cisdi

Center for Indonesia's Strategic Development Initiatives

Cigarette Affordability in Indonesia:

Recent Trends and Elasticity

Cigarette Affordability in Indonesia: Recent Trends and Elasticity

Muhammad Zulfiqar Firdaus

Fariza Zahra Kamilah

Beladenta Amalia

Aufia Espressivo

I Dewa Gede Karma Wisana

Center for Indonesia's Strategic Development Initiatives (CISDI), 2026

Suggested citation:
Center for Indonesia's Strategic Development Initiatives. (2026). *Cigarette Affordability in Indonesia: Recent trends and elasticity*. Jakarta: CISDI.

Funding Information:
Center for Indonesia's Strategic Development Initiatives (CISDI) is funded by the Economics for Health program, a research project housed in the Department of Health, Behavior & Society at the Johns Hopkins Bloomberg School of Public Health, to conduct economic research on tobacco taxation in Indonesia. Johns Hopkins University is a partner of the Bloomberg Philanthropies Initiative to Reduce Tobacco Use. The views expressed in this document cannot be attributed to, nor can they be considered to represent, the views of John Hopkins University or Bloomberg Philanthropies.

TABLE OF CONTENTS

Table of Contents ii

List of Tables iii

List of Figures iii

Executive Summary iv

1. Introduction 1

2. Methodology 2

- Data 2
- Gross domestic product per capita 3
- Wages 4
- Disposable income per capita 5
- Cigarette prices 6
- Data to estimate affordability elasticity 8
- Estimation strategy 9

3. Results 10

- Descriptive statistics 10
- The impact of affordability on smoking behaviour 12

4. Discussion 18

5. Conclusion 20

Appendix 24

LIST OF TABLES

Table 1. Average unit values and income per household	9
Table 2. Average unit values and income per household	14
Table 3. Average unit values and income per household	16
Table 4. Total affordability elasticity of demand	17
Table 5. Robustness: Total affordability elasticity of demand	17
Table A1. Nominal and real GDP per capita (in Rp and annual growth rate)	25
Table A2. Average monthly nominal and real wages of employees (in Rp)	26
Table A3. Disposable income per capita (in Rp)	26
Table A4. Cigarette prices in Indonesia (in Rp)	27
Table A5. Sociodemographic characteristics of households – Susenas data	28
Table A6. Affordability indicators	29
Table A7. VIF test	29
Table A8. Estimation of prevalence elasticity – different models	30
Table A9. Estimation of intensity elasticity – different models	31

LIST OF FIGURES

Figure 1. Nominal and real GDP per capita (Pc)	3
Figure 2. Growth rates of GDP per capita (Pc)	4
Figure 3. Average monthly nominal and real wage of employees	5
Figure 4. Disposable income per capita (Pc)	6
Figure 5. Cigarette prices in Indonesia: Nominal and real averages	7
Figure 6. Cigarette prices in Indonesia: Real prices by cigarette types	7
Figure 7. Relative income price (RIP) index computed using various income proxies	10
Figure 8. RIP index by cigarette type	11
Figure 9. Growth rate of GDP per capita and cigarettes (all types) price	12
Figure 10. Quantity of cigarettes sold and affordability of cigarettes	12
Figure A1. Market share by cigarette type	24
Figure A2. Production volume by cigarette type	24
Figure A3. Trends in excise tax increase	25

EXECUTIVE SUMMARY

Raising tobacco product prices through tobacco taxation is widely recognized as the most effective policy to reduce tobacco consumption. However, when income grows faster than prices rise, affordability may remain unchanged or even increase, thereby limiting the policy's effectiveness in reducing tobacco consumption. In this case, affordability, which accounts for both price and income, is an ideal measure for governments to consider when formulating a better tobacco taxation policy.

