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The Relationship Between Cigarette Consumption And Poverty: Analysing The Role Of Price

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ABSTRACT

Poverty has been a global concern until recently. In Indonesia, the poverty rate will reach 9.57 per cent in 2023 or at least 26 million people below the poverty line. A phenomenon occurs in poor communities in Indonesia where half of the households spend money on cigarettes. Cigarette consumption burdens households through consumption costs as well as health costs and reduced household productivity, which can affect the welfare of smoker households. Conversely, environmental factors, especially in poor communities, also influence cigarette consumption habits. This study aims to examine the relationship between cigarette consumption and poverty. For this reason, the instrumental variable method is used to avoid endogeneity bias due to reverse causality when analysing the relationship between cigarette consumption and poverty. Cigarette price is used as the instrument variable. The data used in the study is pooled cross section data from the National Socio-Economic Survey from 2014 to 2021. The results of the analysis show a significant negative relationship of cigarette prices to household cigarette consumption and cigarette consumption increases the probability of households being poor.

INTRODUCTION

Poverty is a global problem that occurs in almost all countries. In Indonesia, the poverty rate in 2023 was 9.57 per cent or at least 26.4 million people below the poverty line (BPS, 2023). This figure is still quite high when compared to the sustainable development goals target of eradicating poverty by 2030 (Bappenas, 2023).

Poverty is a condition of limitation in fulfilling basic needs that can have a negative impact if not resolved. Poverty conditions can lead to a decrease in the quality of human resources, productivity and welfare of the poor. In addition, poverty can have an impact on the surrounding environment where illegal activities and crime risks can arise due to inequality and inequality in

society (Banerjee & Duflo, 2011). Unaddressed poverty can also have an impact on the social and political instability of a country (Greve, 2020).

In relation to poverty in Indonesia, there is a phenomenon where the poor in Indonesia choose to consume cigarettes, which should not be a priority for basic or main needs, and even this consumption has a negative impact on health. The portion of cigarette consumption among the poor is even quite large compared to other basic needs. Based on BPS data (2023), cigarettes, especially filter clove cigarettes, rank second in the share of household expenditure on food commodities that contribute to the poverty line. In addition, based on data from the national socio-economic survey (SUSENAS), poor households that consume cigarettes are approximately half of the number of poor households in Indonesia (BPS, 2022).

The choice of cigarette consumption among the poor in Indonesia needs to be further investigated because one of the factors causing poverty is inappropriate consumption choices (World Bank, 2023). This needs to be researched because the limitations faced by the poor in Indonesia do not reduce the desire of some poor people to continue smoking. Cigarette consumption at least burdens household expenditure. In addition, there is a burden in the form of health costs arising from the negative impact of cigarette consumption on health.

Furthermore, the negative impact of cigarette consumption on health will reduce the quality of life and productivity of smokers and risks reducing income and welfare, especially of the poor, so there is a suspicion that cigarette consumption is related to or has an impact on welfare or poverty. This is supported by previous research which shows that cigarette consumption has an impact on poverty (Alkadri et al., 2023; Lubis et al., 2021; Neli & Hardius, 2020; Liu et al., 2006). Thus, it can be said that smoking is related to or has an impact on poverty.

On the other hand, the phenomenon of smoking among the poor is also influenced by environmental factors. Desmond (2003) states that smoking is influenced by environmental factors. The habit of smoking is synonymous with the environment of the poor or poverty. This is proven by several studies, one of which is Cambron et al. (2019) which states that a poor environment affects people's smoking habits. In addition, the results of research by Afif & Sasana (2019) also show that poverty has a significant positive relationship with the amount of cigarette consumption in Indonesia. Thus it can be said that poverty and poor neighbourhoods affect a person's cigarette consumption habits. There are several empirical studies that show the relationship between cigarette consumption and poverty, both research on the impact of cigarette consumption on poverty (Alkadri et al., 2023; Lubis et al., 2021; Margareth at al., 2021; Neli & Hardius, 2020; Liu et al., 2006) and the relationship between the environment of poor people or poverty with consumption or smoking habits (Afif & Sasana, 2019; Cambron et al., 2019; Watel et al., 2009, Hu et al., 2005; Flint & Novotny; 1997).

The reverse causality between cigarette consumption and poverty may lead to potential endogenous bias. Several previous studies related to cigarette consumption and poverty are still limited and have not accommodated the resolution of endogeneity. Therefore, this study uses the instrumental variable method to eliminate bias in the value of the relationship between cigarette consumption and poverty. In addition, research on the relationship between cigarette consumption and welfare, particularly in Indonesia, is largely limited to using units of observation at the provincial and national levels.

This does not sufficiently illustrate the influence of household or individual cigarette consumption behaviour/habits on poverty. There are studies that use household or individual observation units, the scope of the research is very narrow, namely to a particular region in Indonesia. Thus, it can be said that research on the relationship between cigarette consumption and poverty in Indonesia needs to be developed by considering the development of research with units of observation in the form of households and expanding the scope of research, namely all households in Indonesia to see the relationship between cigarette consumption and household poverty that occurs in all regions in Indonesia.

Cigarette price was chosen as an instrument variable in the study using the instrumental variable method with the assumption that cigarette price affects poverty (dependent) only through cigarette consumption (independent) so that it can be used as an instrument variable to eliminate the endogenous bias of cigarette consumption on poverty.

LITERATURE REVIEW

Poverty

Poverty is a condition of deprivation where a person cannot fulfil their basic daily needs or can be called an underprivileged community. Based on this, poverty can be measured from how much calorific input a person should meet on a daily basis to how much the minimum amount a person must spend to meet basic needs or basic daily needs to be able to live properly. World Bank (2014) states that poverty status is measured based on how much a person spends to fulfil basic needs in the form of food and non-food based on poverty standards set by each region or country. In Indonesia, poverty is defined as a person's inability to meet basic food and non-food needs based on the poverty line, which is an average of IDR 550,548 per capita per month (BPS, 2023). The determination of the poverty line varies depending on the price conditions in each region or country.

