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The Impacts of Cigarette Prices on Adult Smoking Cessation in Indonesia

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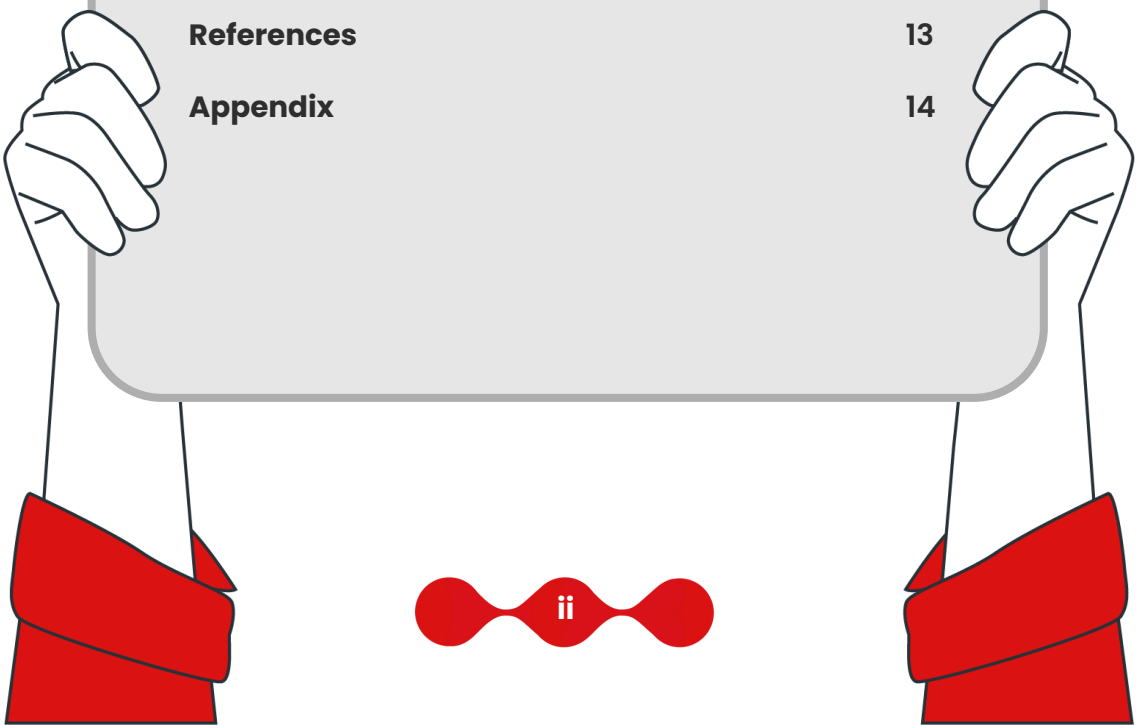

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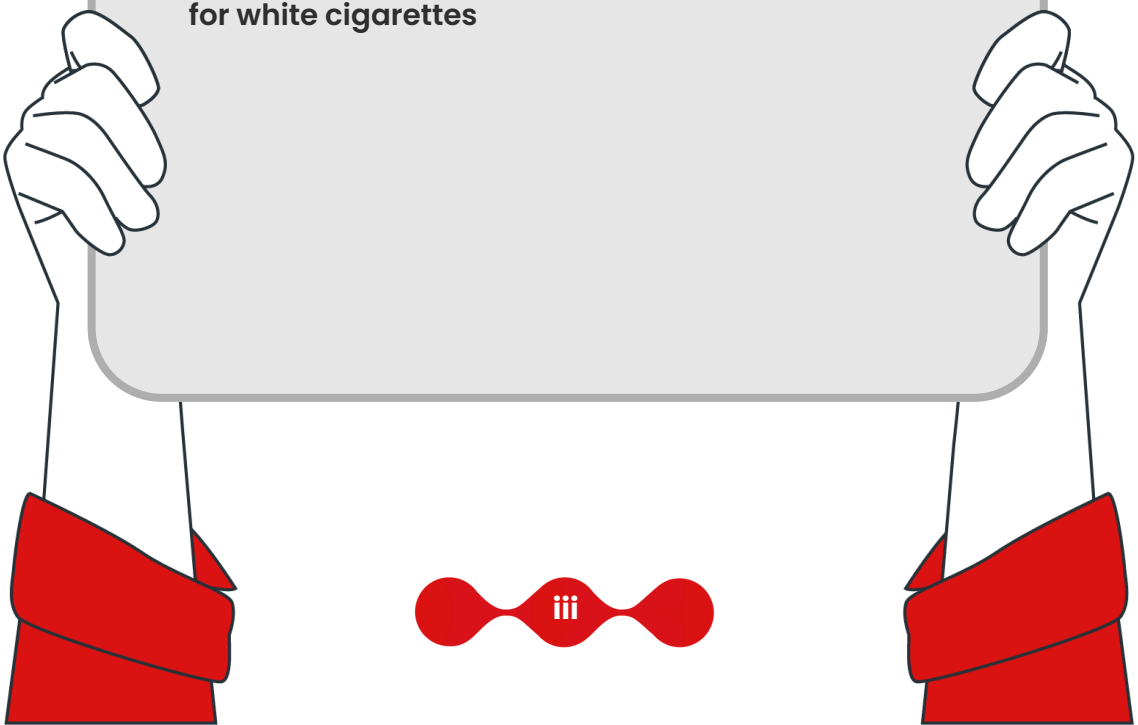

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EXECUTIVE SUMMARY

The cigarette excise tax rate in Indonesia remains among the lowest in the world, and the country faces significant challenges and complexities in its tobacco control efforts. As studies have shown that an increase in cigarette prices can reduce smoking prevalence through behavioral changes such as cessation, this study seeks to understand the impact of cigarette price increases resulting from tax increases in influencing smoking cessation behavior among adult smokers in Indonesia.

