

Research article

# The Impact of Smoking on Poverty: Evidence from Indonesia

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**Abstract:** This study investigates the impact of cigarette consumption on poverty incidents in Indonesia, control for Regional Gross Domestic Products, Consumption Credit, Human Development Index, and Unemployment. The data is obtained from the Bureau of Statistical Center (BPS) and the Financial Services Authority (OJK). The analysis is conducted by employing the Static Panel Data Model, namely Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Among the three, REM is the best model according to Chow and Hausman Test. The finding shows that cigarette consumption in Indonesia tends to worsen poverty, indicated by the positive and significant relationship between cigarette consumption and poverty in REM analysis. Moreover, RGDP also has a significant and positive effect on poverty. It means that RGDP is not able to reduce poverty in Indonesia. Hence, it can be concluded that the impact of cigarette consumption in increasing poverty outweighs the impact of cigarette production in decreasing poverty through RGDP.

**Keywords:** poverty, smoking, cigarette consumption

**JEL Classification:** I30, I31, I32, O15

**Abstrak:** Studi ini mengkaji dampak konsumsi rokok terhadap kemiskinan di Indonesia, dengan melibatkan Produk Domestik Regional Bruto, Kredit Konsumsi, Indeks Pembangunan Manusia, dan Pengangguran sebagai variabel kontrol. Data untuk analisis empiris diperoleh dari Badan Pusat Statistik (BPS) dan Otoritas Jasa Keuangan (OJK). Analisis dilakukan dengan menggunakan Model Data Panel Statis, yaitu Common Effect Model (CEM), Fixed Effect Model (FEM), dan Random Effect Model (REM). Diantara ketiganya, REM merupakan model terbaik berdasarkan uji Chow dan uji Hausman. Temuan menunjukkan bahwa konsumsi rokok di Indonesia cenderung memperburuk kemiskinan. Hal ini ditunjukkan oleh hubungan positif dan signifikan antara konsumsi rokok dan kemiskinan dalam model Random Effect. Selain itu, PDRB secara mengejutkan juga berpengaruh signifikan dan positif terhadap kemiskinan. Artinya PDRB ternyata belum mampu mengurangi kemiskinan di Indonesia. Dengan demikian, untuk kasus Indonesia, dapat disimpulkan bahwa dampak konsumsi rokok dalam meningkatkan kemiskinan lebih besar daripada dampak produksi rokok dalam mengurangi kemiskinan melalui PDRB.

**Kata Kunci:** kemiskinan; kebiasaan merokok; konsumsi rokok

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## 1. INTRODUCTION

Poverty is a condition where the basic need of a person is not fulfilled perfectly (Ashraf & Hassan, 2013). Poverty can be seasonal or perpetual. Several people suffered from poverty for many years and finally can go out from it. However, many people live in misery because of poverty in their whole lives. Poverty is usually characterized by low nutrition, lack of sanitation, shelter, access to

health services, and educational opportunities (Ashraf & Hassan, 2013; Banerjee & Duflo, 2011; Todaro & Smith, 2015). Hence, the poor people face the satanic circle of poverty. Poor people have low income, which causes low savings, low capital accumulation, and low productivity, creating low income. Low earnings also lead to a scarce opportunity for educational services, inadequate human resources quality, low productivity, creating low income. Lastly, low income creates low consumption quality, lack of nutrition, low healthiness, low performance, low productivity, and similarly low income (Bauer, 2019).

Poverty is a sustainable problem, and maybe poverty has never been eradicated from this world throughout history. When people in a particular area achieve prosperity, other people in another region are still trapped in poverty. Luxembourg has managed to alleviate poverty with a zero percent poverty level from 2004 to 2010. But at the same time, 65 percent of the Central African people are in misery because of poverty. On the other side, when people have been released from the shackles of poverty within a specific time, there is always an accident that makes them fall back into poverty. Back to Luxembourg as an example, the zero percent poverty level cannot be maintained over time, whereas the poverty level in Luxembourg is 0.3 percent as of 2018 (Bank, 2021b).

Since the economic crisis in 1998, the poverty in Indonesia declined from 24.23 percent to 9.315 percent in 2019. However, the poverty level in Indonesia increased to 10.14 percent in March 2021 due to the covid 19 pandemic. Since the population of Indonesia is relatively large, about 273.5 million in 2021, the number of poor people in Indonesia is relatively high. It means that 27.7 million people in Indonesia still live under the poverty line as of March 2021 (BPS, 2021d). This number almost equals the population of Malaysia in 2020, namely 32.37 million (Bank, 2021a). An Islamic perspective, poverty can be seen from two points of view, namely, the lack of income and the wrong spending. It is based on the *hadits* from Ibnu Hibban and At Tirmidzi said if there are two responsible for the property, namely, how to get and use it (Sunan Tirmidhi No. 2417). From the income side, poverty can happen because of the low productivity that leads to low income. On the other hand, deprivation can also occur because of the mistake in allocating spending. Sometimes one cannot satisfy their needs because they don't make the correct priority scale. The wrong priority scale in spending is seen in Indonesia's high cigarette expenditure. Bureau of Statistical Centre (BPS) reported that the consumption of cigarettes in Indonesia is the second-highest number after rice consumption. Even amid the pandemic in April 2020, the spending for smoking (6.05 percent of total consumption) is higher than rice (5.57 percent of total expenditures for consumption) (BPS, 2021a).