Using the latest data from Statistics Indonesia (*Badan Pusat Statistik*, BPS) and the Ministry of Finance, along with the 2017–2024 Indonesia Socio-economic Survey (*Survei Sosial Ekonomi Nasional*, Susenas), this study employed descriptive analysis to track cigarette affordability trends and applied a two-part model to estimate affordability elasticity in Indonesia.

Our results show that the relative income price (RIP), widely regarded as the international benchmark for measuring cigarette affordability, remains within a low and narrow range of 3–7 percent, depending on the income proxy used, during 2010–2024. The results indicate that income growth has made tax and price adjustments less pronounced, keeping cigarettes highly affordable.

The estimated affordability elasticity of –0.77 suggests that a 10-percent reduction in affordability could decrease cigarette demand among households by 7.7 percent. The elasticity across income groups further shows that lower-income households are significantly more sensitive to affordability changes than higher-income groups, implying that policies aimed at reducing affordability may lower overall consumption while delivering greater health benefits for disadvantaged populations.

The findings highlight that Indonesia's tobacco taxation policies over the last decade have been insufficient in making cigarettes less affordable. There is a need to significantly reduce cigarette affordability through a sustained and significant increase in tobacco taxes, adjusting for income growth to raise prices and, consequently, reduce tobacco consumption effectively.

The tobacco excise tax policy reforms in Indonesia should prioritize substantial price increases alongside simplifying the highly complex multi-tiered excise tax system, which currently generates wide price differentials across brands and facilitates downtrading to cheaper alternatives. Strengthening the policy in this manner would accelerate reductions in cigarette affordability, lower tobacco consumption, and help reduce health inequalities.

1 INTRODUCTION

Smoking remains highly prevalent in Indonesia. The 2023 Indonesian Health Survey (*Survei Kesehatan Indonesia*, SKI) published by the Indonesian Ministry of Health shows that approximately 70 million people in the country are active smokers **(1,2)**. Among adults aged 18 years and older, 31.9 percent are active smokers, with a substantial gender gap, as smoking prevalence is markedly higher among males (60.7 percent) than females (1.3 percent). The prevalence of smoking among youth aged 10–18 years is 7.4 percent. These high rates of smoking have profound implications for the country's public health and economy. The widespread use of tobacco products contributes to an increasing burden of noncommunicable diseases, including cardiovascular disease, respiratory ailments, and cancers. It imposes significant costs on health care systems, as documented by extensive prior evidence **(3–5)**.

Cigarette affordability is an important key concept in tobacco control. It reflects the extent to which cigarette prices are affordable relative to consumers' income rather than their nominal price levels alone **(6)**. Even when cigarette prices rise due to excise taxes, real income growth may outpace price increases, resulting in cigarettes becoming more affordable over time **(7)**. Global evidence consistently shows that reductions in cigarette affordability—achieved through sustained price increases that exceed real income growth—are strongly associated with declines in smoking prevalence and consumption **(8)**. Studies across countries demonstrate that affordability measures, such as the relative income price (RIP) of cigarettes, are more predictive of smoking behaviour than price changes alone **(6,9)**. Accordingly, the World Health Organization (WHO) recommends that tobacco excise taxes should be regularly adjusted to account for both inflation and real income growth to ensure that tobacco products become progressively less affordable and deliver meaningful public health benefits **(10)**.

One of the key drivers behind Indonesia's persistent high smoking prevalence is the continued affordability of cigarettes (relative to income) **(11)**. Despite periodic—though modest—excise tax increases in recent years, cigarettes remain highly affordable for many consumers. The government raised cigarette excise rates by approximately 10 percent in 2023 and 2024 across various categories, including hand-rolled kreteks *(sigaret kretek tangan*, SKT), machine-rolled kreteks (*sigaret kretek mesin,* SKM), and machine-rolled white cigarettes (*sigaret putih mesin*, SPM) **(12)**, with the intention of reducing cigarette consumption by lowering affordability. However, given rising incomes and the structural complexity of the excise tax system, which allows cigarette manufacturers to place their products in lower-tiered excise tax tiers, preliminary evidence suggests that the decline in affordability may only be modest **(11,13,14)**. Many smokers, including those in lower-income groups, continue to perceive cigarettes as affordable despite excise tax increases, as the market structure allows access to lower-taxed cigarettes with low prices **(15)**. In addition, for these lower-taxed products, low baseline prices, and low excise tariff levels mean that even sizable excise tax increases translate into relatively small absolute price changes with limited impact on overall affordability **(16)**.

