
THE EFFECT OF SMOKING BEHAVIOR ON HEALTH EXPENDITURE IN INDONESIA'S RURAL AREAS

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Abstract

Smoking is one of the biggest causes of death in the world. The WHO reported that smoking kills 8 million people each year. Besides threatening global health, smoking by rural people tends to detain poverty alleviation efforts due to several factors, including cigarette expenditures and health expenditures. Indonesia has one of the most significant worldwide smoking prevalence and has become one of the countries that most suffer from smoking. The MoH Indonesia reported that health costs due to smoking reached Rp596.61 trillion in 2015. Previous studies found that smoking caused an increase in health expenditure due to smoking-related diseases in Indonesia. However, there is a lack of evidence found in rural areas. This research aims to answer whether smoking affects health expenditure in rural areas. Robust regression analysis is used in this model and processed by STATA 14 application. Using IFLS 5 data, the analysis shows that cigarettes consumed in rural areas have a positive and significant effect on outpatient costs. Increased outpatient costs in rural areas due to smoking will make the rural economy suffer and escalate poverty. The government should intensify the tobacco control policy in rural areas to avoid an increase of poverty rate in Indonesia.

Keywords: Health Expenditure, Poverty, Rural Areas, Cigarette

Abstract

Merokok merupakan salah satu penyebab kematian terbesar di dunia. WHO melaporkan bahwa merokok membunuh 8 juta orang setiap tahun. Selain mengancam kesehatan masyarakat dunia, kebiasaan merokok oleh masyarakat pedesaan cenderung menghambat usaha pengentasan kemiskinan karena beberapa faktor, termasuk biaya rokok dan biaya kesehatan. Indonesia merupakan salah satu negara dengan prevalensi merokok terbesar di dunia. Kemenkes RI mencatat biaya kesehatan dari merokok mencapai Rp596 triliun pada tahun 2015. Penelitian sebelumnya menyatakan bahwa merokok menyebabkan peningkatan pengeluaran kesehatan disebabkan oleh penyakit yang terkait dengan merokok. Akan tetapi, masih terdapat sedikit bukti yang ditemukan di wilayah pedesaan. Penelitian ini bertujuan untuk menjawab apakah merokok dapat berdampak pada biaya kesehatan di wilayah pedesaan. Analisis robust regression digunakan dalam model dan diolah menggunakan aplikasi STATA 14. Menggunakan data IFLS 5, analisis menunjukkan bahwa konsumsi rokok di wilayah pedesaan mempunyai dampak yang positif dan signifikan pada biaya rawat jalan. Meningkatnya biaya rawat jalan di wilayah pedesaan karena rokok akan membuat ekonomi wilayah pedesaan memburuk dan meningkatkan kemiskinan. Pemerintah seharusnya lebih mengencangkan lagi kebijakan pengendalian penggunaan rokok di wilayah pedesaan untuk menghindari meningkatnya angka kemiskinan di Indonesia.

Kata kunci: Pengeluaran kesehatan, Kemiskinan, Pedesaan, Rokok

INTRODUCTION

Smoking is one of the biggest causes of death in the world. The World Health Organization (WHO) states that smoking kills more than 8 million people every year worldwide, of which more than 7 million are active smokers and 1.2 million others are passive

smokers (WHO, 2020). Tobacco consumption in various forms such as cigarette funnels, e-cigarettes, chewing tobacco, and pipe tobacco is harmful to human development and the economy. It further emphasizes the importance of preventing tobacco consumption which has a dangerous impact on health. Indonesia is one of

the top 10 biggest cigarette producers in the world. If Indonesia calculated with other major ASEAN producers, it can produce about 586 billion cigarettes annually in 2016. A large amount of supply also met high demand with Indonesia's smoking prevalence of 66 percent for men and 8.4 percent for women in 2016 (Ginting and Maulana, 2020).

That economic benefit creates a dilemma for the government, which must choose to save its people from health and economic impacts that are unquestionably very large or to save the economy in the area where the industry is located, which absorbs labor and generates income for the country. The impact of smoking is divided into two categories which are direct cost and indirect cost. Direct costs incurred directly from smoking, such as decreased consumption of other commodities. Indirect cost is the economic cost induced due to lost productivity because of the health impact of smoking (Ginting and Maulana, 2020).