High expenditure on smoking can raise poverty since there is a substitutional effect from saving to spending due to cigarette consumption. According to Supriadi & Rusyiana (2018), the poor even prefer cigarettes to rice if they don't have enough to buy both. Furthermore, high consumption of tobacco tends to emerge several kinds of diseases (Bloom et al., 2011). The poor often must sell their asset to pay medication costs for a disease caused by smoking. Otherwise, cigarettes consumption also creates income for society, namely for tobacco farmers, the labor of cigarettes companies, and cigarettes traders. Then, it is essential to investigate the degree of advantages and disadvantages of smoking in terms of poverty in Indonesia (Nasrudin et al., 2013).

The effect of cigarettes consumption in Indonesia on poverty is still under study. A study by Afif & Sasana (2019) investigates the opposite effect, namely the effect of poverty on cigarettes consumption. They found that the poverty level positively affects the cigarettes consumption level in Indonesia. Research that specifically analyzes the impact of cigarette consumption on poverty is conducted by Yunita (2018). She tried to investigate the influence of smoking on poverty in Aceh Province as the poorest region in Sumatra. She found that cigarettes consumption has a positive impact on poverty. The higher the consumption of cigarettes, the higher the poverty in Aceh Province. Similar studies have also been conducted overseas. Hu et al. (2005) found that smoking harms living standards. In other words, smoking has a positive impact on poverty. Hence, this research is conducted to shed light on the relationship between cigarette consumption and Indonesia's poverty.

According to Banerjee & Duflo (2011), poor people are characterized by several things. The number of family members is usually large, between 6 to 12 people. The poor condition and many

children force them to experience a lack of food, health services, and educational services. The poor usually spend most of their money buying food. Surprisingly, expenditure of the poor for non-essential needs also has a significant number, such as for tobacco, alcohol, and festivals. The land is the asset that is owned by most of the poor. The poor also have lack access to health facilities and educational services. In terms of income, most of the poor have multiple occupations. They tend to do everything if creating earning. The poor also lack specialization and tend to have multi-talented due to the multiple occupations (Banerjee & Duflo, 2011).

Poverty is usually divided into two categories, namely cultural poverty and structural poverty. Cultural poverty is the poverty caused by the bad habit and culture of the poor person. The poor person who becomes poor because of laziness, waste, and other bad habits is cultural poverty. On the other hand, structural poverty is caused by the system and environmental conditions. Lousy infrastructure, corruption, and discrimination in working opportunities are examples of the causes of structural poverty. Cultural and structural poverty usually coincide since the leader's behavior represents the community's behavior. A lousy system and environment are typically found in the community, with bad habits in the majority (Zahrawati, 2020). Many theories explain poverty from an income approach. Poverty means the lack of income compared to the minimum standard of living (Atalay, 2015). It assumes that people always satisfy their needs according to the correct priority scale. But in fact, many people prioritize, for example, buying cigarettes instead of enough food. They choose to reduce food consumption to be able to consume tobacco. Besides, there is a high expenditure for festivals or celebrations in society, such as weddings or other celebrations. Most people are willing to sell their assets to celebrate a wedding. This fact shows that spending is also crucial in poverty besides income (Banerjee & Duflo, 2011).

Spending in the wrong way often makes people fall into poverty for formerly rich people. The incorrect priority scale also makes the poor fall deeply into poverty and become chronic poverty (long-lasting poverty). According to Banerjee & Duflo (2011), expenditure for tobacco, alcohol, and celebration in society raises poverty. This paper tries to test empirically the impact of one of those expenditures, namely tobacco, on poverty in Indonesia. Among the three, cigarette consumption is the highest in Indonesia (BPS, 2021a). Cigarette consumption is almost the same as rice consumption, whereas rice is the leading food in Indonesia, while cigarette is just a complementary need (BPS, 2021a). The number of smokers in Indonesia is about 30 percent of Indonesia's population. If the population of men is 50 percent of the total population, then 30 percent of male in Indonesia is smokers. The estimation of cigarette consumption in Indonesia reaches 2,380 trillion rupiahs per year (BPS, 2021a), such fantastic wasting money. Besides it, the estimate of the cost of treating diseases caused by smoking is 29 trillion rupiahs per year (Kristina et al., 2018). Furthermore, the government gets huge income from cigarette excise. In 2020, Indonesia's government earned 185.9 trillion rupiahs from cigarette excise (Kusnandar, 2021).