In estimating the impact of cigarette prices on smoking cessation, we use duration analysis by constructing a pseudo-panel data set using Indonesia's Global Adult Tobacco Survey 2021 and cigarette price data obtained from the National Consumer Price of Selected Goods and Services released by the Bureau of Statistics *(Badan Pusat Statistik)*. We use calculated historical average price data that are representative of 28 provinces from 1998 to 2021 to estimate the average price effect on smoking cessation while also taking into account some demographic and unobservable region-fixed characteristics.

We find that cigarette price increases are associated with a higher probability of cessation among adult smokers (with a price elasticity of cessation of 0.017 among males and 0.013 among both genders). Comparing the results with other upper middle-income countries, the impact of price on cessation in Indonesia is lower considering the affordability factor and the availability of alternatives for switching when a particular type or brand of cigarette price increases as a result of a higher tax.

Based on these findings, we recommend the government increase the cigarette tax by a higher margin, minimize the availability of cheaper cigarettes, ban the sale of single-stick cigarettes, and combat illicit cigarette trade to induce smoking cessation to a greater extent among smokers.

INTRODUCTION

Smoking prevalence in Indonesia is among the highest in Southeast Asia and the entire world (WHO, 2020, 2021). It is estimated that one-third of the adult population in the country smokes tobacco products, especially kretek cigarettes (G. A. Sahadewo, 2023). According to the Ministry of Health (2022), over the ten-year period from 2011 to 2021, the number of adult smokers increased from 60.3 million to 69.1 million. Smoking has detrimental effects on health as it is associated with cardiovascular diseases and cancer-related deaths (WHO, 2021). As a consequence, it also places a significant burden on the country's health system. It is estimated that in 2019, smoking costs Indonesia's Social Security Agency on Health *(Badan Penyelenggara Jaminan Sosial Kesehatan)* up to IDR 27.7 billion (or USD 1.8 billion) (Meilissa et al., 2022).

Increasing the price of cigarettes through excise taxation has been demonstrated to be the most effective and cost-effective strategy for reducing smoking (Jha & Peto, 2014). However, the size of the tobacco industry in Indonesia and its interference in policy-making decisions cause complexities in the country's tobacco control efforts (Astuti, 2020; Bigwanto, 2023). In 2016, it was estimated that Indonesia is the second-largest cigarette market in the world, with an overall retail volume of 316.1 billion sticks per year (CTFK, 2016). Meanwhile, Indonesia's tobacco industry interference index is the highest among its South Asian neighboring countries, meaning that the tobacco industry has considerable influence over tobacco-related policies (Assunta & Dorotheo, 2016). This may be the reason why the cigarette excise tax in Indonesia remains among the lowest in the world (Astuti, 2020). A study showing that cigarettes rapidly became more affordable in recent years strongly correlates with the increasing smoking prevalence between 2000 and 2016 (Blecher, 2018). In addition, Indonesia has a very complex cigarette excise tax structure, which facilitates individuals' switching to lower-taxed cigarettes (G. Sahadewo, 2017).

Globally, many studies have found that higher cigarette prices and taxes are associated with a higher probability of smoking cessation (Franz, 2008; Hanewinkel & Isensee, 2007; Kostova et al., 2014; Tauras & Chaloupka, 1999). Currently, the evidence evaluating cigarette prices' impact on individuals' decisions to quit smoking in Indonesia remains very limited. However, there is a strong indication that higher cigarette prices due to taxes would also positively impact smoking cessation. For instance, a nationally representative survey conducted in 2018 indicates that 12 percent and 32 percent of surveyed smokers would consider quitting if cigarette prices were increased by 50 percent and 100 percent, respectively (Widya Kartika et al., 2019).

This is the first study that aims to evaluate the impact of cigarette prices on cessation during the life course of adult smokers in Indonesia using duration analysis. This study builds upon previous studies that analyzed the impact of cigarette prices on smoking initiation and cessation behavior in 15 countries (Kostova et al., 2014) and China (Kostova et al., 2017). However, due to the limited length of longitudinal cigarette price data that are available for Indonesia, this study only focuses on cessation behavior.

DATA

Data on smoking and individual characteristics are obtained from Indonesia's Global Adult Tobacco Survey (GATS) 2021. The GATS is a nationally representative survey of men and women aged 15 and older that collects data on individual characteristics such as geographic location, smoking behaviors, demographics, and environmental factors related to tobacco use. While it is not a longitudinal survey, it can be transformed into a pseudo-longitudinal format by constructing each individual's smoking history from survey questions: *"How old were you when you first tried smoking tobacco, even once?"* that indicates respondents' age at initiation and *"How long has it been since you stopped smoking?"* that indicates respondents' age at the time of quitting smoking. The initial data (Table 1) consist of a total sample of 9,018 respondents in 2021. About 43.34 percent of adults reported that they currently smoke or ever smoked in the past (ever smokers). Among men, the rate of ever smoking is higher at 82.14 percent [1]. On average, smoking initiation happens at the age of 17 [2]. Among ever-smokers who quit smoking in the total sample, 20.71 percent reported having quit at the average age of 34 years old [3].