Although many studies have examined cigarette prices and excise taxes in Indonesia, research specifically addressing cigarette affordability remains limited. The existing evidence is based on data prior to 2017, which precedes the more recent changes in excise policy and economic conditions **(11,14)**. Moreover, while cigarette affordability has been recognized as a contributing factor to sustained tobacco consumption, the extent to which affordability influences smoking behaviour among different demographic groups in Indonesia has not been studied extensively. These gaps in the literature limit policy makers' ability to assess the effectiveness of excise tax increases and underscore the need for updated, evidence-based analysis.

This study seeks to address these gaps by providing an updated analysis of cigarette affordability in Indonesia and its potential implications for smoking behaviour. Specifically, it examines recent trends in affordability in relation to income growth and tax policy (price increases), while also exploring how affordability may influence consumption patterns across different sociodemographic groups. By generating more recent evidence, this study aims to strengthen the empirical foundation for tobacco control strategies in Indonesia. The findings are expected to help policy makers assess whether current fiscal measures are sufficient to reduce smoking prevalence and consumption and to inform consideration on policy reforms, such as higher excise tax increases and simplifications of excise tax structure to reduce smoking and advance public health in Indonesia.

2 METHODOLOGY

Data

In examining the affordability of cigarettes and their relationship with cigarette consumption, this study utilizes two analytical approaches:

(1) Computing cigarette affordability levels for each year spanning from 2010 to 2024 using a measure recommended by the literature to assess the trends and ascertain the magnitude of change in cigarette affordability over the observed period in Indonesia.

(2) Evaluating the impact of affordability on cigarette consumption using a modified indicator derived from a household survey and estimating affordability elasticity.

In the first part, this study uses the relative income price (RIP) as a primary metric to assess cigarette affordability. RIP is derived as the percentage of gross domestic product (GDP) per capita required to purchase 100 packs of cigarettes, with higher values indicating cigarettes are less affordable **(6)**. It is represented by the following formula:

$$RIP = \frac{100\ X\ P}{GDP\ per\ capita} \quad \text{..... (1)}$$

While traditionally *P* represents a single-brand retail price, or the most-sold brand, we use the average retail price of cigarettes to more accurately reflect the actual price that smokers pay in our calculation.

Moreover, because public and private income are typically measured by GDP per capita, this may not fully capture individuals' real purchasing power and may overstate or understate affordability in settings with significant income disparities, such as Indonesia. Therefore, we also use average wages as an alternative denominator for trend comparison. Wages directly capture labor market returns and provide a timely indicator of workers' purchasing power. By focusing specifically on earnings from employment, wages offer an immediate perspective on how labor market dynamics translate into individual well-being **(17)**. Most scholars believe it is a superior measure and should be used when the data are available. A limitation is that wage data in Indonesia are only available from 2015; thus, we only compute the RIP, which uses wages as a proxy, from 2015.