Determining a certain value limit as a welfare standard or poverty line needs to be done to measure how much poverty occurs in a region or country and overcome poverty problems (Greve, 2020). In addition, to be able to solve poverty problems, the government also needs to know the factors that cause poverty. Leiser & Shemesh (2018) mentioned that the factors that cause poverty are individual factors (lack of individual effort and motivation to escape from conditions of deprivation and poor financial management and individual consumption choices), structural factors (lack of education, opportunities and an economic system that only benefits the prosperous groups) and other factors that cannot be controlled. In addition, the World Bank also explains the factors that cause poverty as regional, community, demographic, economic, and social characteristics (World Bank, 2014).

Table 1 Factors Causing Poverty According To The World Bank

No.	Causal Factors	Points that Cause Poverty
1.	Area characteristics	Climatic conditions, natural resources, and geographical location.
2.	Community characteristics	Availability of infrastructure such as schools, health, availability of labour, and the social environment of the community.
3.	Demographic characteristics	The number of family members, the ratio of family members in the labour force, and the gender of the household head.
4.	Economic characteristics	Employment, income, food and non-food options consumed, and presence of property assets.
5.	Social characteristics	Health of family members, education, and place of residence.

Source: World Bank (2014)

Consumer Behaviour

Consumer behaviour is influenced by consumer preferences, budget constraints, and consumer choices. Consumption preferences or preferences between one good and another are influenced by many factors such as needs, price of goods, product specifications, consumer demographics, market perceptions, experience, knowledge and other factors. In relation to consumption preferences, consumers will be faced with choices and limited resources or budgets. Therefore, consumers will adjust their choices by considering the available budget and the greatest utility or satisfaction for themselves. To be able to maximise utility under budget constraints, consumers must meet the conditions of maximising consumption on the income

line or consumer financial capability and choose a combination of consumption packages that have the highest level of satisfaction without exceeding their budget limits (Pindyck & Rubinfeld, 2018). A person's choices, financial condition and consumption preferences are different from one another. By understanding the three factors that influence consumer behaviour, it will be easier to analyse consumer demand and know how consumers respond to changes in prices and income.

Demand and price elasticity

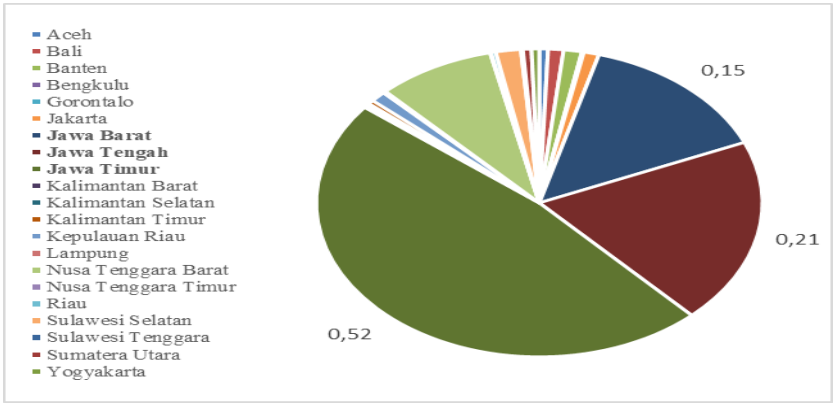
In microeconomic theory, the demand for a good is influenced by the price of that good. An increase in the price of a good will reduce the amount of consumption of the good ceteris paribus. In addition to the price of goods, consumer income also affects how much consumers demand for a good due to changes in their ability or budget constraints. Furthermore, the price of substitute and complementary goods also affects consumer demand for a good (Pindyck & Rubinfeld, 2018). Consumer responses to changes in the price of goods also vary according to consumers' willingness to buy and the nature of the goods consumed. Consumers will be sensitive to price increases for goods that are elastic. Conversely, consumers will be less sensitive to price increases for goods that are inelastic (Pindyck & Rubinfeld, 2018). The price elasticity of a good is influenced by the availability and price of substitute or complementary goods, the addictive nature of a good, and a person's income.

The absence of similar substitute goods causes the good to be inelastic while an increase in the price of complementary goods affects the demand for a good (cross price elasticities). Meanwhile, addictive goods also cause demand to be inelastic while a person's income also affects how much demand for a good (income elasticity) (Pindyck & Rubinfeld, 2018). In the context of control policies, especially those related to prices or fiscal policy, price elasticity affects the effectiveness of tariff setting. The more inelastic a good is, the higher the tariff that should be imposed to reduce demand or control the good.

Cigarettes and Negative Externalities

Tobacco has been recognised by Indonesians for centuries. Clove cigarettes are an original Indonesian product and have become a cultural product of the Indonesian people (Sunaryo, 2013). This is one of the reasons for the large number of smokers and the amount of cigarette consumption in Indonesia. With the large amount of demand for cigarettes, the cigarette industry is also growing rapidly in Indonesia. The largest development of the cigarette industry is on the island of Java, especially in the provinces of West Java, Central Java and East Java. This can be seen from the large percentage of the tobacco products industry based on Figure 1.

Figure 1 Percentage Of The Number Of Tobacco Product Factories By Province In Indonesia In 2023



Source: Directorate General of Customs and Excise, processed (2023).

Behind the large number of smokers and cigarette consumption in Indonesia, the negative impacts are also very large. Based on data from the Ministry of Health, there are several chronic diseases and premature deaths caused by smoking (Ministry of Health, 2018). In Indonesia, health costs due to smoking are estimated at 17.9 to 27.7 trillion rupiah (CISDI in BKF, 2021). Of these costs, 10.5 to 15.6 trillion rupiah is financed by BPJS Health funds. These health costs are equivalent to 20 to 30 per cent of the national health insurance subsidy issued by the state budget (BKF, 2021). To overcome the negative externalities of smoking and control cigarette consumption, WHO recommends controlling, one of which is through a price mechanism (WHO, 2003).