Table 1. Descriptive statistics of GATS Indonesia 2021 survey sample

Characteristics	Overall (N=9,018)	Men only (N=4,218)
Ever smokers (%)	43.34%	82.14%
Quitter (% of ever smokers)	20.71%	18.76%
Average age at the survey (years)	40.44	40.04
Average age of starting (years)	17.14	16.70
Average age of quitting (years) - among quitters	33.62	34.21
Average of smoking duration (years) - among ever smokers	21.75	22.21
Urban residence (%)	57.46%	57.54%

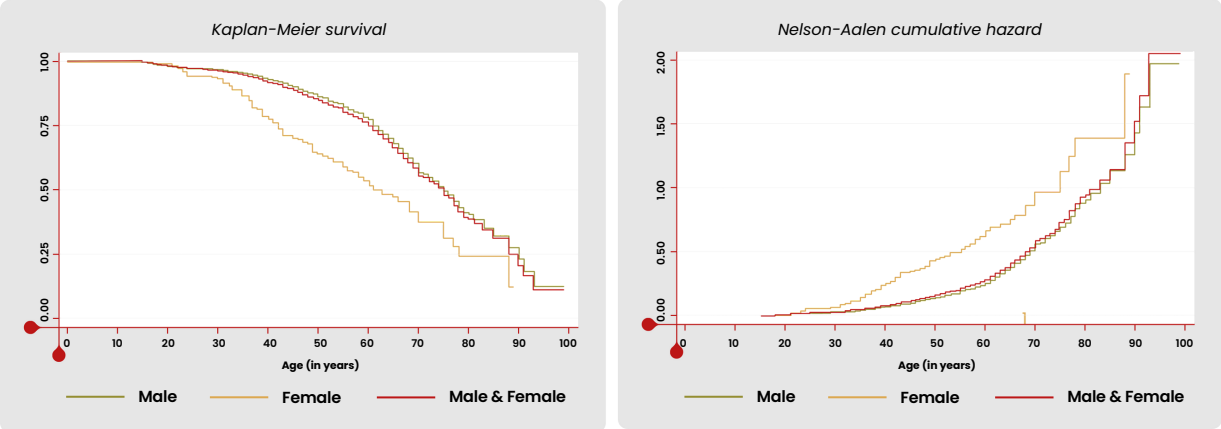
1 The rate of ever smoking among females is 5.00%.
2 The average age of smoking initiation among females is 24.23 years old.
3 The average age of quitting among female smokers who quit is 30.19 years old.

Characteristics	Overall (N=9,018)	Men only (N=4,218)
Education (%)		
Completed less than primary school	14.55%	12.27%
Completed primary school	23.97%	22.97%
Completed secondary school	20.55%	20.95%
Completed high school	30.52%	33.77%
Completed college/university or higher	10.40%	10.04%
Wealth index (%)		
Lowest	15.25%	13.94%
Low	23.90%	25.52%
Middle	17.85%	17.91%
High	19.88%	19.71%
Highest	23.12%	22.93%

Source: Authors' calculations using GATS 2021 survey sample
Notes: Estimates are calculated using the GATS sampling weight.

Figure 1 shows the descriptive trend of smoking cessation hazard (probability) in Indonesia by gender from 1998 to 2021. The graph shows that the probability of cessation increased steeply after the age of 30 for both genders. However, females have significantly higher chances of quitting than males cumulatively over time from the age of 23 until 88 years old.