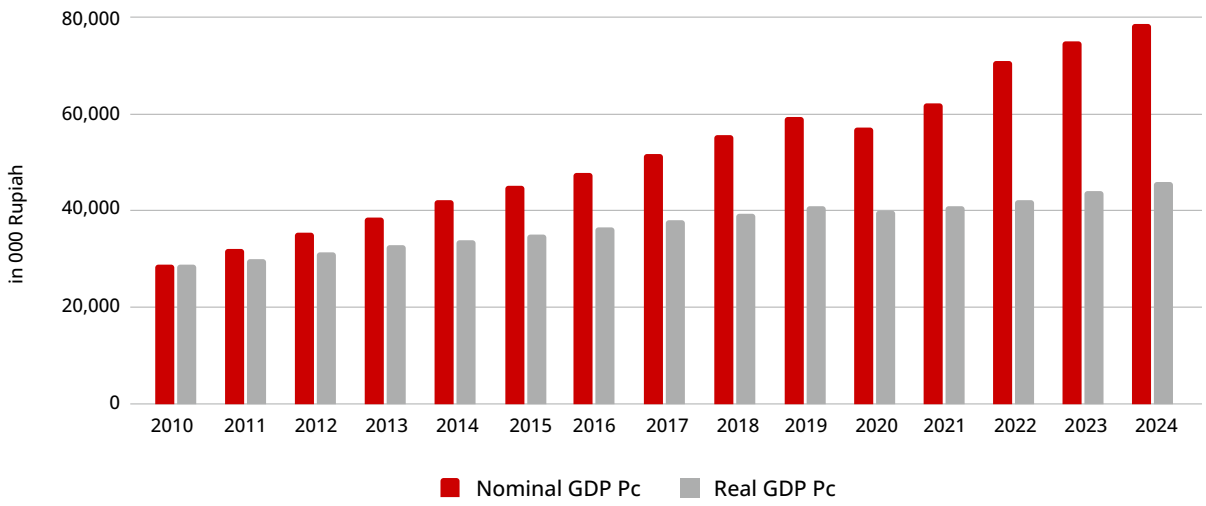
Some researchers also argue that disposable income (DI) per capita could be a better proxy for income, as it represents the average after-tax income **(18)**. For this reason, we also calculate the RIP using DI per capita for comparison. As the data for DI are only available from 2016 to 2023, we compute the RIP using DI only for that period.

The following are descriptions of the data used in the first part of the analysis.

Gross domestic product per capita

Over the past 13 years, Indonesia has experienced steady improvement in economic performance, reflected in the continuous rise in both nominal and real GDP per capita (adjusted for inflation). These indicators show a consistent upward trend in two main phases (from 2010 to 2019 and from 2021 to 2024). In recent years, the gap between nominal and real GDP has widened, largely due to stronger inflationary pressures. This difference was evident in 2022 to 2024, when high global commodity prices and rising domestic inflation pushed nominal GDP per capita much higher than real GDP per capita (Figure 1).

Figure 1. Nominal and real GDP per capita (Pc)