The impact of smoking habits on poverty incidents can be seen from several points of view. First, cigarette consumption will increase marginal propensity to consume. High consumption means that the income remaining for saving is minimal. Without saving, there is no opportunity to invest and create more income (N. Gregory Mankiw, 2017). Hence, the poor smokers will continuously be in poverty conditions. Second, the high expenditure for smoking reduces the ability to pay for good education. The opportunity to buy a book, get additional lessons, and other education facilities will also be gone and resulting low quality of education. Low quality of education creates low quality of human resources, and they cannot go out from poverty. Smoking also reduces the opportunity to get good nutrition. Malnutrition affects the quality of human resources and then continues in poverty (Todaro & Smith, 2015).

According to the study of Yunita (2018); Hu et al. (2005); and Liu et al. (2006), cigarette consumption has a positive and significant impact on poverty incidents. Hence the hypothesis of this research is cigarette consumption has a positive and significant impact on poverty incidents in Indonesia. Therefore, the main objective of the further empirical analysis is to test whether to support or fail to support this hypothesis. The procedure to test this hypothesis will be discussed in the methodology section.

## 2. RESEARCH METHODS

### 2.1. Measurement of Variables

This research involved five variables for conducting analysis: one dependent variable and five independent variables. The poverty level in Indonesia is the dependent variable. Otherwise, cigarette consumption, regional gross domestic product, bank credit, human development index, and unemployment are explanatory variables. Among independent variables, the variable of interest in this study is merely cigarette consumption, while regional gross domestic product, bank credit, human development index, and unemployment are involved as control variables. Regional gross domestic product is included since the production of cigarettes may increase the value of RGDP, then RGDP can create income for society and reduce poverty (Satti et al., 2016; Sehwat & Giri, 2018). By including RGDP in the model, the effect of smoking on poverty can be seen from two points of view, namely income and expenditure. HDI is also included as a control variable since it is also the main determinant of poverty, where HDI usually represents the quality of human resources. Other control variables are also included since they have the potential to significantly affect poverty (Hidayat et al., 2020; Mad et al., 2019). The measurement of poverty is based on the Bureau of Statistical Center's (BPS) measurement, namely the number of people who live below the poverty line. The formula for measuring the percentage of poverty according to BPS is as follows:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left[ \frac{z - y_i}{z} \right]^{\alpha} \quad (1)$$

where:  $P_{\alpha}$  is percentage of poverty on population,  $\alpha = 0$ ;  $z$  is poverty line,  $y_i$  is average monthly expenditure of population who live below the poverty line,  $q$  is the number of the population who live below the poverty line, and  $n$  is population (BPS, 2021c).

According to BPS, the poverty line consists of the food and non-food poverty lines (BPS, 2021c). The food poverty line is based on the minimum expenditure to buy 52 types of food for a month. The non-food poverty line is the minimum expenditure to buy 14 commodities in an urban area and 12 types of commodities in a rural area (BPS, 2021c). As of March 2021, the poverty line of Indonesia is Rp. 472,525,- per capita per month (BPS, 2021e). It also needs to be noted that there is a double calculation in the calculation of the poverty line and cigarette consumption since spending for tobacco (cigarette) is included as one of the items for the food poverty line calculation (BPS, 2022). However, the poverty line is not a proxy of the poverty incident in this paper. The poverty line role is mere as the basic calculation for the number of poor people in Indonesia. The proxy of the poverty incident in this paper is the percentage of poor people to the total population. Hence, the involvement of spending for a cigarette in the calculation of the poverty line is not going to cause a self-relationship between cigarette consumption and poverty incident in the model. Self-relationship will occur if the poverty line is employed as proxy of poverty since cigarette consumption is included inside of poverty line calculation.

The measurement for cigarette consumption is the cigarette consumption per capita per year. The use of cigarette consumption per capita is caused by the availability of data. Authors only found the data for cigarette consumption in rupiahs per capita per week unit of account. An adjustment was conducted by multiplying cigarette consumption by 52 weeks to equalize the time unit of account for all variables. However, since it is difficult to find the data for the exact total population of Indonesia in 2018 and 2019, it is better to let the data for cigarette consumption still be in per capita unit of account instead of multiplying it by the estimated total population to obtain total consumption of cigarette. Cigarette consumption can also be measured by the percentage of smokers in the population. However, this measurement cannot give information related to the amount of expenditure for smoking. Otherwise, the cigarette consumption per capita per year in rupiahs can represent the expenditure for smoking better than the percentage of smokers.

