0.000)***	(0.000)***	(0.000)***
High School	-0.152	-0.136	-0.156
	(0.000)***	(0.001)***	(0.001)***
Higher Education	-0.418	-0.306	-0.441
	(0.000)***	(0.000)***	(0.002)***
Urban (*dummy*)	-0.133	-0.152	-0.080
	(0.000)***	(0.000)***	(0.000)***
Married (*dummy*)	-0.209	-0.198	-0.137
	(0.000)***	(0.000)***	(0.001)***
Household Size	-0.006	0.037	-0.052
	(0.000)***	(0.001)***	(0.000)***
Informal	0.089	0.111	0.023

	(0.000)***	(0.000)***	(0.001)***
Formal	0.110	0.123	0.053
	(0.000)***	(0.001)***	(0.001)***
Health Insurance (*dummy*)	-0.066	-0.065	-0.046
	(0.000)***	(0.000)***	(0.000)***
Constant	-1.824	1.746	-6.220
Adj. R^2	0.217	0.156	0.281

Note: * Significant at the 0.10 level, ** significant at 0.05 level, *** significant at the 0.01 level; Robust standard error at parentheses; source: author's estimation based on SUSENAS (2018)

Estimates for the Elasticity of Demand

Table 6 below summarizes the price elasticity of demand on the previous regression results in Table 4 and Table 5. The price elasticity of demand (Ep) shows negative signs across all samples. Following this finding, the increase in cigarette prices in Indonesia should be able to reduce overall cigarette consumption. The price elasticity of demand varies across income groups with the value between -0.751 to -1.048. In total, the price elasticity of demand is -0.811. This could be interpreted as: a 10% increase in cigarette prices could decrease the household cigarette consumption by 8.11%. *Mustahik* households will reduce their cigarette consumptions by 10.48% when there is a 10% increase in cigarette prices. Whereas the effect for *muzaki* is slightly lower with 7.51% decrease in cigarette consumption for every 10% increase in cigarette prices. The increase in cigarette consumption is more likely to reduce the number of cigarettes consumed by a household rather than the probability of the household to consume cigarette. This applied to both households with *mustahik* households have higher elasticities (8.29%) compared to *muzaki* (6.38%).

Table 6. Cigarettes Price Elasticity of Demand (Ep) in Cigarette Consumption

Zakat Status	Ep Household Smoking Status	Ep Number of Cigarettes Consumed	Ep Total
Total	-0.33	-0.682	-0.811
Muzaki	-0.289	-0.638	-0.751
Mustahik	-0.548	-0.829	-1.048

Source: author's estimation based on SUSENAS (2018)

Table 7 shows that the income elasticity of demand has positive and statistically significant relationships with household cigarette consumption. The total income elasticity varies between 0.559 – 1.754. *Mustahik* households are more responsive towards the income increase compared to *muzaki*. Overall, the income elasticity of cigarette demand (Ei) is 0.975. This means an increase by 10% in household income will increase cigarette consumption by 9.75%. The effect of income increases is much larger among *mustahik* households with 1.754 income elasticity of cigarette demand – compared to 0.559 among *muzaki* households.

In terms of household smoking status, an increase of 10% in household income would increase the likelihood of household to have a smoker by 5.48% for overall households. This is much higher for *mustahik* households whereby an increase by 10% in household income would increase the consumption by 14.58% - as compared to *muzaki* (1.79%). The case is similar for the number of cigarettes consued. Every 10% increase in household income would increase the cigarette consumption (in a household with a smoking household member) by 7.61% and substantially higher in *mustahik* households (14.58%). It is also lower for *muzaki* households whereby an increase by 10% in

income would increase the number of cigarettes consumed by 4.89% in *muzaki*

households that have a smoking household member.

Table 7. Total Income Elasticity of Demand (Ei) in Cigarette Consumption

Zakat Status	Ep Household Smoking Status	Ep Number of Cigarettes Consumed	Ep Total
Total	0.548	0.761	0.975
Muzaki	0.179	0.489	0.559
Mustahik	1.458	1.171	1.754

Source: author's estimation based on SUSENAS (2018)

DISCUSSION

The finding in this study is consistent with the previous studies in Indonesia and China whereby higher income groups (in this study is *muzakki*) tend to consume more cigarettes compared to their lower counterparts, despite a higher level of education attained (Adioetomo and Djutaharta, 2005, Ahsan and Tobing, 2008, Hu et al., 2005). The findings also supported previous studies that showed lower-income groups tend to allocate a higher proportion of their income for cigarette consumptions (ranging from 7.24% - 11.3%) (Adioetomo and Djutaharta, 2005, Hu et al., 2005, San and Chaloupka, 2016). Furthermore, this study confirmed the study by Lian and Dorotheo (2018) findings that in many developing countries, more than 10% of household income is allocated for merely cigarette consumption, indicating lower spending for food, education, and health. This number is even higher in Indonesia, whereby the latest survey found that low-income households spent approximately 15% of their income on cigarette consumption – and this remained the same even during COVID-19 pandemic (IDEAS, 2021). The result of this study also confirmed the previous research that suggests how an increase in cigarette price would lead to a decrease in cigarette consumption among poor households (Ahsan and Tobing, 2008, Kidane et al., 2015, Liu et al., 2006, Sari et al., 2017).