Cigarette Excise Policy

Excise is one of the control policies in the form of indirect taxes imposed on certain goods or services as a form of consumption control (Screpanti & Zamagni, 2005). In addition to being an instrument of consumption control and state revenue, excise levies can be used to compensate for negative externalities generated by an activity so that the amount of the excise tariff should be adjusted to the cost of the externality generated by a good (Kaplow, 2008). In Indonesia, excise tax is imposed on tobacco products. Several types of processed tobacco products based on Law number 11 of 1995 concerning Excise jo. Law number 7 of 2021 concerning Harmonisation of Tax Regulations, among others, are machine-made clove cigarettes as clove cigarettes produced using machines, machine-made white cigarettes as cigarettes without a mixture of cloves produced by machines, clove and white hand-rolled cigarettes whose production uses simple tools, filtered clove/white hand-rolled cigarettes produced with simple tools by inserting filters, cigarette rhubarb, kelobot, cigars, tobacco extracts and essences, molasses tobacco, inhaled tobacco and chewing tobacco.

The determination of excise tariffs and retail selling prices applied to various types of processed tobacco varies according to the type of cigarette and the class of tobacco production and the tariffs increase every year. The differences in excise rates and retail selling prices are determined based on the production capacity of cigarette companies and the types of cigarettes produced.

This is done to protect small industries and maintain business competition. The determination of the retail selling price of cigarettes serves to control prices in the market. The Ministry of Finance, through the Directorate General of Customs and Excise, has set a lower limit on the retail selling price of cigarettes and routinely conducts market transaction price surveys to ensure that the prevailing price in the market is not lower than the predetermined price. The imposition of excise tax on cigarettes is aimed at controlling cigarette consumption by reducing the affordability of cigarette products in the community. However, the complexity of the excise tax system in Indonesia makes the increase in excise tax rates that is carried out almost every year less effective in reducing the affordability of cigarettes in the community due to the availability of cheaper cigarette options.

The results of research conducted by Prasetyo & Adrison (2019) state that the increase in excise tariffs is less effective in reducing the affordability of cigarettes in the community as a result of the complexity of prices and excise tariffs so that there are options for people to switch to cheaper cigarettes. It can be seen in Table 2 that the lowest retail selling price of cigarettes in each type of cigarette is almost half of the highest retail selling price. In addition, of the three types of cigarettes, hand-rolled clove cigarettes are the type of cigarettes with the lowest range of tariffs and retail selling prices so that it can be an option for smokers to switch to cheaper cigarettes when there is an increase in cigarette prices due to an excise tax increase. This causes the excise policy to be less effective in controlling cigarette consumption in the community.

METHODS

Based on the theories and literature discussed earlier, cigarette consumption does not only impact poverty, but on the contrary, poverty and poor neighbourhoods also influence a person's smoking habits. To find out the true impact of cigarette consumption on poverty, a method is needed that eliminates the problem of endogenous bias from the reverse causality relationship. In this study, the instrumental variable method is used to reduce the endogenous bias of reverse causality.

The impact of cigarette consumption on poverty will be analysed with the instrument variable price so that cigarette prices will be analysed with cigarette consumption in the first stage and then from these results cigarette consumption will be re-analysed with poverty in the second stage instrumental variable. The reason for choosing price as an instrument variable is because cigarette price meets the criteria as a connecting variable in analysing the relationship between cigarette consumption and poverty using the instrumental variable method where the cigarette price variable affects the independent variable of cigarette consumption but does not affect the dependent variable of poverty directly but only through the relationship of cigarette price to poverty (reduced form). The unit of analysis in this study is households throughout Indonesia that are included in the national socio-economic survey (susenas) in the period 2014 to 2021 so that this study is expected to be able to capture the relationship between household cigarette consumption and household poverty status throughout Indonesia in that period.

RESULT

Variable Description

This study uses household data included in the national socio-economic survey (SUSENAS) by combining observations in the national socio-economic survey from 2014 to 2021 (pooled cross section). This pooled cross section data model is used to obtain a large number of observations in different time periods so that it is useful for examining differences in behaviour among various characteristics of households in Indonesia within the period (Das, 2019). The households analysed in the study were 2,405,058 in the period 2014 to 2021 throughout Indonesia. Based on Table 3, it was found that the percentage of poor households from all observations was 8 per cent. The poverty status of households in the data is determined based on the poverty line of the district/city of the household, which is different every year.

Table 1 Summary Of Research Variables For All Observations

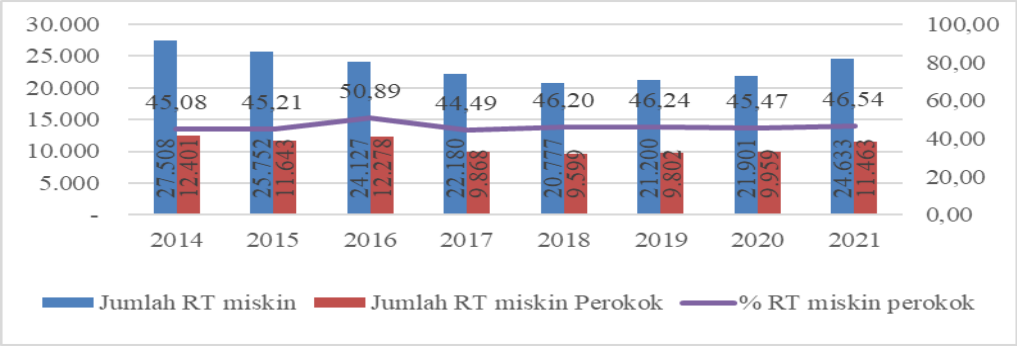
Variable	Observasi	Mean	Std. dev	Min	Max
Poverty	2.405.058	0,08	0,27	0	1
(1=poor, 0=non-poor)	2.405.058	251,19	320,21	0	7.628,57
Quantity	2.405.058	929,53	293,37	150	1.922,22
(cigarettes/month/rt)	2.405.058	0,42	0,49	0	1
Price (rupiah/cigarette)	2.405.058	3,77	1,62	1	9
Typekabkot	2.405.058	0,85	0,36	0	1
(1=kota, 0=kabupaten)	2.405.058	7,35	3,12	0	22
Jart (person)	2.405.058	0,75	0,42	0	1
Jkkart (1=male, 0=female)	2.405.058	1.383,89	3.011,47	0,562289	20.260,21
Avgyos (year)	2.405.058	50.563,62	59.316,12	5.274,309	799.349,1