Figure 1. Hazard to quit smoking by gender in the period 1998–2021

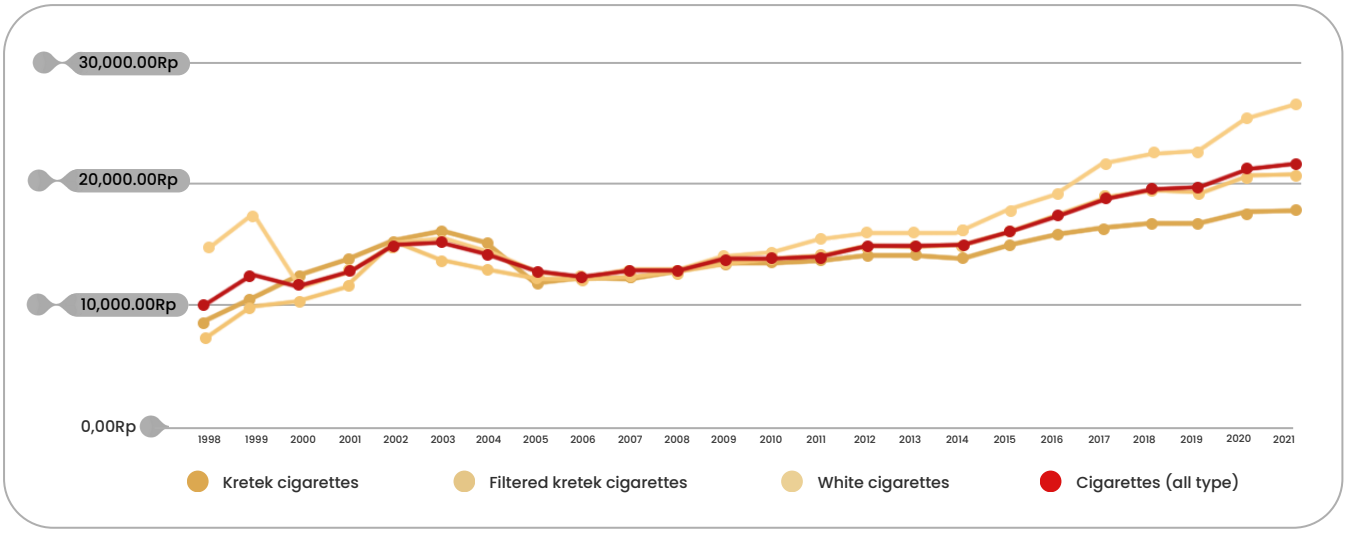


The Kaplan-Meier graph (left) describes the hazard, or probability of failure (i.e., cessation), over time as individuals get older. Meanwhile, the Nelson-Aalen graph (right) shows the cumulative probability of individuals experiencing smoking cessation as they get older. From these graphs, it can be seen that female smokers have a significantly greater probability of quitting than male smokers cumulatively over time.

Source: Authors' calculations

In this study, we use the cigarette price data from the National Consumer Price of Selected Goods and Services released by the Bureau of Statistics *(Badan Pusat Statistik)* from 1998 to 2021. The data consist of the per-pack retail price of three different cigarette types—namely, kretek cigarettes, filtered kretek cigarettes, and white cigarettes (that is, regular tobacco with no clove)—in different cities. We construct the average price of cigarettes at the national level and by province from 1998 to 2021. We adjust the cigarette price using the 2012 consumer price index (CPI) to account for inflation. Figure 2 shows the trend of average cigarette prices from 1998 to 2021. To construct our final data set, we match the average price at the national level with the respondent's smoking history obtained from GATS. Since Indonesia's GATS records respondents' geographic locations in 28 provinces, we also match respondents' smoking history to average cigarette prices calculated by province. As we have the average price that represents different cigarette types and varies by province in our final data set, we could presume that region-temporal variation properly reflects market conditions in our analysis.

Figure 2. Cigarette prices in Indonesia (1998-2021)



Over the past two decades (1998–2021), the average real price of cigarettes per pack in Indonesia has tended to show an upward trend, despite experiencing declines during the periods of 1999–2000 and 2003–2005. A similar pattern also occurred across all cigarette types. Furthermore, upon comparing different cigarette types, kretek and filter cigarettes emerged as cheaper in contrast to white cigarettes starting from 2005.

Source: Authors' elaboration based on the National Consumer Price of Selected Goods and Services and Consumer Price Index (CPI) from the Central Bureau of Statistics *(Badan Pusat Statistik)*.

The availability of price data determines and limits the final size of the pseudo-longitudinal data set used in the cessation analysis. Full reconstruction of respondents' smoking history starting from the year of birth cannot be done as the price data are not available to match all the years. However, this does not significantly reduce the number of ever smokers included in the analysis; the total sample of GATS consists of 3,707 ever smokers. Meanwhile, our sample consists of 3,529 ever smokers (only excluding 138 male and 40 female ever smokers) (Table 2). The average length of follow-up for the male-female and male-only sample is nearly 18 years. The duration of follow-up starts at the year of initiation and ends either at the year of cessation or at the year of survey, whichever comes first. The duration of follow-up can be left truncated by the available price series and right-truncated by the survey interview. In this study, we determine the event of cessation as successfully quitting smoking for at least one year (Chaiton et al., 2016).

Table 2. Sample characteristics of the analysis model

	Combined gender sample	Male sample only*
Number of persons	3,529	3,337
Average number of observed years per person	17.71	17.98
Cessation event (% of sample)	17.77%	16.15%

Source: Authors' calculations
Notes: *baseline model, all provinces included

The individual characteristics included are the age of the individual in each year of follow-up *(age)*, gender identifier *(male)*, residence *(urban)*, category of education *(education)*, wealth index *(wealth)*, and the duration of smoking *(smoking duration)*. *Male* and *urban* are binary variables indicating whether the individual is a male and whether the individual resides in an urban area at the time of the survey, respectively. *Education* gives categorical information about the level of education attained by each individual at the time of the survey. It classifies each individual into five different categories of education level (Table 1). *Wealth* groups each individual into five different levels of wealth: low, lowest, medium, high, and highest (Table 1), based on the wealth index constructed using the GATS information on the ownership of core household items, following Kostova et al. (2017). *Smoking duration* is the number of years of smoking counted starting from the year of initiation.

Urban, education, and *wealth* are obtained based on the responses of individuals at the year of the survey and are time-invariant. This means we do not have enough information to reconstruct the individual variability of these variables in preceding periods. However, we still use them as proxies for unobserved fixed individual characteristics that may influence the cessation behavior as opposed to standard individual characteristic control variables that vary following the behavior observed each year. In this case, *education* and *wealth* do not directly explain the impact of schooling or income category, but could explain the individual educational capacity and earning potential. Similarly, *urban* does not separate the impact between those who reside in urban areas and those who reside in rural areas, but could be helpful to account for individual residential preferences or migration to a limited extent.