Regional Gross Domestic Product (RGDP) is proxied by RGDP per capita with a constant price. The use of RGDP per capita is conducted to avoid bias due to the difference of population among provinces in Indonesia. The Human Development Index (HDI) is also measured according to BPS. BPS calculates HDI based on three dimensions, namely health, education, and expenditure. The formula

for measuring HDI is shown as follows:

$$HDI = \sqrt[3]{I_{health} \times I_{education} \times I_{expenditure}} \times 100 \tag{2}$$

where: *I* denote index and maximum value for HDI is 100 (BPS, 2021b). Lastly, the bank's credit is proxied by consumer credit per capita for consumption usage and unemployment is proxied by the percentage of open unemployment to the total population of each province in Indonesia.

### 2.2. Data

This paper uses secondary data. The data for poverty, cigarettes consumption, regional GDP, and HDI are obtained from Indonesia's Bureau of Statistical Center (BPS). The data consumer credit is taken from Indonesia's Banking Statistic published by the Financial Service Authority (OJK) of Indonesia. The data is balanced panel data. Its cross-sections dimensions are 34, representing the number of provinces in Indonesia, and its time-series dimension is three years, from 2018 until 2020. The number of periods is relatively low due to data availability, where the data for cigarettes consumption is only available from 2018 until 2020 in BPS.

**Table 1.** List of variables, proxy, and data source

Variables	Symbol	Proxy	Source
Poverty	POV	BPS Measurement	BPS
Cigarettes Consumption	SMOKE	Cigarettes consumed per capita in rupiah	BPS
Regional GDP	RGDP	GDP per province for a year	BPS
Credit for Consumption	CREDIT	Credit for Consumption of Commercial Bank	OJK
Human Development	HDI	BPS Measurement	BPS
Unemployment	UNEMP	BPS Measurement	BPS

Source: Authors calculation, 2021

### 2.3. Model

Since this study uses panel data, the analysis is conducted with Ordinary Least Square (OLS) for static panel data. Panel data analysis that is used is static panel data analysis, namely Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The best model is selected based on Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test. Chow Test is used to determine the best model between CEM and FEM. Hausman Test is used to choose the best model between FEM and REM. Lastly, LM Test is conducted to select the best model between CEM and REM (Wooldridge, 2013).

#### 2.3.1 Common Effect Model

The model for Common Effect Model (CEM) assumes that intercept and slope coefficient constant across time and individual (Wooldridge, 2013) as represented by the following basic model:

$$Y_{it} = \alpha + \beta_j X_{jit} + \varepsilon_{it} \tag{3}$$

where:  $Y_{it}$  and  $X_{jit}$  are the dependent and independent variables, respectively.  $\alpha$  is an intercept, and  $\beta_j$  is a slope coefficient. Lastly,  $\varepsilon_{it}$  is error terms or estimation error. By inserting the variables of this research into the basic equation, the final common effect model can be gotten as the following equation:

$$POV_{it} = \alpha + \beta_1 SMOKE_{it} + \beta_2 RGDP_{it} + \beta_3 CREDIT_{it} + \beta_4 HDI_{it} + \beta_5 UNEMP_{it} + \varepsilon_{it} \tag{4}$$

The variables *SMOKE*, *RGDP*, and *CREDIT* will be transformed into logarithmic form, as follows:

$$POV_{it} = \alpha + \beta_1 \log(SMOKE)_{it} + \beta_2 \log(RGDP)_{it} + \beta_3 \log(CREDIT)_{it} + \beta_4 HDI_{it} + \beta_5 UNEMP_{it} + \varepsilon_{it} \tag{5}$$

The common effect model in the equation is characterized by the absence of subscript  $it$  in the intercept ( $\alpha$ ) and the slope coefficient ( $\beta_j$ ). Since subscript  $it$  represent variation across individual and time, then the absence of  $it$  means there is no variation across individual and time on the intercept and slope coefficient in the equation (Wooldridge, 2013).

### 2.3.2. Fixed Effect Model

Fixed Effect Model (FEM), also known as Least Square Dummy Variable (LSDV), assumes that slope coefficient is fixed across individual and time, but intercept varies across the individual (Wooldridge, 2013). The basic equation for FEM or LSDV is as follows:

$$Y_{it} = \alpha_i + \beta_j X_{jit} + \varepsilon_{it} \quad (6)$$

The subscription  $i$  in the intercept,  $\alpha$ , represent that intercept varies across individual and fixed across time. Otherwise, the absence of  $it$  on slope coefficient  $\beta_j$  represents that the slope coefficient is constant across individuals and time. Since there are 34 cross-section individuals in this research, there are 33 dummy variables in maximum for the intercept to avoid the dummy variable trap (Wooldridge, 2013). Following is the final fixed-effect model after substitution of variables to the basic equation:

$$POV_{it} = \alpha_1 + \alpha_2 D_{2i} + \dots + \alpha_{33} D_{33i} + \beta_1 SMOKE_{it} + \beta_2 RGDP_{it} + \beta_3 CREDIT_{it} + \beta_4 HDI_{it} + \beta_5 UNEMP_{it} + \varepsilon_{it} \quad (7)$$