Source: Processed from various sources (2014-2021)

The relative poverty rate experienced a downward trend from 2014 to 2021. The increase in poverty that occurred in 2020 and 2021 could be due to the covid-19 pandemic that affected

the national economy. From the number of poor households, it was found that around half of the poor households are smoker households or households that have the burden of cigarette consumption expenditure (see Figure 3).

Figure 2 Number Of Poor Households & Poor Smoker Households From 2014 To 2021



Source: BPS, processed (2014-2021).

The type of cigarettes consumed by both poor and non-poor households is filter clove cigarettes (Table 4). The choice of consumption of filter clove cigarettes in households is in line with the data on the choice of food commodities in the community where filter clove cigarettes are in the second most consumed expenditure share by households.

Table 2 Percentage Of Cigarette Types Consumed By Poor And Non-Poor Households In All Observations From 2014 To 2021

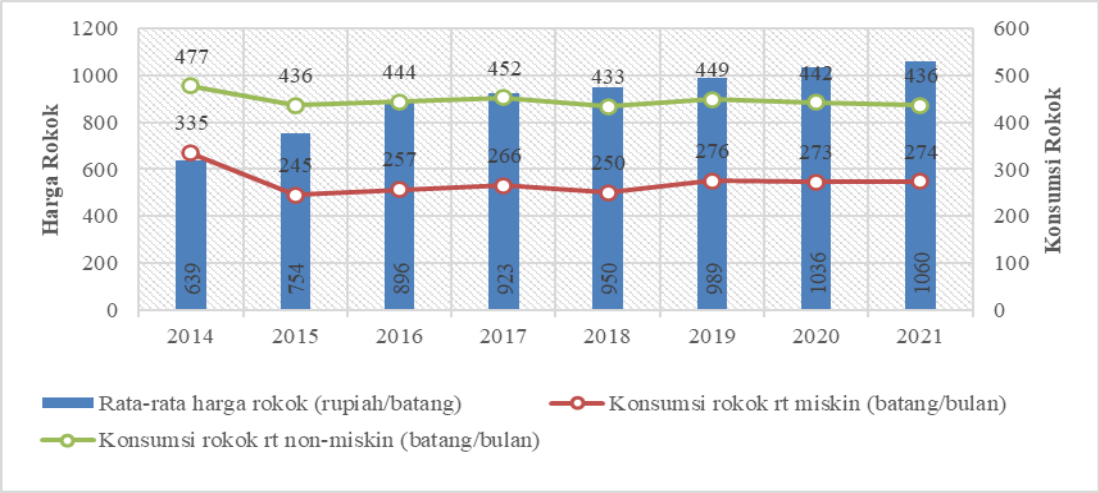
	Type of cigarettes consumed (%)		
	Filter clove cigarettes	Unfiltered clove cigarettes	White cigarette
Poor households	62,33	33,07	4,60
Non-poor households	68,99	23,74	7,27

Source: BPS, processed (2014-2021)

Based on Figure 4, the average amount of household cigarette consumption fluctuates for both poor and non-poor smoker households from 2014 to 2021. The decrease in cigarette consumption in 2015, 2018, 2020, and 2021 can generally be caused by cigarette prices increasing every year. This is in accordance with the results of research conducted by Lesmana & Khoirunurrofik (2022), Djutaharta (2020), and Kim & Jung, (2019) which showed a negative relationship between cigarette prices and cigarette consumption. In contrast to these conditions, an increase in cigarette prices followed by an increase in the amount of household cigarette consumption occurred in 2016, 2017, and 2019.

This could be due to an increase in the number of smokers in Indonesia in 2017 and rational expectations of consumption choices due to the non-increase in excise tax in 2019 (see Table 2) as well as a shift in consumption to cigarettes with lower prices. This condition is possible due to the gap between excise tax and cigarette selling prices so that consumers choose cheaper cigarettes when there is an excise tax increase (Barber & Ahsan, 2009). An increase in household income that is relatively larger than the increase in cigarette prices is also a possible reason for the increase in cigarette consumption when there is an increase in cigarette prices. This is in accordance with demand theory where consumption or demand for a good is influenced by the price of the good itself, the price of substitute and complementary goods, and consumer income (Pindyck & Rubinfeld, 2018).

Figure 3 Average Cigarette Price And Cigarette Consumption Of Household Smokers Tahun 2014 S.D. 2021



Source: BPS (2014 - 2021), reprocessed

Results Of Empirical Analysis

This study uses the instrumental variable method so that the analysis is divided into an analysis of the relationship between cigarette prices and household cigarette consumption (first stage) and an analysis of the relationship between cigarette consumption and household poverty status (second stage). The first stage estimation results were used to analyse cigarette consumption on household poverty in the second stage to eliminate endogenous reverse causality bias.

Robustness tests were also conducted to test the consistency and robustness of the estimation results to changes in regression specifications both by type of cigarette and region. The estimation procedure used in this instrumental variable probit regression uses the IV-Probit procedure.