Rural areas can be defined as the smallest administrative region that does not comply with urban criteria, which consist of people density, percentage of agricultural households, and urban facilities (BPS, 2021a). The increased health expenditure because of smoking-related diseases makes people in rural suffering. There is a clear difference between smoking prevalence for those who live in rural and urban areas, whether for adolescent, adult, and pregnant women (Stevens et al., 2010). The higher number of smokers in rural areas will result in people with health problems that rural health facility inadequate to handle (Stevens et al., 2010). A study about the economic loss of smoking estimated the cost resulting from smoking-related diseases in Jakarta is Rp. 14,7 trillion, that number is far higher than the income from tobacco which is just about Rp. 400 billion (Agustin, 2019). The Indonesian Ministry of Health reported that health costs due to smoking reached 596.61 trillion rupiah in 2015, emphasizing the significant economic loss and health impact of smoking (Soewarta Kosen et al., 2017).

Based on data from the Indonesian Central Bureau of Statistics, the percentage of smoking in the population over 15 years in rural Indonesia shows the lowest point in 2016, with a

prevalence of 27.19 percent. Meanwhile, the highest smoking prevalence was recorded in 2018 at 30.74 percent, then decreased again in the following years (BPS, 2020). Central Bureau of Statistics, through National Socioeconomic Survey (SUSENAS), recorded that smoking prevalence is higher in rural areas than in urban areas in 2020, with 30.46 percent and 27.33 percent, respectively (BPS, 2020). With smoking prevalence still high in rural areas, the smoking impact can detain the poverty reduction effort.

For the last two decades, Indonesia has enjoyed high average economic growth (BPS, 2022). Data from the Indonesian Central Bureau of Statistics shows that poverty in Indonesia between 2015-2020 continues to decline in line with sustainable development efforts. Indonesia's poverty reached the lowest level in 2019 at 12.72 percent (BPS, 2021b). However, it starts to rise again in 2020 with 13.01 percent. The benefit of the development cannot be felt equally in the rural areas. It is supported by the data that recorded poverty rates in Indonesia is higher in rural areas compared to urban areas (BPS, 2021b).

In rural areas, not many rural communities are aware of and to be provided with mass media messages about smoking prevention and treatment (T. M. Smith et al., 2004). Rural youth may experience less exposure to anti-tobacco campaigns, which can create an environment where smoking is perceived as less acceptable (Adler et al., 1993). In rural areas, relatively low incomes, low levels of health insurance and poor healthcare availability limit access to smoking cessation services. (T. M. Smith et al., 2004).

Indonesia is one of the countries with the highest number of smokers in the world. More than a third of people in Indonesia are a smoker in 2020. That number makes Indonesia the country with the highest number of smokers in Southeast Asia and ranked 7th in the world (Mahardhika et al., 2020). For poor households, income significantly affects cigarette spending, so every increase in income will increase spending on cigarettes (Ginting and Maulana, 2020). Tobacco expenditures can exacerbate the effects of poverty and cause a significant

deterioration in living standards among the poor (Efroymson et al., 2001).

Previous research found that smoking caused an increase in health expenditure due to smoking-related diseases in Indonesia (Soewarta Kosen et al., 2017). However, there is a lack of evidence found in rural areas. This study aims to answer whether smoking has the potential to affect health spending in rural areas. In addition, this study also aims to analyze the effect of other socio-economic variables such as age, education, household expenditure, and body weight on health expenditure in rural areas.

RESEARCH METHODOLOGY

The data used in this study were collected from the Indonesian Family Life Survey (IFLS) 5 in 2014/2015. IFLS 5 is a collaboration between RAND and Survey Meter. The project leader is John Strauss (University of Southern California and RAND). Firman Witoelar (Survey Meter) and Bondan Sikoki (Survey Meter) are co-PI and Field Director for IFLS 5.