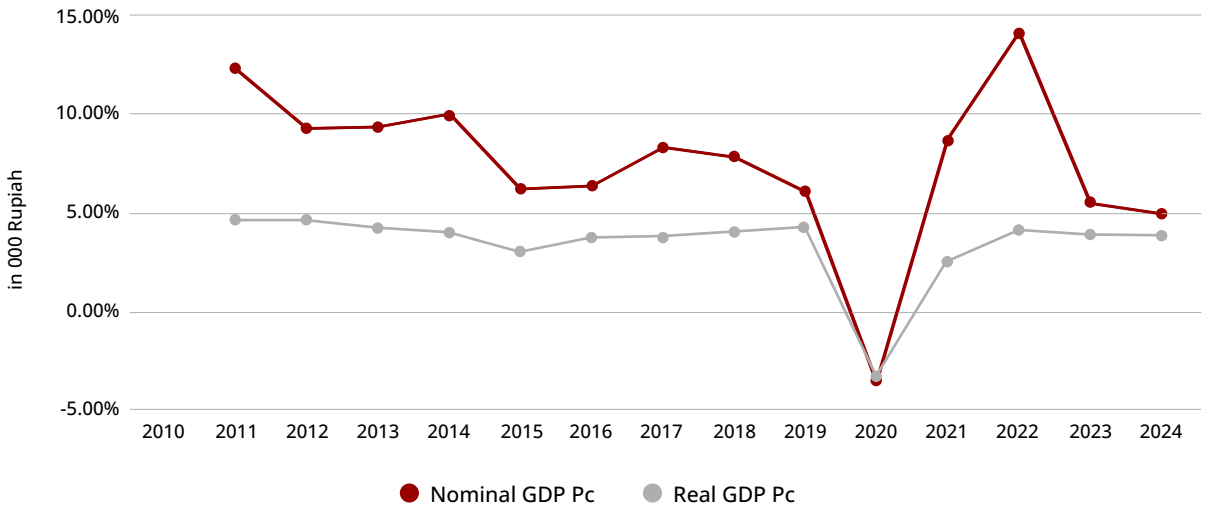
Source: Statistics Indonesia

Figure 2 also highlights key episodes of economic volatility in Indonesia's GDP per capita. The sharpest decline occurred in 2020 (-3.03 percent), when the COVID-19 pandemic triggered the country's first recession in more than two decades, with real GDP per capita falling due to strict mobility restrictions, weaker household consumption, and disruptions to tourism and trade heavily constraining economic activity **(19)**.

Indonesia, however, showed resilience in the following years. In 2021 and 2022, real GDP per capita rebounded with growth of 2.52 percent and 4.15 percent, respectively, supported by the reopening of the economy and recovery in domestic demand. The growth was further boosted by a sharp acceleration in private consumption following the lifting of mobility restrictions. At the same time, the fiscal position improved as rising global commodity prices (such as coal, palm oil, and nickel) boosted exports and, in turn, government revenues, alongside declining COVID-related spending **(20–22)**.

Nevertheless, during 2023–2024, Indonesia's economic growth momentum began to slow down after a strong post-pandemic recovery. This slowdown was driven by the fading commodity-price boom, weaker global demand, and persistent inflationary pressures, including the effects of adjustments in subsidized fuel prices that affected household purchasing power. Even so, domestic consumption and infrastructure investment continued to support growth during this period **(23)**.

Figure 2. Growth rates of GDP per capita (Pc)