Results Of First Stage Analysis

The first stage analysis in this study estimates the relationship between cigarette prices and household cigarette consumption. Based on the results of the first stage analysis in column 9 of table 5, cigarette prices are significantly negatively related to cigarette consumption. This indicates that an increase in cigarette prices will reduce household cigarette consumption. The coefficient value between cigarette prices and cigarette consumption shows the value of cigarette price elasticity where a 1 per cent increase in cigarette prices will reduce cigarette consumption by 0.77 per cent of household cigarette consumption in a month. The relationship between price and cigarette consumption is in accordance with the theory of demand where price negatively affects the demand for a good (Pindyck & Rubinfeld, 2018). The value of cigarette price elasticity in the model is in accordance with the average cigarette price elasticity in developing countries, which is around -0.4 to -0.8 (Ja & Chaloupka in Lesmana & Khoirunurrofik, 2022). Thus it can be said that the results of this estimation are in accordance with the theory and conditions of cigarette price elasticity in developing countries.

Results Of Second Stage Analysis

The second stage analysis in this study estimates the relationship between household cigarette consumption that has been estimated in the first stage and household poverty. From the results of instrumental variable probit analysis, the direction of the coefficient of the relationship between cigarette consumption and household poverty can be seen through column 9 in table 5 while the magnitude of the probability or marginal effect of the relationship

between cigarette consumption and poverty can be seen in the average marginal effect in table 6. The results of the analysis in the second stage show a significant positive relationship between household cigarette consumption in a month and household poverty status. Based on these estimation results, it can be concluded that an increase in cigarette consumption increases the probability of a household being poor.

Meanwhile, based on the marginal effect, the estimation results show that a 1 per cent increase in household cigarette consumption in a month increases by 0.12 percentage points the status of poor households. These results indicate that more household cigarette consumption will potentially increase the probability of households being poor. This is in accordance with poverty theory, which states that economic characteristics in the form of food choices consumed by households are one of the factors that cause household poverty (World Bank, 2014). In line with the results of this analysis, research by Alkadri et al. (2023) and Neli & Hardius (2020) show similar results that cigarette consumption has a positive effect on changes in the status of poor households.The control variables in the second stage that have a positive effect on the probability of household poverty status are the type of district/city of the household, population density, and covid year, which means that these variables have an effect in increasing the probability of a household being poor. The control variables that negatively affect the probability of household poverty are the sex of the household head, years of education, number of family members, working household ratio, and GRDP per capita, which means that these variables decrease the probability of a household being poor.

All stages of the regression produce a p-value that rejects exogeneity with a Wald anderson of exogeneity p-value of less than 0.05 or rejects H0. This means that the regression equation does require an instrument variable because the relationship between cigarette consumption and poverty is endogenous. Furthermore, the Kleibergen Fstat values at all stages of the regression show values above the critical value of Stock Yogo, which means that the instrument variables are strong and appropriate to use in all models.

Table 3 Estimation Results Of The Relationship Between Cigarette Price And Cigarette Consumption (First Stage) And Cigarette Consumption And Poverty (Second Stage): Stepwise Regression On Control variables

	1st stage Lnkuantitas	*2nd stage* Poverty Status	*1st stage* Lnkuantitas	*2nd stage* Poverty Status	*1st stage* Lnkuantitas	*2nd stage* Poverty status	*1st stage* Lnkuantitas	*2nd stage* Poverty status	*1st stage* Lnkuantitas	*2nd stage* Poverty status
	(1)		**(2)**		**(3)**		**(4)**		**(5)**	
Lnkuantitas		0.304*** (0.000)		0.304*** (0.000)		0.317*** (0.000)		0.309*** (0.000)		0.315*** (0.000)
Lnprice	-0.962*** (0.000)		-0.925*** (0.000)		-0.858*** (0.000)		-0.806*** (0.000)		-0.674*** (0.000)	
Jeniskabkot			-0.173*** (0.000)	0.004*** (0.000)	-0.170*** (0.000)	0.007*** (0.000)	-0.131*** (0.000)	0.042*** (0.000)	-0.155*** (0.000)	0.049*** (0.000)
Jkkart					2.104*** (0.000)	-0.696*** (0.000)	2.113*** (0.000)	-0.653*** (0.000)	1.682*** (0.000)	-0.606*** (0.000)
Avgyos							-0.023*** (0.000)	-0.030*** (0.000)	-0.018*** (0.000)	-0.034*** (0.000)
Jart									0.364*** (0.000)	-0.056*** (0.000)
Rasio_kerja										
Crowd										
Lnpdrb										
Covid										
Constant	9.977*** (0.002)	-1.534*** (0.000)	9.815*** (0.002)	-1.535*** (0.000)	7.574*** (0.002)	-0.974*** (0.000)	7.367*** (0.002)	-0.866*** (0.000)	5.456*** (0.002)	-0.660*** (0.000)
Kleibergen Fstat	$8.8x10^6$	$8.8x10^6$	$7.9x10^6$	$7.9x10^6$	$7.3x10^6$	$7.3x10^6$	$6.0x10^6$	$6.0x10^6$	$4.3x10^6$	$4.3x10^6$
Wald test Exo. P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$
R^2	0.0124	0.0124	0.0133	0.0133	0.0810	0.0810	0.0815	0.0815	0.1170	0.1170
***Standard errors in parentheses* (* p<0.10, ** p<0.05, *** p<0.01).**										