METHODS

The transition of cessation behavior is modeled in a duration framework, where the timing of each transition, represented by the hazards (probability) of cessation of individual *i* in region *j* at analysis time *t* (h_{ijt}), which is modeled as a function of cigarette cigarette price in region *j* at time *t* $(price_{jt})$ and a set of time-invariant characteristics of individual *i* (X_i), as follows:

$$h_{ijt}(Cessation) = Pr\,(quit \mid prior\ smoking) = \beta_1 price_{jt} + \beta_2 X_i + \varepsilon_{ijt}$$

In this model framework, analysis time t represents the specific number of years since the individual started smoking, not the calendar specific time. The individual characteristics included in X_i are: *age, urban, education, wealth, and smoking duration (t)* in male-only specifications plus male in the combined-gender specification. The baseline models are based on a male-only sample, although the results from combined gender analysis are also presented. The possible wide differences in outcomes between males and females justify the separation of the models by gender. There are 539 cessations among 3,337 qualifying males and 88 cessations among 192 qualifying females.

The impact of price is based on the variation in cigarette prices in different provinces of Indonesia over time. The possibility of confounding from simultaneity between price and smoking cessation at the individual level is unlikely to influence region-level pricing since it is being addressed through the application of macro-level prices (that is, provinces). In addressing the possibility of confounding arising from the unobserved provincial characteristics that simultaneously affect both smoking behavior and region-level prices, such as provincial-specific or local anti-tobacco policy, we also add the region-fix effect in a few of our models.

We use both a standard duration model and a split-population duration model in estimating the models. The standard duration model assumes that all smokers will eventually quit smoking. This contradicts the fact that some smokers in our data set never quit smoking during the observed years. To address this issue, we also use the split-population duration model, which examines the probability of cessation while explicitly taking into account a proportion of smokers that never quit, making the analysis more accurate (Kostova et al., 2014, 2017; Nguyen et al., 2023). The model first estimates the probability of an individual quitting smoking, then weighs the hazard function by this probability.

RESULTS

In our analysis, we use two different cigarette price specifications: a national-level price and 28 provinces' prices. In the national-level price, the average cigarette price used in the estimation varies by year, while in the 28-provinces' prices, the average cigarette prices used in the estimation vary by year and by province.

The results of the split-population duration analysis using national-level prices and 28 provinces' prices indicate that higher cigarette prices are strongly correlated with a greater probability of smoking cessation (Table 3). The price elasticity of cessation among males and both genders in the 28 provinces' price specification is estimated to be 0.015 and 0.011 on average, respectively, which increases to 0.017 and 0.013 in the national-level price specification (Table 4). This means our baseline model shows that a 10-percent increase in price would increase the probability of cessation by 0.15 percent to 0.17 percent among male ever smokers. We also present the elasticity of cessation for three different types of cigarettes. Kreteks and filtered kretek cigarettes consistently have higher price elasticity of cessation compared to white cigarettes since they are cheaper and the most used. This indicates that price increases would substantially impact the quitting of smokers who smoke those cigarette types compared to the other.

Apart from the price, the results presented in Table 3 also confirm that demographic variables influence the outcomes. The coefficient for age suggests that the older the individual, the greater the probability of cessation (Kostova et al., 2014, 2017). Furthermore, individuals who reside in urban areas have a greater probability of quitting smoking than those who reside in rural areas in the year of the survey. We also find that those who finished primary school had a lower probability of quitting smoking than those who did not complete primary school in the year of the survey. This counterintuitive finding could be caused by the age factor, which may be more apparent. The people who completed primary school are younger in age (average age of 48 years) than people who did not complete primary school (average age of 57 years) at the time of the survey in our sample. Similar to two previous studies (Gonzalez-Rozada & Montamat, 2019; Kostova et al., 2017), we also found that higher wealth in the year of the survey is associated with a higher probability of cessation. Finally, we found that the longer the individual's smoking duration *(t)*, the lower the probability of cessation, implying the long-term addictive nature of tobacco smoking.

Table 3. Split-population duration models, male (marginal effects)

	National-level price	28 provinces' price
Cigarette price (in IDR)	0.00017***	0.00015***
	(0.000)	(0.000)
Age	0.12193***	0.11843***
	(0.005)	(0.005)
Urban residence	0.27793**	0.29392***
	(0.125)	(0.127)
Education level (relative to those who did not complete primary school):		
Completed primary school	-0.24312*	-0.27474**
	(0.114)	(0.109)
Completed secondary school	-0.1121	-0.15178
	(0.148)	(0.141)
Completed high school	-0.08718	-0.14606
	(0.148)	(0.138)
Completed college/university or higher	0.1696	0.05001
	(0.240)	(0.215)

	National-level price	28 provinces' price
Wealth index (relative to the lowest wealth index):		
Low	-0.14723 (0.133)	-0.10406 (0.140)
Middle	0.13958 (0.184)	0.2065 (0.195)
High	0.65644*** (0.269)	0.68992*** (0.274)
Highest	0.60821*** (0.268)	0.69890*** (0.284)
Smoking duration (t)	-0.12814*** (0.004)	-0.12642*** (0.004)
N (person-year)	59,993	59,993