The result of this study is also consistent with an economic theory where prices have inverted relationships with demand regardless of the income groups. Consumers will reduce their consumption on certain goods in order to keep their commodities basket on the budget line, ceteris paribus, or finding substitutes with lower prices. Adioetomo and Djutaharta (2005) stated that the increase in prices with exogenous assumptions will have more impacts on quantity rather than the probability of households to consume cigarettes. Whereas cigarette consumers who refused to stop smoking will tend to seek cheaper alternatives (Kartika et al., 2019).

In addition, the research by Adioetomo and Djutaharta (2005) and Ahsan and Tobing (2008) employing SUSENAS data also found that the increase in household income will increase the probability of the household consuming cigarette as well as cigarette demand across all income groups. Afif and Sasana (2019), Masitho (2017), Sari et al. (2017), and Surjono and Handayani (2013).

This study shows slightly higher price elasticities of demand compared to studies by Adioetomo and Djutaharta (2005) and Surjono and Handayani (2013) in which the price elasticity of demand is only 3% for the higher-income group. Moreover, in developing countries such as Argentina dan Uganda the price elasticities of demand are nearly 5% – indicating that cigarette is still affordable for higher-income groups. Nevertheless, higher cigarette prices indicate the success of policymakers in reducing cigarette consumption among lower-income groups (Rodríguez-Iglesias et al., 2017, Chelwa and van Walbeek, 2019). Besides, a study in China observing smokers in the urban population in 2015 shows that price elasticity of cigarette on the frequency of cigarette consumption is relatively more inelastic and varies across

different income groups (from -0.12 to -0.14) (Huang et al., 2015).

The result of this study confirms the previous research by Surjono and Handayani (2013) that found an increase in income could lead to an increase in cigarette demand by up to 20%. Yeh et al. (2017) also found that the income elasticity of cigarette demand varies between 0.5 – 1.2, whereas Khair (2015) and Cetin (2017) found that the income elasticity of cigarette demand is 0.85 and 1.07 for each higher and lower-income groups. However, this result is slightly higher compared to a study by Hu et al. (1995) which found that the income elasticity of cigarette demand is only 0.46.

CONCLUSION AND RECOMMENDATION

By employing a two-parts (logistic and multiple linear regression) model this study found that an increase in cigarette prices will decrease the demand for cigarettes. The price elasticity of cigarette demand is higher for *mustahik* group as compared to *muzaki*. The result of this study also shows that an increase in household income will lead to increasing number of cigarettes consumed. *Mustahik* households are more responsive towards income changes. The study showed that cigarette prices and household income have significant impacts on cigarette consumption in Indonesia, primarily among *mustahik* households. This implied that the lower-income group tends to be more dynamic and sensitive towards economic changes in its surrounding. Hence, the government needs to maximize cigarette taxes above the income elasticity of cigarette demand. Moreover, tax maximization should be imposed on the most consumed cigarette, which is a kretek filter cigarette.

The result of this study also has important implications for zakat institution as well as other Islamic-based organization. Given that an increase in income could lead to increasing cigarette consumption, zakat institution and Islamic-based organization should be more actively engaged in reducing cigarette consumption. Zakat institution should ensure and monitor that the utilization of zakat among *mustahik* is fully allocated for consumptions that could increase the *mustahik* welfare. Moreover, terms and conditions such as no cigarette consumers in the households or banning any tobacco consumption in the households during the zakat program should be imposed among households of zakat recipients. In addition, Islamic-based organization should make a bold move on banning cigarette consumption in Indonesia. There is a constant discourse between two major Islamic-civic based organizations in Indonesia resulting in a divided view on the status of cigarette in Islamic law. The haram law imposed on cigarette consumption in MUI Fatwa is currently not explicit and are still allowed for certain categories of population. Given the complexity of tobacco control measures in Indonesia – partly due to tobacco industry lobbying, MUI Fatwa to explicitly prohibiting cigarette consumption would strengthen tobacco control efforts in Indonesia.

This study's main limitation lies on the difficulty in identifying the actual *muzaki* and *mustahik* status due to data limitation. Future study is encouraged to link the actual data with data from the National Zakat Board to allow the research to identify if an observation is a *muzaki* or *mustahik*. This will also help to expand the research to examine the consumption of cigarettes among actual zakat recipients (e.g., how the recipients are using their zakat assistance).

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ATTACHMENT

1. Multicollinearity Test Results

Dependent Variable	VIF	Tolerance
Price/pack	1.52	0.657
Income/HH	1.90	0.528
Male (*dummy*)	1.86	0.539
Age	1.34	0.746
Elementary School	1.83	0.547
High School	2.04	0.489
Higher Education	1.42	0.700
Urban (*dummy*)	1.15	0.872
Married (*dummy*)	1.89	0.529
Household Size	1.32	0.760
Informal	3.97	0.252
Formal	4.16	0.240
Health Insurance (*dummy*)	1.04	0.965
Average of VIF		1.96

2. Goodness of Fit Test

	Wald Chi2 (z)	Pseudo R2	Chi2	Log Likelihood
Overall	9,113,856	0.119	0.0000	-41,337,268
Muzaki	5,695,471	0.124	0.0000	-24,729,626
Mustahik	3,899,426	0.135	0.0000	-16,151,903