Tabel 5 (

	1st stage Lnkuantitas	*2nd stage* Poverty status	*1st stage* Lnkuantitas	*2nd stage* Poverty status	*1st stage* Lnkuantitas	*2nd stage* Poverty status	*1st stage* Lnkuantitas
	(6)		**(7)**		**(8)**		**(9**
Lnkuantitas		0.309*** (0.000)		0.310*** (0.000)		0.306*** (0.000)	
Lnprice	-0.752*** (0.000)		-0.747*** (0.000)		-0.760*** (0.000)		-0.776*** (0.000)
Jeniskabkot	-0.142*** (0.000)	0.043*** (0.000)	-0.129*** (0.000)	0.036*** (0.000)	-0.137*** (0.000)	0.043*** (0.000)	-0.136*** (0.000)
Jkkart	1.581*** (0.000)	-0.566*** (0.000)	1.581*** (0.000)	-0.566*** (0.000)	1.580*** (0.000)	-0.564*** (0.000)	1.581*** (0.000)
Avgyos	-0.023*** (0.000)	-0.037*** (0.000)	-0.023*** (0.000)	-0.036*** (0.000)	-0.024*** (0.000)	-0.037*** (0.000)	-0.025*** (0.000)
Jart	0.331*** (0.000)	-0.035*** (0.000)	0.331*** (0.000)	-0.036*** (0.000)	0.331*** (0.000)	-0.032*** (0.000)	0.331*** (0.000)
Rasio_kerja	0.622*** (0.000)	-0.233*** (0.000)	0.623*** (0.000)	-0.233*** (0.000)	0.616*** (0.000)	-0.227*** (0.000)	0.611*** (0.000)
Crowd			-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Lnpdrb					0.059*** (0.000)	-0.063*** (0.000)	0.058*** (0.000)
Covid							0.040*** (0.000)
Constant	5.761*** (0.002)	-0.613*** (0.000)	5.726*** (0.002)	-0.610*** (0.000)	5.213*** (0.003)	0.006*** (0.001)	5.336*** (0.003)
Kleibergen Fstat	$5.5x10^6$	$5.5x10^6$	$5.3x10^6$	$5.3x10^6$	$5.4x10^6$	$5.4x10^6$	$5.4x10^6$
Wald test Exo. P value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$	$5.52x10^8$
R^2	0.1244	0.1244	0.1244	0.1244	0.1246	0.1246	0.1246

Standard errors in parentheses **(* p<0.10, ** p<0.05, *** p<0.01).**

Table 4 Average Marginal Effect (Dy/Dx) Of Second Stage Estimation (Relationship Between Cigarette Consumption And Poverty)

Poverty	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
	dy/dx	**dy/dx**	**dy/dx**	**dy/dx**	**dy/dx**	**dy/dx**	**dy/dx**	**dy/dx**	**dy/dx**
Lnkuantitas	0,127	0,128	0,138	0,113	0,124	0,109	0,110	0,104	0,128
Jeniskabkot		0,002	0,003	0,015	0,019	0,015	0,013	0,015	0,019
Jkkart			-0,303	-0,238	-0,238	-0,199	-0,201	-0,191	-0,229
Avgyos				-0,011	-0,013	-0,013	-0,013	-0,013	-0,013
Jart					-0,022	-0,012	-0,013	-0,011	-0,018
Rasio_kerja						-0,082	-0,083	-0,077	-0,098
Crowd							0,000	0,000	0,000
Lnpdrb								-0,021	-0,025
Covid									0,049

Description: This table is the Average marginal effect value of the 2nd stage estimation table xxxx

Robustness test: Regression analysis of the relationship between cigarette prices, cigarette consumption, and poverty based on Java and Outer Java regions. In this research model, the Robustness test is conducted by analysing data based on the Java and Outer Java region clusters as well as the cigarette type cluster, namely filter clove cigarettes, unfiltered clove cigarettes, and white cigarettes. The reason for using this cluster is to see the impact of cigarette consumption on poverty in Java, which has a larger population and higher economic level than outside Java, and to see the difference in the impact of price on cigarette consumption and the relationship between cigarette consumption and poverty based on the three types of cigarettes studied.

The impact of cigarette prices on cigarette consumption (cigarette price elasticity) of households outside Java is greater than in Java. The cigarette price elasticity in Java was -0.19 while in Outer Java it was -1.44. This value is different from the initial model/main model which is -0.77. Thus it can be said that consumer demand for cigarettes outside Java is elastic while consumer demand for cigarettes in Java and the national or overall observation is inelastic.

The results of the second stage analysis in Table 7 show that cigarette consumption is positively related to increasing the probability of poor household status in both Java and Outer Java. Based on the marginal effect, a 1 per cent increase in cigarette consumption increases the probability of poor household status by 0.62 percentage points in Java and 0.05 percentage points in Outer Java. This implies that the impact of an increase in household cigarette consumption on the probability of poor household status is greater in Java than outside Java. The high value can be related to the price elasticity of cigarettes where the demand for cigarettes in Java is inelastic. When the price is increased, smokers in Java Island will continue to consume the cigarettes because they are not sensitive to price changes so that it will burden the smoker community and reduce their welfare.

Table 7 Estimation Results Of The Relationship Between Cigarette Prices And Cigarette Consumption (First Stage) And The Relationship Between Cigarette Consumption And Poverty (Second Stage) By Java And Outside Java

	Jawa			Luar Jawa		
	(1st stage)	*(2nd stage)*	*Margin 2nd stage*	*(1st stage)*	*(2nd stage)*	*Margin 2nd stage*
	Lnkuantitas	**Poverty**	**dy/dx#**	**Lnkuantitas**	**Poverty**	**dy/dx#**
Lnkuantitas		0.366*** (0,000)	0.621***		0.241*** (0,000)	0.051***
Lnprice	-0.196*** (0,001)			-1.439*** (0,001)		
Jeniskabkot	-0.052*** (0.000)	0.019*** (0.000)	0.034***	-0.241*** (0.000)	0.035*** (0.000)	0.007***
Jkkart	1.584*** (0.000)	-0.595*** (0.000)	-1.007***	1.529*** (0.001)	-0.508*** (0.000)	-0.107***
Avgyos	-0.049*** (0.000)	0.008*** (0.000)	0.014***	0.0095*** (0.000)	-0.083*** (0.000)	-0.017***
Jart	0.371*** (0.000)	-0.122*** (0.000)	-0.206***	0.297*** (0.000)	0.046*** (0.000)	0.009***
Rasio_kerja	0.593*** (0.000)	-0.232*** (0.000)	-0.392***	0.627*** (0.0004)	-0.203*** (0.000)	-0.043***
Crowd	0.000*** (0.000)	0.000*** (0.000)	0.000***	-0.000*** (0.000)	0.000*** (0.000)	0.000***
Lnpdrb	-0.113*** (0.000)	0.036*** (0.000)	0.061***	0.255*** (0.000)	-0.171*** (0.000)	-0.036***
Covid	-0.048*** (0.000)	0.053*** (0.000)	0.089***	0.094*** (0.000)	0.207*** (0.000)	0.044***
Constant	3.223*** (0.004)	-0.728*** (0.001)		7.650*** (0.004)	0.929*** (0.001)	
Kleibergen Fstat##	1.9×10^5	1.9×10^5		8.5×10^6	8.5×10^6	
Wald test of Exo. P value	0.0000	0.0000		0.0000	0.0000	
N	3.25×10^8	3.25×10^8		2.3×10^8	2.3×10^8	
r2#	0.1301	0.1301		0.1307	0.1307	