In this fixed-effect model, the intercept differs from one province to another. The following equation is obtained after transforming variables SMOKE, GRDP, and CREDIT to the logarithmic form:

$$POV_{it} = \alpha_1 + \alpha_2 D_{2i} + \dots + \alpha_{33} D_{33i} + \beta_1 \log(SMOKE_{it}) + \beta_2 \log(RGDP_{it}) + \beta_3 \log(CREDIT_{it}) + \beta_4 HDI_{it} + \beta_5 UNEMP_{it} + \varepsilon_{it} \quad (8)$$

### 2.3.3 Random Effect Model

The Random Effect Model (REM), also known as Error Component Model (ECM), assumes that intercepts vary across individuals. However, instead of using dummy variables, the intercept is replaced by the average of all variations of intercepts (Wooldridge, 2013). The basic equation of the random effect model is shown as follows:

$$Y_{it} = \alpha + \beta_j X_{jit} + \varepsilon_i + \mu_{it} \quad (9)$$

where:  $\alpha$  is the mean of intercept across cross-section observation and  $\varepsilon_i$  is the error or intercept deviation of each individual from the intercept mean. The final equation can be derived by inserting all the variables into the previous basic equation as follows:

$$POV_{it} = \alpha + \beta_1 SMOKE_{it} + \beta_2 RGDP_{it} + \beta_3 CREDIT_{it} + \beta_4 HDI_{it} + \beta_5 UNEMP_{it} + \varepsilon_i + \mu_{it} \quad (10)$$

Just like CEM and FEM, several variables from this equation is transformed to the logarithmic form as follows:

$$POV_{it} = \alpha + \beta_1 \log(SMOKE_{it}) + \beta_2 \log(RGDP_{it}) + \beta_3 \log(CREDIT_{it}) + \beta_4 HDI_{it} + \beta_5 UNEMP_{it} + \varepsilon_i + \mu_{it} \quad (11)$$

All three models are the semi-log model for the relationship between variable SMOKE, RGDP, and CREDIT on poverty. Meanwhile, the relationship between HDI and UNEMP on poverty is a linear model. When the dependent variable is in the liner form and independent variables use the log model, then the slope coefficient must be multiplied by 0.01 before interpretation to hinder misleading interpretation (Wooldridge, 2013).

### 3. RESULTS AND DISCUSSION

The first section reports the descriptive statistic is presented to see the central tendency and variation of the data. A descriptive statistic is essential to reveal if further analysis is feasible. If there is no significant variation within the data, the estimation like OLS maybe not be appropriate to be done. The result of descriptive statistics is shown in Table 1. The descriptive statistic shows that the mean of poverty for each province in Indonesia is below one million. However, the standard deviation is very high, 1.057 million people. The inequality of population causes this variation among provinces in Indonesia. When using poverty data in the percent of the population, the variation is not too high. The standard deviation is only 5.5 percent, with a mean of 10.6 percent. The average cigarette consumption per capita per year is below one million rupiahs, 864,543.3 rupiahs, with a standard deviation of 176,308.8 rupiahs. The percentage of smokers in the population is relatively equal in each province in Indonesia. The average smoker is 29.3 percent, with a standard deviation of only 3.4 percent. It means that the smoking habit in each region in Indonesia is almost the same.

**Table 2.** Descriptive Statistic of Variables

Variables	Standard Deviation	Minimum	Maximum
POV (Headcount Number)	1057.18	48.70	4502.54
POV (Percentage of Population)	5.49	3.42	27.43
SMOKE (Headcount Number)	176,308.80	446,259.8	1,329,966
SMOKE (Percentage of Population)	3.38	20.50	36.56
RGDP	4.51	25,034,082.00	1.84
HDI	3.91	60.06	80.77
CREDIT	81,071.90	84.00	461,949.00
UNEMP	1.703	1.14	9.32

Source: Self-Created, 2021

Table 2 reports the descriptive statistics, so the empirical analysis can be continued with the panel data regression method. Results of analysis with general effects model, fixed effect model, and random effect model.

**Table 3.** Empirical Test Results

Variables	CEM	FEM	REM
Constant	215.977*** (29.290)	27.581*** (6.735)	31.500*** (7.263)
log(SMOKE)	-10.572*** (2.170)	0.703 (0.803)	1.209* (0.732)
log(RGDP)	1.356 (0.931)	0.504*** (0.177)	0.480** (0.190)
log(CREDIT)	-0.622 (0.478)	-0.230 (1.091)	-0.472 (0.682)
HDI	-1.015*** (0.117)	-0.457*** (0.169)	-0.572*** (0.133)
UNEMP	0.594** (0.283)	0.604*** (0.065)	0.599*** (0.070)
Criteria test	LM-test: 83.86***	Chow: 617.54***	Hausman: 2.48

Notes: (bracket) denotes standard error, \*10%, \*\*5%, and \*\*\*1%

Source: Authors calculation, 2021

Table 3 reports the Chow and Hausman test are conducted to determine the best model among CEM, FEM, and REM. Chow test results indicate the best model between CEM and FEM. If the Chow test result is significant, FEM is better than CEM. The result of the Chow test is significant. It means that FEM is better than CEM. The next step is to test which one the better between FEM and REM.