Source: Authors' calculations
Notes: SEs in parentheses
*p<0,1, **p<0,05, ***p<0,01

Table 4. Price elasticities of cessation (baseline and sensitivity estimates)

	Men only, national-level price (N=59,656)	Men only, 28 provinces price (N=59,656)	Men and women, national-level price (N=62,126)	Men and women, 28 provinces price (N=62,126)
All cigarette types	0.01747*** [0.002]	0.01551*** [0.002]	0.01388*** [0.002]	0.01161*** [0.003]
Kretek cigarette	0.02343*** [0.003]	0.01428*** [0.003]	0.01800*** [0.003]	0.01059*** [0.003]
Filtered kretek cigarette	0.01713*** [0.002]	0.01474*** [0.002]	0.01347*** [0.002]	0.01104*** [0.002]
White cigarette	0.01223*** [0.003]	0.01012*** [0.001]	0.00978*** [0.002]	0.00746*** [0.002]

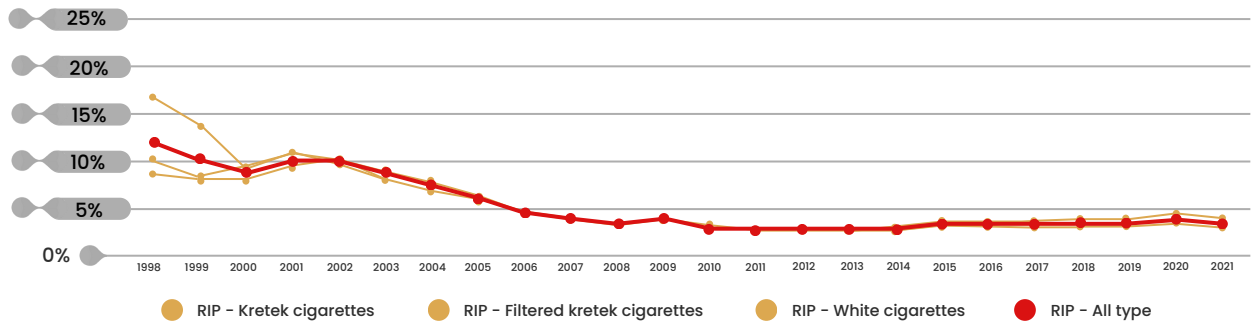
Source: Authors' calculations
Notes: Calculated using non-split-population duration analysis. Bootstrapped standard errors in brackets. Models include age, male (in men and women specification), urban, education, wealth index, smoking duration, and region fixed effect. For detailed results, please refer to the Appendix section.
*p<0,1, **p<0,05, ***p<0,01

DISCUSSION

Reflecting on prior studies, the results of our study are consistent with Kostova et al. (2014), which indicates that cigarette prices have a statistically significant impact on smoking cessation, especially among other upper middle-income countries. However, the same study finds that the elasticity of cessation ranges between 0.50–0.51, which is significantly higher than the estimated elasticity of cessation in Indonesia. There are a few possible explanations for this.

The low elasticity of cessation could reflect the fact that the cigarette price increase in Indonesia during the period from 1998 to 2021 may not have resulted in a significant reduction in affordability, and thus, was not able to incentivize smokers to quit to a greater extent. It is important to note that increasing cigarette prices does not necessarily make cigarettes less affordable (Blecher, 2004). Studies show that Indonesia experienced an increase in cigarette affordability from 2005 to 2012 (Blecher, 2018; Zheng, 2018). This could indicate that cigarettes did not become less affordable over time, despite their prices increasing. Using our price data, we also calculate the relative income price (RIP) and find that cigarettes in Indonesia had become relatively more affordable by 3.6 times in 2021 compared to 1998 (Figure 3.). This could explain why the impact of price on cessation in Indonesia is lower compared to other upper middle-income countries.

Figure 3. Cigarette affordability in Indonesia, measured by RIP (1998–2021)



RIP measures the percentage of GDP per capita to purchase 100 packs of cigarettes. This graph shows that Indonesia experienced three different stages of cigarette affordability: 1) a fluctuating affordability trend from 1998 to 2001; 2) an increasing affordability trend (decrease in RIP) from 2002 to 2010; and 3) a relatively constant affordability trend (the RIP fluctuates between 2.5 percent to 3.3 percent) from 2011 to 2021.

Source: Relative income price (RIP) is calculated based on the Central Bureau of Statistics' *(Badan Pusat Statistik)* National Consumer Price of Selected Goods and Services data on the price of cigarettes per pack and the World Bank Development Indicators' statistics on GDP per capita.
Notes: The data used in the RIP calculation of price of cigarettes per pack are not standardized in terms of the number of cigarette sticks per pack.

Such low cessation response could also be explained by the fact that once the price of a particular brand or type of cigarette is increased as a result of tax, smokers tend to switch down to other types or brands that are less expensive, which potentially hinders future cessation efforts (Hyland, 2005; K M Cummings et al., 1997). In fact, switching is well facilitated, as the complex cigarette excise tax structure in Indonesia gives producers an opportunity to avoid higher taxes by aiming their products at the tiers that are taxed lower (Prasetyo & Adrison, 2019). This makes the availability of cheaper cigarettes almost guaranteed. Furthermore, smokers can also switch to loose cigarettes, which are very accessible (Hartono et al., 2023), and, to a lesser extent, illicit cigarettes (Widya Kartika et al., 2019) when the price of cigarettes they usually smoke becomes more expensive.