Robustness test: Regression analysis of the relationship between cigarette prices, cigarette consumption, and poverty by type of filter clove cigarettes, unfiltered clove cigarettes, and white cigarettes. Based on the results of the regression analysis by type of cigarette, namely filter clove cigarettes, unfiltered clove cigarettes, and white cigarettes, the relationship between cigarette prices and household cigarette consumption (first stage) produces a significant negative direction in all three types of cigarettes. Based on the estimation results in Table 8, the elasticity of cigarette prices reflected by the relationship between cigarette prices and cigarette consumption in the model shows inelastic values for the three types of cigarettes. The most inelastic cigarette price elasticity is white cigarettes with a value of -0.24, followed by filter clove cigarettes with a value of -0.74 and unfiltered clove cigarettes with a value of -0.97. The elasticity value of filter clove cigarettes is almost the same as the value of the initial model/main model which is -0.77. Thus it can be said that the demand for unfiltered clove cigarettes is the most elastic cigarette type among the three types of cigarettes while white cigarettes are the most inelastic cigarette type compared to the other two types of cigarettes. White cigarettes are the type of cigarette with the lowest consumption compared to clove cigarettes (see table 4). This indicates that the consumers and market segment of white cigarettes are different from clove cigarettes and in a limited scope of smokers. In addition, the absence of substitution options for similar cigarette types may also cause white cigarettes to be more inelastic. This could be the reason for the lack of sensitivity of white cigarette consumers to price changes, making white cigarettes highly inelastic. Unfiltered clove cigarettes are the most elastic cigarette type compared to the other two cigarette types. This can be because unfiltered clove cigarettes have the lowest tariff structure and class compared to the other two types of cigarettes. The low price and tariff of unfiltered clove cigarettes will target consumers with low income so that when the price is increased, consumers with limited income will be more sensitive to price changes and unfiltered cigarettes become more elastic than other cigarettes. This is in accordance with economic theory where elasticity is influenced by one's income (Pindyck & Rubinfeld, 2018).

The results of the second stage analysis in Table 8 show that cigarette consumption is positively related to increasing the probability of poor household status for filter clove cigarettes, unfiltered clove cigarettes, and white cigarettes. Based on the marginal effect, a 1 per cent increase in cigarette consumption increases the probability of poor household status by 0.13 percentage points for filter clove cigarettes, 0.06 percentage points for unfiltered clove cigarettes, and 0.085 percentage points for white cigarettes. This can be interpreted that the impact of increasing consumption of filter clove cigarettes on the probability of poor household status is greater than other types of cigarettes. The high value can be attributed to the large number of households that consume filter clove cigarettes and the price elasticity of filter clove cigarettes that falls into the inelastic category. The relationship between cigarette consumption and poverty can be explained by the costs of consuming cigarettes and the costs incurred due to the health costs of the negative effects of smoking (Liu et al., 2006). In addition, the negative health effects of smoking will reduce the quality and productivity of smokers, which risks reducing family income and welfare. This is why cigarette consumption is positively related to poverty. The relationship between cigarette consumption and poverty in this study is in accordance with the theory of poverty where one of the factors causing poverty is inappropriate consumption choices (World Bank, 2014).From the estimation results comparing the three types of cigarettes, it can be concluded that robustness tests conducted according to the types of filter clove cigarettes, unfiltered clove cigarettes, and white cigarettes produce the same direction and significance in the main variables but with different magnitudes. The three types of cigarettes show a significant negative relationship between cigarette price and quantity of cigarettes consumed, while the relationship between cigarette consumption and poverty is significantly positive, making it similar to the initial model/main model. Thus, it can be concluded that the model is robust to clustering analysis by cigarette type.

Table 8 Estimation Results Of The Relationship Between Cigarette Price And Cigarette Consumption (First Stage) And The Relationship Between Cigarette Consumption And Poverty (Second Stage) By Type