Hausman test is employed to choose between FEM and REM (Table 3). Meanwhile, the probability value higher than 0.05 shows that the Hausman test is insignificant. It means that REM is better than FEM. Since the FEM is better than CEM and REM is better than FEM, it means that REM is also better than CEM. Hence, there is no need to do an LM test. It can be concluded that REM is the best model. Hence, Random Effect Model (REM) is the chosen model in this empirical analysis. More detailed analysis results of the random effect model with robust standard error are presented in Table 4.

According to the test results for the random effect model in Table 4, the effect of all independent variables is significant except log(CREDIT). log(SMOKE) representing cigarette consumption is significant level at 10 percent. Variable log(RGDP) representing Regional Gross Domestic Product for each province in Indonesia is significant at 1 percent. Variable HDI, UNEMP, and constant are also significant at 1 percent. Otherwise, variable log(CREDIT) is not significant at 1, 5, or 10 percent. Since the coefficient of variable SMOKE, RGDP, and CREDIT is still in the log forms, as Wooldridge (2013) suggested, all of the coefficients need to be multiplied by 0.01 to avoid a misleading interpretation. Hence, the coefficient of variable SMOKE, RGDP, and Credit are 0.01209, 0.00480, and -0.00472, respectively.

**Table 4.** Estimation Results for Random Effect Model

Variable	Coefficient	Robust Standard Error	Z-statistic	P-Value
Constant	31.500	9.774	3.22	0.001
log(SMOKE)	1.209	0.673	1.80	0.072
log(RGDP)	0.480	0.142	3.38	0.001
log(CREDIT)	-0.472	0.769	-0.61	0.539
HDI	-0.572	0.118	-4.83	0.000
UNEMP	0.599	0.071	8.39	0.000

Source: Authors calculation, 2022

### 3.1. Empirical Results

The variable SMOKE slope coefficient of 0.01209 represents the direction and magnitude of the relationship between cigarettes consumption and poverty in Indonesia. When cigarette consumption changes by 1 rupiah, poverty changes 0.01209 percent to the same direction. It means that the increase of cigarette consumption by 1 rupiah will be followed by the increase of poverty in 0.01209 percent. On the other hand, if cigarette consumption decreases by 1 rupiah, poverty will decrease by 0.01209 percent. Therefore, it can be concluded that this finding supports the hypothesis which states that cigarette consumption significantly and positively affects poverty in Indonesia. The higher cigarette consumption, the higher the poverty rate, otherwise the lower cigarette consumption, the lower the poverty incident rate.

An unusual result is shown by the coefficient of the RGDP variable where the direction of the relationship between RGDP and poverty is positive, although with an absolutely small magnitude of 0.00480. It means that every rise of RGDP by 1 percent will be followed by the rise of the poverty rate by 0.00480 percent. This finding shows that the economic growth in Indonesia is still not pro-poor. The majority of the increase of wealth from the increase of RGDP is merely obtained by a very small portion of the society. To put it in another way, this finding reveals that the rate of inequality in Indonesia is relatively high. However, since it is not the main topic of this paper, this finding will not be discussed far further.

The next relationship is the credit-poverty relationship, which is represented by the coefficient of variable CREDIT, namely -0.0472. Since this relationship is not significant, then there is no need to interpret the direction and magnitude of the coefficient. This result may occur because the poor people in Indonesia do not have enough access to bank credit, due to the absence of collateral. In other words, credit in Indonesia is only accessible for people who have collateral who are generally not the poor.

Different from the credit, test results show that the human development index has a very strong relationship with poverty. The relationship is significant at 1 percent with the z-statistic of



4.83. The direction is negative with a magnitude of 0.572. It means that the higher the human development index, the lower the poverty rate. Otherwise, the lower the human development index, the higher the poverty rate in Indonesia. The magnitude shows that if the human development index changes by 1 percent, then the poverty rate will move by 0.572 percent in the opposite direction.