Since our price data only represent the retail price of cigarettes per pack by region, they cannot capture "wide varieties of cigarettes from different brands that are sold at a wide range of retail prices" in the market (Zheng, 2018). More importantly, they do not capture the price of cheaper alternatives such as loose and illicit cigarettes. Due to this limitation, we are unable to take into account the possibility of smokers switching to other cheaper (cigarette) alternatives when the price of a particular type or brand of cigarette is increased. As a result, the impact of price on cessation in this study could be underestimated.

Furthermore, although the use of varying cigarette price data across different provinces (28 provinces in total) allows us to obtain more robust estimates, they are still subject to measurement error. First, because the individuals' geographical movement or migration over time is not traceable, the match between some individuals and cigarette prices could not be entirely accurate. Second, similar to all retrospective studies, recall bias related to the possibility of inaccurate smoking start and end dates could introduce errors in the results. These two sources of measurement error could also potentially result in an underestimation of price's impact (Bar & Lillard, 2012; Kenkel et al., 2004; Lillard et al., 2013).

CONCLUSION

Despite the low elasticity response caused by the low price increases and the possibility of switching to a wide range of cheaper cigarettes, we find that higher cigarette prices are strongly associated with a higher probability of smoking cessation in Indonesia. This means increasing cigarette prices through taxation could effectively reduce smoking prevalence and help to avoid the catastrophic health and economic costs of smoking.

Our study implies that the government should consider increasing the cigarette tax by a higher margin, as the current price increases might not have resulted in a significant reduction in affordability and may not be sufficient to induce cessation to a greater extent. The current law, which regulates that the excise tax on cigarettes can only be capped at 57 percent of the retail price, should be revoked, as recommended by the World Health Organization (2020). The issues related to consumers switching to affordable alternatives when the price of a particular cigarette type or brand increases should also be addressed. The current tax structure should be simplified to reduce tax avoidance by cigarette manufacturers and make cigarettes less affordable. Furthermore, the issues related to the sale of loose cigarettes and the illicit cigarette trade should also be addressed by banning loose cigarettes, conducting stricter market surveillance, and implementing stricter penalties.

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APPENDIX

Table A1

Price elasticities of cessation for all types of cigarettes (on average)

	Men only, all regions [N=59,656]	Men only, 28 regions [N=59,656]	Men and women, all regions [N=62,126]	Men and women, 28 regions [N=62,126]
All types [average] (in log)	0.01747*** [0.002]	0.01551*** [0.002]	0.01388*** [0.002]	0.01161*** [0.002]
Age	0.00083*** [0.000]	0.00082*** [0.000]	0.00075*** [0.000]	0.00074*** [0.000]
Male	-	-	-0.00031 [0.001]	-0.00052 [0.001]
Urban residence	0.00241** [0.001]	0.00234*** [0.001]	0.00283** [0.001]	0.00278*** [0.001]
Education level (relative to those who did not complete primary school):				
Completed primary school	-0.00114 [0.002]	-0.00123 [0.001]	-0.00053 [0.001]	-0.00060 [0.001]
Completed secondary school	0.00059 [0.002]	0.00048 [0.001]	0.00069 [0.001]	0.00060 [0.001]
Completed high school	0.00039 [0.001]	0.00031 [0.001]	0.00070 [0.001]	0.00063 [0.001]
Completed college/university or higher	0.00117 [0.002]	0.00106 [0.002]	0.00184 [0.002]	0.00173 [0.002]
Wealth index (relative to the lowest wealth index):				
Low	-0.00112 [0.001]	-0.00121 [0.001]	-0.00074 [0.001]	-0.00078 [0.001]
Middle	0.00216 [0.001]	0.00203 [0.001]	0.00141 [0.001]	0.00135 [0.002]
High	0.00374** [0.001]	0.00365*** [0.001]	0.00344** [0.001]	0.00337** [0.001]
Smoking duration (t)	-0.00103*** [0.000]	-0.00103*** [0.000]	-0.00110*** [0.000]	-0.00111*** [0.000]

Source: Authors' calculations

Notes: Calculated using non-split population duration analysis. Bootstrapped standard errors in brackets.
*p<0,1, **p<0,05, ***p<0,01

Table A2

Price elasticities of cessation for kretek cigarettes

	Men only, all regions [N=59,656]	Men only, 28 regions [N=59,656]	Men and women, all regions [N=62,126]	Men and women, 28 regions [N=62,126]
Kretek (in log)	0.02343*** [0.003]	0.01428*** [0.003]	0.01800*** [0.003]	0.01059*** [0.002]
Age	0.00082*** [0.000]	0.00080*** [0.000]	0.00074*** [0.000]	0.00073*** [0.000]
Male	-	-	-0.00035 [0.002]	-0.00070 [0.002]
Urban residence	0.00243*** [0.001]	0.00228*** [0.001]	0.00283*** [0.001]	0.00274*** [0.001]
Education level (relative to those who did not complete primary school):				
Completed primary school	-0.00116 [0.002]	-0.00143 [0.001]	-0.00057 [0.001]	-0.00075 [0.001]
Completed secondary school	0.00062 [0.001]	0.00037 [0.001]	0.00070 [0.001]	0.00056 [0.001]
Completed high school	0.00043 [0.002]	0.00020 [0.001]	0.00068 [0.001]	0.00052 [0.001]
Completed college/university or higher	0.00121 [0.002]	0.00089 [0.002]	0.00180 [0.002]	0.00153 [0.002]
Wealth index (relative to the lowest wealth index):				
Low	-0.00115 [0.001]	-0.00128 [0.001]	-0.00077 [0.001]	-0.00083 [0.001]
Middle	0.00201 [0.002]	0.00179 [0.002]	0.00133 [0.001]	0.00122 [0.001]
High	0.00363*** [0.001]	0.00345** [0.001]	0.00337** [0.002]	0.00324** [0.001]
Smoking duration (t)	-0.00104*** [0.000]	-0.00104*** [0.000]	-0.00111*** [0.000]	-0.00112*** [0.000]