The sample of 2,697 people were collected from this data, which presented individuals and households in Indonesia in 2014. The sample used in the study was 2,697 people who were willing to answer questions related to smoking behavior and health expenditure in IFLS 5 with the following equation:

$$\begin{aligned} \text{outpatient cost}_i &= \alpha_1 + \alpha_2 \text{cigarettes_consumed}_i + \alpha_3 \text{age}_i + \alpha_4 \text{expenditure_percapita}_i \\ &+ \alpha_5 \text{education}_i + \alpha_5 \text{weight}_i + U_i \end{aligned}$$

Table 1. Variable Description

Variable	Description	Unit
Outpatient Cost	Logarithmic outpatient cost	Percentage
Cigarettes Consumed	Number of conventional cigarettes consumed in rural areas	Per cigarettes stick
Age	Age	Years
Education	Years of Schooling	Years
Weight	Individual body weight	Kilogram
Expenditure per Capita	Logarithmic expenditure per capita	Percentage
U	Error	

Source: Indonesian Family Life Survey 5, 2014/2015

Where outpatient costs is logarithmic outpatient cost ever incurred by the respondent. Cigarettes consumed is the number of conventional cigarettes consumed in rural areas. Age is the respondent's age variable. Education is a variable of the respondent's length of school (in years). Weight is a variable weight of the respondent. Expenditure per capita is the variable of expenditure per capita of each household. Those variable are used to determine the effect of the characteristics of rural communities on outpatient costs that need to be spent.

All variables are sourced from various books/sections in IFLS and processed using

MLR estimation models. However, the MLR estimation model has some problems known as outliers. In solving these problems, there are two events to deal with outlier problems: changing the data or using robust estimates to reduce the outlier influence of the data used. The data used in this study is cross-sectional data. The data refers to one point in time, namely the IFLS 5 in 2014. With the help of the STATA 14 application, the data is processed using the Multiple Linear Regression method. This study uses Multiple Linear Regression (MLR) to see the relationship between the dependent and independent variables. However, MLR has a weakness, namely the problem of classical

assumptions. Therefore, robust regression is used to create the best model and avoid the problem of classical assumptions (Pesko and Robarts, 2017; Rasheed et al., 2014) .

RESULT & DISCUSSION

Table 2 Demographic Data

Age Groups (Years)	Male	Percentage	Female	Percentage	Total Frequency
0-19	76	35.514%	138	64.486%	214
20-29	157	25.738%	453	74.262%	610
30-39	226	32.148%	477	67.852%	703
40-49	184	40.350%	272	59.650%	456
50-59	137	35.863%	245	64.136%	382
>59	142	42.771%	190	57.229%	332

Source: Author's Analysis, Indonesian Family Life Survey 5, 2014/2015

Table 3. Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Outpatient cost	2,697	10.440	1.118	6.908	20.720
Cigarettes consumed	2,697	1.451	4.984	0.000	84.000
Age	2,697	39.350	15.510	15.000	94.000
Education	2,697	8.204	4.538	0.000	16.000
Weight	2,697	57.040	11.680	6.200	115.000
Expenditure per capita	2,697	13.750	0.631	11.600	16.330

Source: Author's Analysis, Indonesian Family Life Survey 5, 2014/2015

Table 2 shows the demographic table of respondents for the variables of cigarette consumption in rural areas and age. Cigarette consumption of 0-10 comes daily and age 30-39 is the highest category in this study. Based on table 3, it can be known that the overall observations in this study are as many as 2,697 individuals. For the variable outpatient cost, it has the lowest value of 6.908 percent to the highest of 20.72 percent; for cigarettes consumed variable, the lowest value is 0 (no smoking habit) to the highest is 84 cigarettes in one day; for the age variable, the lowest value is an individual aged 15 years and the highest is an individual aged 94 years; for the education variable the lowest score is 0 (never school) and 16 years of schooling; for the weight variable, the lowest value is 6.2, and the highest is 115 kilograms; for the expenditure variable per capita, the lowest

value is 11.60 percent, and the highest is 16.33 percent.