A similar relationship with the human development index is also shown by the variable UNEMP which represents the relationship between the unemployment rate and poverty rate. The relationship between unemployment and poverty is the strongest in this model since it has the highest significant level, namely the z-statistic of 8.39. Not only has the strongest significance, but also the larger magnitude of slope coefficient with positive direction, namely 0.599. It can be interpreted that when unemployment increase by 1 percent, then the poverty rate will also rise by 0.599 percent. This finding gives information related to the productivity of Indonesian people. If the society is productive enough, they will not directly fall into poverty when they lose their job. They will find something to do to create money to meet at least their daily need. This strong relationship shows that when someone lost their job in Indonesia, they also lost income completely since there is nothing, they do to create temporary side income before getting a new job.

Lastly, the intercept of the model is also significant with a value of 30.500. The intercept in the random effect model means the average of the intercept of all the individuals (cross-section) dimensions, namely the province in Indonesia. However, different from the fixed-effect model, the individual-specific effect is unobservable, latent, (Wooldridge, 2013), and included within the compound error terms. The intercept of 30.500 means that when the value of all independent variables is zero, then the poverty rate is 30.500 percent. It also needs to be noted that the intercept has a high standard error, namely 9.774. This value shows that the average deviation of the intercept of each observation from the average intercept is relatively high. It means that each province in Indonesia has different characteristics of poverty since the variation of intercept represents the variation of individual-specific effect in the model (Wooldridge, 2013). However, once more, the individual-specific effect is unobservable in this model due to the use of the random effect model.

### *3.2. Impact of Smoking on Poverty*

This finding aligns with several theories that high cigarette consumption tends to raise poverty. Cigarette consumption can affect poverty in two main ways, namely substitutional effect and medication effect. Typically, the substitution effect occurs due to the addiction to smoking, where smokers can't be able to retain the temptation to smoking. They often prefer to reduce consumption of food, clothes, or shelter instead of decreasing cigarettes consumption. A low-income family sometimes experiences deprivation of food, but, at the same time, they have enough cigarettes to consume.

The first type of substitutional effect is the substitution of saving by spending. The consumption of cigarettes has a dominant role in increasing household consumption. Smoking habit tends to raise marginal propensity to consume (MPC) and compensate by decreasing marginal propensity to save (MPS). MPC denotes the proportion of income used for spending and MPS represents the proportion of income used for saving (N. Gregory Mankiw, 2017). This pattern shows that the proportion of income that remains for saving is decreasing. Low saving leads to low investment, low productivity, low income, and finally increase poverty. To put it in another way, the proportion of income that should be used to save and invest for creating additional income in the future is finally lost. It means that smoking habit eliminates the opportunity to improve the standard of living through saving and investment. In the case of Indonesia, cigarette consumption must have made a large contribution to the MPC, since according to the data from World Population Review, Indonesia is the country with the highest male smoking rate, namely 70.50 percent as of 2018 (World Population Review, 2018).

The second type of substitutional effect is the substitution from an opportunity to get good nutrition to cigarette consumption. Good nutrition is one of the main factors to improve the quality of human resources, where the improvement of human resources tends to reduce poverty and enhance the standard of living. Smokers from low-income families have to reduce the quality of

their food in order to be able to buy and consume cigarettes. It means that poverty reduction through nutrition improvement is hard to achieve in smoker families. The third type of substitutional effect is the substitution of spending from educational need to cigarette consumption. Without smoking, a smoker parent may be able to give better education opportunities to their children, such as buying books, taking tutoring services, subscribing to learning video services, and other educational services. Good education gives higher opportunities to succeed and out of poverty. However, since the money that is potentially used for educational services is used for buying cigarettes, the opportunity to get a good education is also finally gone. As a result, the smoker families remain in poverty.

It also needs to be noted that the increase in cigarette prices also worsened the impact of cigarette consumption on poverty. The study of Afif & Sasana (2019) found that the cigarettes price has no significant effect on cigarette consumption. Accordingly, the measurement of government to increase the cigarette prices will not decrease cigarette consumption, but it will merely increase the expenditure burden of the low-income smokers. In other words, instead of reducing cigarette consumption, the increase of cigarette price increases the substitutional effect of saving, good nutrition, and good quality education toward cigarette consumption. It means that the increase in cigarette prices contributes to aggravating poverty.

Cigarette consumption also affects poverty through health problems. The impact of cigarette consumption on poverty in this way can be called a medication effect. Smoking habits in the long-term tend to cause many kinds of diseases, especially lungs disorders. Medication costs are expensive, and one often has to sell an asset to satisfy medication costs. The United Nations reports 3.3 million death of smokers related to lung disease. This number includes people who are exposed to secondhand smoke, including more than 60,000 children under the age of five who died from lower respiratory tract infections due to passive smoking. The WHO's Department for the Prevention of Non-Communicable Diseases reports the global economic loss from tobacco is \$1.4 trillion (Bloom et al., 2011). Smoker patients have to suffer several costs like medication, transportation, time, and opportunity costs due to the disease caused by smoking. Patients often lose their job because of the sick, and then they are forced to sell their assets to satisfy their daily needs. The loss of a job followed by losing assets means falling into poverty for the have and falling deeper into poverty for the poor.