	Rokok kretek filter			Rokok kretek tanpa filter			Rokok putih		
	(*1st stage*)	(*2nd stage*)	*Margin 2nd stage*	(*1st stage*)	(*2nd stage*)	Margin *2nd stage*	(*1st stage*)	(*2nd stage*)	*Margin 2nd stage*
	Lnkuantitas	Poverty	dy/dx	Lnkuantitas	Poverty	dy/dx	Lnkuantitas	Poverty	dy/dx
Lnkuantitas		0.318*** (0.000)	0.134***		0.340*** (0.000)	0,063***		0.511*** (0.001)	0.085***
Lnprice	-0.743*** (0.001)			-0.972*** (0.001)			-0.236*** (0.000)		
Jeniskabkot	0.030*** (0.000)	-0.006*** (0.000)	-0.003***	-0.191*** (0.000)	0.074*** (0.000)	0,014***	0.039*** (0.000)	-0.017*** (0.000)	-0.003***
Jkkart	0.867*** (0.000)	-0.332*** (0.000)	-0.140***	0.698*** (0.000)	-0.337*** (0.000)	-0,062***	0.060*** (0.000)	-0.140*** (0.000)	-0.023***
Avgyos	0.005*** (0.000)	-0.043*** (0.000)	-0.018***	-0.037*** (0.000)	-0.088*** (0.000)	-0,016***	0.015*** (0.000)	-0.122*** (0.000)	-0.020***
Jart	0.274*** (0.000)	-0.029*** (0.000)	-0.012***	0.100*** (0.000)	0.106*** (0.000)	0,020***	0.044*** (0.000)	0.133*** (0.000)	0.022***
Rasio_kerja	0.851*** (0.000)	-0.324*** (0.000)	-0.137***	-0.332*** (0.000)	0.006*** (0.000)	0,001***	0.034*** (0.000)	-0.124*** (0.000)	-0.021***
Crowd	-0.000*** (0.000)	0.000*** (0.000)	0.000***	0.000*** (0.000)	0.000*** (0.000)	0,000***	0.000*** (0.000)	0.000*** (0.000)	0.000***
Lnpdrb	0.276*** (0.000)	-0.133*** (0.000)	-0.056***	-0.254*** (0.000)	-0.020*** (0.000)	-0,004***	0.051*** (0.000)	-0.161*** (0.000)	-0.027***
Covid	0.349*** (0.000)	-0.000*** (0.000)	-0.000***	-0.097*** (0.000)	0.253*** (0.000)	0,047***	-0.077*** (0.000)	0.243*** (0.000)	0.040***
Constant	2.082*** (0.004)	1.078*** (0.001)		9.768*** (0.004)	-0.800*** (0.002)		0.950*** (0.002)	0.906*** (0.001)	
Kleibergen Fstat	2.1×10^6	2.1×10^6	2.1×10^6	2.2×10^6	2.2×10^6	2.2×10^6	1.6×10^6	1.6×10^6	1.6×10^6
Wald test - P value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	5.52×10^8	5.52×10^8	5.52×10^8	5.52×10^8	5.52×10^8	5.52×10^8	5.52×10^8	5.52×10^8	5.52×10^8
r2	0.0842	0.0842	0.0842	0.0633	0.0633	0.0633	0.0133	0.0133	0.0133

CONCLUSIONS

This study aimed to examine the relationship between household cigarette consumption and poverty as measured by the status of poor households. The endogenous bias caused by the reverse causality between cigarette consumption and household poverty is overcome by using the instrumental variable method. The instrumental variable used in this study is cigarette price which is believed to fulfil the requirements as an instrumental variable with the assumption that cigarette price is related to household poverty only through cigarette consumption.

The results of the empirical analysis using the instrumental variable probit model show that cigarette consumption has a positive effect on the status of poor households. This can be interpreted that an increase in the amount of cigarette consumption increases the probability of poor household status. This relationship can be explained by the negative impact of cigarette consumption on smokers and the families or people around smokers. Cigarette consumption can risk reducing the quality of a person's health and productivity, thus reducing household income. The costs incurred from cigarette consumption and the health costs caused by the negative impacts of cigarette consumption will also burden the household economy. These conditions can lead to an increase in the probability of a person falling into a poverty trap.

The results of the research analysis also show a negative relationship between cigarette prices and cigarette consumption. This is in accordance with the law of demand where an increase in the price of a good will reduce the amount of demand for that good. The relationship between cigarette prices and cigarette consumption in this study also reflects the cigarette price elasticity value of -0.77. This figure indicates that the demand for cigarettes is inelastic or insensitive to the increase in cigarette prices. The resulting elasticity value in this study falls within the range of the average value of cigarette price elasticity in developing countries.

The results of the analysis by clustering Java Island and outside Java Island show a similar coefficient direction to the analysis in the initial model/main model. Cigarette prices have a negative effect on household cigarette consumption and cigarette consumption increases the probability of households being poor. The elasticity of cigarette demand in Java (-0.19) is more inelastic than outside Java (-1.44). The elastic demand for cigarettes outside Java could be due to the existence of substitute goods other than the three types of cigarettes studied as well as

relatively lower incomes and higher market prices for cigarettes than in Java. Similar results were also obtained when the analysis was conducted separately between the three types of cigarettes consumed where an increase in cigarette prices caused a decrease in household cigarette consumption while cigarette consumption increased the probability of households being poor. The elasticity of demand for filter clove cigarettes is -0.74, unfiltered clove cigarettes -0.97, and white cigarettes -0.24. Thus it can be said that the demand for unfiltered clove cigarettes is the most elastic and the demand for white cigarettes is the most inelastic compared to the other two types of cigarettes. The more inelastic demand for white cigarettes could be due to the fact that the consumer or market segment for white cigarettes is different from clove cigarettes and the scope of smokers is limited (seen from the small share of household consumption of white cigarettes) as well as the absence of substitution options for similar types of cigarettes so that consumers of white cigarettes are not sensitive to price changes. The more elastic demand for unfiltered clove cigarettes compared to other types of cigarettes can be attributed to the low price and excise tax on unfiltered clove cigarettes, which targets consumers with low incomes. When prices are increased, consumers with limited income will be more sensitive to price changes, causing unfiltered clove cigarettes to be more elastic than the other two types of cigarettes.

SUGGESTION

This study was conducted at the household level with pooled cross section data. With this model, it is recognised that researchers cannot see changes in the impact or changes in consumer behaviour on cigarette consumption in the same household in the following year as can be captured by panel data. Therefore, if panel data on consumption at the household level is available, then further research can be developed to look at changes in impact or behaviour at the same individual unit.

This study did not include data on illegal cigarettes, which may affect household cigarette demand or consumption. This is important because illicit cigarettes can be a consumption option for the community and affect people's purchasing power for cigarettes. The currently available information on illegal cigarettes is only at the national level on a bi-annual basis so it is less relevant to be included in this research model. Due to these limitations, researchers suggest using a proxy for the number of illegal cigarettes that can describe the level of illegal cigarettes according to the level of the research observation unit.

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