Source: Authors' calculations

Notes: Calculated using non-split population duration analysis. Bootstrapped standard errors in brackets.
*p<0,1, **p<0,05, ***p<0,01

Table A3

Price elasticities of cessation for filtered kretek cigarettes

	Men only, all regions [N=59,656]	Men only, 28 regions [N=59,656]	Men and women, all regions [N=62,126]	Men and women, 28 regions [N=62,126]
Filtered kretek (in log)	0.01713***	0.01474***	0.01347***	0.01104***
	[0.002]	[0.002]	[0.002]	[0.002]
Age	0.00083***	0.00082***	0.00075***	0.00075***
	[0.000]	[0.000]	[0.000]	[0.000]
Male	-	-	-0.00018	-0.00049
			[0.002]	[0.002]
Urban residence	0.00245***	0.00239**	0.00286***	0.00283***
	[0.001]	[0.001]	[0.001]	[0.001]
Education level (relative to those who did not complete primary school):				
Completed primary school	-0.00109	-0.00121	-0.00055	-0.00064
	[0.001]	[0.001]	[0.001]	[0.001]
Completed secondary school	0.00063	0.00051	0.00068	0.00058
	[0.002]	[0.001]	[0.001]	[0.001]
Completed high school	0.00043	0.00031	0.00070	0.00060
	[0.001]	[0.001]	[0.001]	[0.001]
Completed college/university or higher	0.00120	0.00111	0.00184	0.00172
	[0.002]	[0.001]	[0.001]	[0.002]
Wealth index (relative to the lowest wealth index):				
Low	-0.00109	-0.00118	-0.00070	-0.00075
	[0.001]	[0.001]	[0.001]	[0.001]
Middle	0.00229*	0.00213	0.00150	0.00139
	[0.001]	[0.001]	[0.001]	[0.001]
High	0.00383***	0.00368***	0.00351**	0.00336**
	[0.001]	[0.001]	[0.001]	[0.001]
Highest	0.00490***	0.00466***	0.00411**	0.00392***
	[0.001]	[0.001]	[0.002]	[0.001]
Smoking duration (t)	-0.00103***	-0.00103***	-0.00111***	-0.00111***
	[0.000]	[0.000]	[0.000]	[0.000]

Source: Authors' calculations

Notes: Calculated using non-split population duration analysis. Bootstrapped standard errors in brackets.
*p<0,1, **p<0,05, ***p<0,01

Table A4 Price elasticities of cessation for white cigarettes

	Men only, all regions [N=59,656]	Men only, 28 regions [N=59,656]	Men and women, all regions [N=62,126]	Men and women, 28 regions [N=62,126]
White (in log)	0.02343***	0.01428***	0.01800***	0.01059***
	[0.003]	[0.003]	[0.003]	[0.002]
Age	0.00082***	0.00080***	0.00074***	0.00073***
	[0.000]	[0.000]	[0.000]	[0.000]
Male	-	-	-0.00035	-0.00070
			[0.002]	[0.002]
Urban residence	0.00243***	0.00228***	0.00283***	0.00274***
	[0.001]	[0.001]	[0.001]	[0.001]
Education level (relative to those who did not complete primary school):				
Completed primary school	-0.00116	-0.00143	-0.00057	-0.00075
	[0.002]	[0.001]	[0.001]	[0.001]
Completed secondary school	0.00062	0.00037	0.00070	0.00056
	[0.001]	[0.001]	[0.001]	[0.001]
Completed high school	0.00043	0.00020	0.00068	0.00052
	[0.002]	[0.001]	[0.001]	[0.001]
Completed college/university or higher	0.00121	0.00089	0.00180	0.00153
	[0.002]	[0.002]	[0.002]	[0.002]
Wealth index (relative to the lowest wealth index):				
Low	-0.00115	-0.00128	-0.00077	-0.00083
	[0.001]	[0.001]	[0.001]	[0.001]
Middle	0.00201	0.00179	0.00133	0.00122
	[0.002]	[0.002]	[0.001]	[0.001]
High	0.00363***	0.00345**	0.00337**	0.00324**
	[0.001]	[0.001]	[0.002]	[0.001]
Smoking duration (t)	-0.00104***	-0.00104***	-0.00111***	-0.00112***
	[0.000]	[0.000]	[0.000]	[0.000]

Source: Authors' calculations

Notes: Calculated using non-split population duration analysis. Bootstrapped standard errors in brackets.
*p<0,1, **p<0,05, ***p<0,01