This finding is also in line with the result of Yunita (2018) in Aceh, Hu et al. (2005) in China, and also Liu et al. (2006) in China, where they found that cigarette consumption tends to enhance poverty level and reduce the standard of living. Yunita (2018) found that cigarette consumption affects poverty by analyzing data from BPS Aceh as of 2018. Poverty is proxied by the number of people who live beneath the poverty line and cigarette consumption is proxied by the spending for smoking in rupiahs. To the best of the author's knowledge, research related to the effect of poverty on poverty at the province level has only been carried out in Aceh. The study of Yunita (2018) is the only comparison that can be used against this study in Indonesia. Therefore, it can't be concluded that this finding always occurs at the province level. It merely can be said that, in aggregate, cigarette consumption exacerbates poverty in Indonesia. Regardless of many smokers arguing that smoking has several advantages, it is empirically proven that smoking is a bad habit in terms of poverty.

### *3.3. Cigarette Consumption and Poverty from Islamic Economic Perspective*

Islamic teaching suggests that someone has to strive to get out of poverty and become rich but still have to live simply. According to the Islamic economic approach, poverty incident occurs because of individual and structural causes. Individual causes consist of the source and use of poverty. The structural causes are supporting systems that enhance or hinder poverty, such as neighborhood culture and economic system implemented within a certain country. Individual and structural causes need to be overcome simultaneously to alleviate poverty in a particular jurisdiction (Triono, 2020).

Individual causes related to the source of wealth consist of compliance to the sharia in the working space and laziness. The violation of sharia caused someone to lose integrity and difficulty getting work or business partners. Such a condition makes it difficult to create income. Laziness causes low performance in the working space and leads to a decrease or loss of income. The

individual causes can also be seen from the use of wealth point of view. Poverty accident sometimes occurs because the use of an asset is not aligned with the priority scale. Whereas, the spending priority scale must start from mandatory need, ending with the permissible need, and avoid spending for unlawful expenditure. Structural causes consist of social and state causes. Social cause is are the concern for one another among members of society. Poverty will arise when society members ignore each other. The state factor is the economic system that is implemented in a country. The selected system will determine whether wealth in a country is distributed fairly and evenly (Triono, 2020).

Islamic economics gives several layers of the solution to overcome the poverty problem. Start from the individual role, society role, and state role. First, creating an income process must satisfy the sharia rule, namely free from deception, speculation, usury, stealing, robbery, and other prohibited source of income. Second, working is mandatory for every adult male, and laziness is strictly prohibited. Third, spending assets for unlawful wants is strictly prohibited, such as non-halal food and services. Fourth, everybody must care for his family members. Fifth, every member of society has to care for the other society members, like the rich must help the poor. Sixth, the state is obliged to bear the poor if they have worked hard but are still poor and their family and environment can't afford them (Triono, 2020).

Spending on smoking cannot be included in important spending. The only reason when someone still smoking is merely to satisfy the desire for smoking. It is not a need, but only a wants. Wants are not something that mandatory to satisfy in Islam. On the contrary, Islam even commands to control the desires and is only permitted to satisfy them when the mandatory need has been met. Otherwise, it is forbidden to fulfill desires by ignoring obligatory needs. The wants for smoking is one kind of wants that is only permitted to fulfill when other obligatory needs have been fulfilled, such as the need for food, clothes, shelter, education, health, paying debt, helping starving neighbors, and safety. Finally, from an Islamic economic perspective, smoking is one kind of wastes in the use of property, and waste is forbidden in Islam. Waste is a habit that can lead someone to fall into poverty and difficult to go out of it.

#### **4. CONCLUSIONS**

The conclusions of this study show that cigarette consumption aggravates poverty in Indonesia. The addictive effect of smoking tends to increase expenditure, cost of medication, reduce saving, reduce investment, minimize learning quality, and finally increase poverty. The production of cigarettes indeed gives income to the community, like tobacco farmers, cigarette company labor, and cigarette merchant. Still, the rising poverty because of smoking outweighs poverty reduction due to income from cigarette production. According to the finding of this research, it can be concluded that smoking is a bad habit in terms of poverty eradication.

This paper has several limitations that need to be covered by further research. Firstly, due to the availability of the data, each observation only used three periods. Further study can use a more prolonged period when data has been available. Second, this study only uses a static panel model. Further analysis can use other models like the dynamic panel data model with different GMM and system GMM. Recommendation for a person who wants to go out of poverty is wise to stop smoking. Quitting smoking is not easy because of its nicotine effect. Smokers can cut down the number of cigarettes per day until they can stop completely. By quitting smoking, the standard of living can be potentially increased as soon as possible. It is also recommended for the government of Indonesia that it is worth considering the prohibition of smoking in Indonesia to support poverty alleviation.

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