Using a multiple linear regression (MLR) model that has been robust in the secondary data of the Indonesian Family Life Survey (IFLS 5), regression results can be shown through the following table:

Table 4. Regression Result

VARIABLES	(1) outpatient cost
Cigarettes consumed	0.00776* (0.00430)
Expenditure per capita	0.369*** (0.0346)
Weight	0.00437** (0.00182)
Education	0.0229***

	(0.00557)
Age	0.00618***
	(0.00169)
Constant	4.672***
	(0.460)
Observations	2,697
R-squared	0.070

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's Analysis, Indonesian Family Life Survey 5, 2014/2015

Table 4 showed that the results of the variables have a positive relationship with public health spending, namely the amount of cigarette consumption in rural areas, age, per capita expenditure, education, and weight. However, poverty in rural areas of Indonesia still showed a high number. In March 2021, there were about 15.37 million poor people in rural areas (BPS, 2021c). Poverty conditions in rural areas will impact the quality of life and public health. According to previous research that state cigarette consumption causes 7 million deaths annually (CDC, 2021). Another research states that smoking is more prevalent in rural areas than in metropolitan areas,

Regression results in table 4 showed that consumption of one cigarette in rural areas had a positive and significant effect. Therefore, every increase in consumption of one cigarette will increase public health expenditure by 0.0078 percent, *ceteris paribus*. In addition, smokers will have higher levels of anxiety and depressive symptoms.

In Indonesia, death cases due to smoking behavior reached 235,000 people each year and of the number of deaths due to smoking, 25,000 of them are individuals who do not have smoking habits (Edison et al., 2021). The high number of smoking deaths is undoubtedly caused by the number of individuals who have smoking habits in Indonesia. The cause of many Indonesians who have a smoking habits is the low price of cigarettes and the nicotine content that can trigger addiction. In one cigarette, 4000 chemicals can cause some health problems for the body (P2PTM, 2018).

The difference in health spending between urban and rural people is caused by various factors, such as technology, facilities, and available medical resources. In addition, villagers tend to be less routine in conducting health checks in various health facilities available. This condition is inversely proportional to urban communities that perform various kinds of health more routinely. The regression results align with previous research, which stated a negative relationship between health expenditure and shelter in Rural Areas of India (Pradhan et al., 2017). Economic factors of rural communities can influence these conditions.

Household expenditure and smoking habits showed that low-income households in China smoke less than high-income households, especially in rural households. However, due to their relatively low incomes, households under the poverty level allocate a higher percentage of their income to cigarettes than high-income households. Thus reducing spending on other items in a smoking household. Therefore, if households stop buying cigarettes and spend their money on other goods, they can improve their living standards. This is especially true for poor households (Hu et al., 2005).

Poor health conditions and high health care spending are the main reasons for leaving smoking in China. Smoking exacerbates a large number of poor rural households. Tobacco spending can cause considerable losses to poor households with limited incomes for food and necessities. Analysis of data from rural areas in China indicates that smoking suffers other family members by reducing spending on basic necessities such as food, utilities, and durable goods (Wang et al., 2006). Other studies in Australia have shown that some smokers with a low-middle economy will reduce the household's need and expenditure to maintain smoking on an already limited budget. Most smokers estimate to spend 25%-35% of their income on cigarettes, which often comes at the expense of other important household expenses, such as bills, groceries, clothing, and family activities (Guillaumier et al., 2014).

The results showed that age had a positive and significant influence of 6.18 percent on

health expenditure. This condition is in line with previous research, which states that the higher age of the individual, the prevalence of exposure to various diseases (Pandey et al., 2017). In addition, individuals over 55 and who have a smoking habit will have a higher prevalence of coronary heart disease (AR and Indrawan, 2014).

Other research on smoking habits and individual age showed that younger individuals are more responsive to price changes than older individuals. Although the older age group was less sensitive to price changes, the change in their smoking behavior was still statistically significant. Young individuals will respond when there is a change in the price of cigarettes. So cigarette consumption will decrease when the price of cigarettes increases. While individuals with an older age, their cigarette consumption will remain high even though the price of cigarettes increases. (Taylor et al., 2018). Another study focuses on price elasticity that affects the decision of age groups to consume cigarettes. Price has a statistically significant effect on smoking behavior and the decision to quit smoking for the older age group. Meanwhile, among adolescents, the increase in cigarette prices has a positive but not significant effect on smoking behavior (Franz, 2008).

In this study, educational variables positively and significantly affect individual health expenditure by 2.25 percent. The longer individuals spend on school, the more it increases the cost of health expenses. This condition occurs due to understanding individuals who are getting better at doing health checks regularly. The conditions align with previous research that stated that income would affect high health spending based on selected health services (Retniatika, 2018). In addition, the longer individuals spend time in school, the higher their income will be obtained. Again, this is based on understanding and individual skills that will be better. This condition follows previous research that states that the length of school can affect higher incomes (Coady and Dizioli, 2018). The study was in line with regression results in Table 2 which showed that per capita spending had a positive and significant effect on health spending by 0.03 percent. But, the role of peer pressure, education, or stress also

affects a person's smoking habit (Van Roosmalen and McDaniel, 1992).

Men and women with low education carry out smoking habits compared to those with higher education. Apparent educational differences in smoking prevalence trends are seen in several countries, including Sweden, Finland, Denmark, Germany, Italy, and Spain (Giskes et al., 2005). Another study on the relationship between smoking habits and education conducted on elementary school children in Liverpool aged 4-8 years generally had a negative tendency to smoke and most of them had not formed a regular pattern of smoking behavior. In addition, they seem to have a fairly good understanding of smoking. Porcellato et al., 1999). However, the role of peer pressure, education, or stress also affects a person's smoking habit. Most of today's smokers who start the habit at an early age are driven by many factors that influence each other to create a situation in which this occurs. Thus, higher education, even education about health and the dangers of smoking, has no significant effect on a person's smoking habit (Van Roosmalen and McDaniel, 2014).

The results also showed that an individual's weight positively and significantly influence on health expenditure by 4.37 percent. Excessive individual weight will cause obesity problems, so increased health spending. This will be worse if the individual has excessive weight and has a habit of smoking. The impact of these individuals will increasingly have a high prevalence of being exposed to obesity. The impact is in line with previous research that state that individuals who are overweight and close to obesity will have higher health expenses (Bishay et al., 2021). Furthermore, if you have higher body weight and the individual is a smoker, it can reduce the body's metabolic rate and increase health expenditure. But smoking habits can lead to significant weight loss (Jylhä, 2009).

In addition, a person with higher body weight increases the likelihood of becoming a smoker. There is a causal effect between smoking habits and body weight. Individuals with higher body weight are at higher risk for increasing tobacco consumption. Furthermore, if you have higher body weight and the individual

is a smoker, it can reduce the body's metabolic rate and increase health expenditure (Taylor et al., 2018).

However, studies are showing that leaving smoking has no substantial or permanent effect on average adult body weight because the weight of people who have started and then quit is almost the same as those who have never smoked. Although smoking can lead to weight loss and quitting smoking can lead to weight gain, smoking overall was not associated with an increase in net weight compared to never smoking. (Piirtola et al., 2018). In line with the research. Differences in body weight due to employment status, income, and consumption of healthy foods lead to higher body weight. So there is no causal effect between smoking habits and body weight. However, low people, precarious employment status, and a lower middle-class economy tend to be positively correlated with smoking habits (Mobley et al., 2004).

This study can show the magnitude of health expenditures caused by smoking habits in rural communities. However, this study still has shortcomings and further research is needed using the latest data to show better results. Then, outpatient costs are only calculated based on the cost of treatment that needs to be incurred each time of treatment that needs to be improved to provide more insight.

CONCLUSIONS

From this research, we found that smoking behavior may prevent the poverty eradication effort in rural areas through exacerbating the effects of poverty and causing significant deterioration in living standards among the poor due to several factors, such as smoking expenditure, and the health cost of smoking-related diseases. This study has strengths, where this study can show the magnitude of health expenditures caused by smoking habits in rural communities. However, this study still has shortcomings and further research is needed using the latest and longer time-variant data, as well as to add more variables to provide more insight. The results of this study can be a basis for local governments to

be more aware of limiting cigarette consumption in rural communities.

Our recommendation is to create a policy that aims to effective tobacco control in every kind, it involves the prevention of smoking behavior. The policy can be refocused primarily for people underaged, the majority of smokers. The government should consider policies that have been implemented by other countries such as limitation of cigarette advertising in every media platform, restriction of cigarettes for people underaged, and increased smoking tax. The implementation of non-smoking areas (KTR) should be augmented and enforced, especially in places of education, child care, worship places, and public transportation. Another recommendation is to encourage the government to sign the Framework Convention on Tobacco Control (FCTC), which Indonesia has not ratified, and to intensify the anti-smoking campaign to minimize its impact on poverty.

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