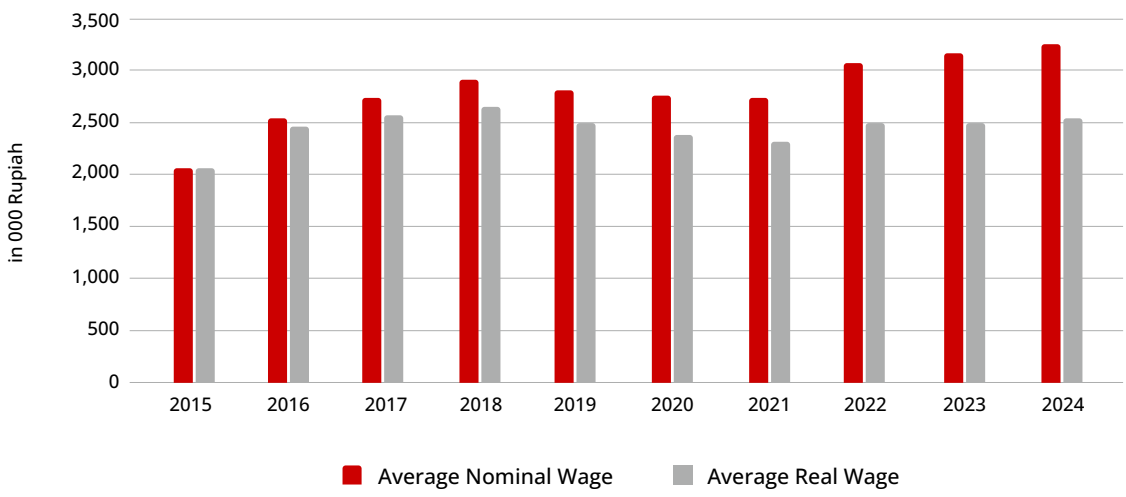
Source: Statistics Indonesia

Wages

We use wages as an alternative proxy for income to compute RIP. Figure 3 illustrates the trend of average annual wages in Indonesia. From 2015 to 2018, both nominal and real wages rose steadily year by year. However, this upward trend was disrupted during 2020–2021, when the COVID-19 pandemic and strict mobility restrictions severely eroded workers' purchasing power. Real wages grew much more slowly and even declined in some periods. The crisis dealt a heavy toll across sectors, marked by widespread economic contraction, reduced working hours, and lower earnings. In several provinces, wages even fell below the legal minimum, as the government decided not to adjust regional minimum wages during the height of the pandemic **(24)**.

Since 2022, nominal wages have rebounded strongly, reaching their highest level in 2023. Yet, real wages have remained broadly stagnant, reflecting persistent inflationary pressures. Similar to the GDP per capita trend highlighted previously, the widening gap between nominal and real indicators suggests that wage growth has not fully translated into higher workers' earnings.

Figure 3. Average monthly nominal and real wage of employees



Source: Statistics Indonesia, Labour Force Survey (August)

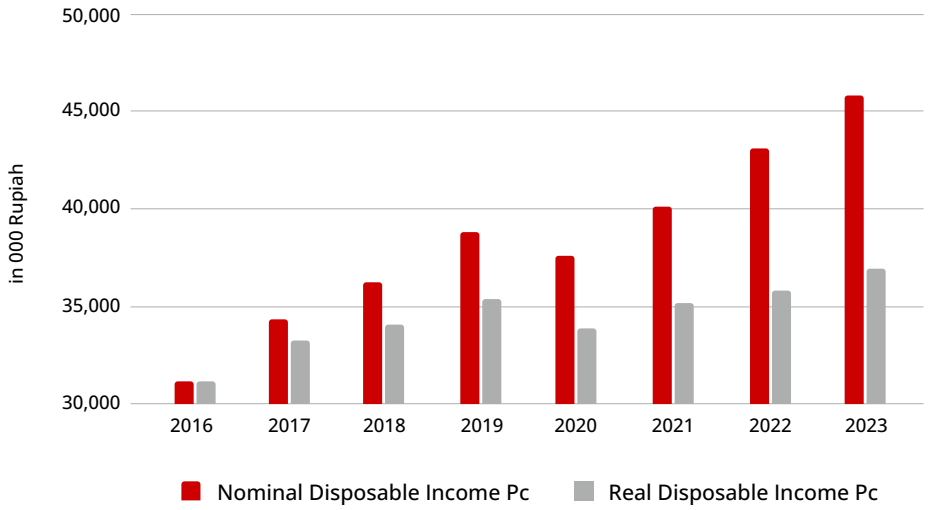
Note: Data on average nominal wages are sourced from Statistics Indonesia, while average real wages are derived by the authors using the CPI published by BPS.

Disposable income per capita

While GDP per capita is a standard indicator of economic performance, it does not always reflect the real-life financial situation of most households. For this reason, we also use household disposable income per capita, which provides a narrower measure and accounts for purchasing power after inflation, taxes, and necessary transfers **(25)**. Figure 4 shows that household disposable income per capita increased steadily between 2016 and 2024, both in nominal and real terms. However, real household disposable income grew more slowly and stagnated in 2020–2021 during the COVID-19 pandemic, which weakened household purchasing power. Recovery became evident only after 2022, in line with the rebound in private consumption following the lifting of mobility restrictions.

A comparison of the trends in disposable income and GDP per capita shows that, while the two generally move in a similar direction, disposable income per capita is more volatile and experienced a sharper decline in 2020. This divergence suggests that disposable income may better capture short-term fluctuations in households' economic conditions that are not fully reflected in GDP per capita.

Figure 4. Disposable income per capita (Pc)



Source: Statistics Indonesia

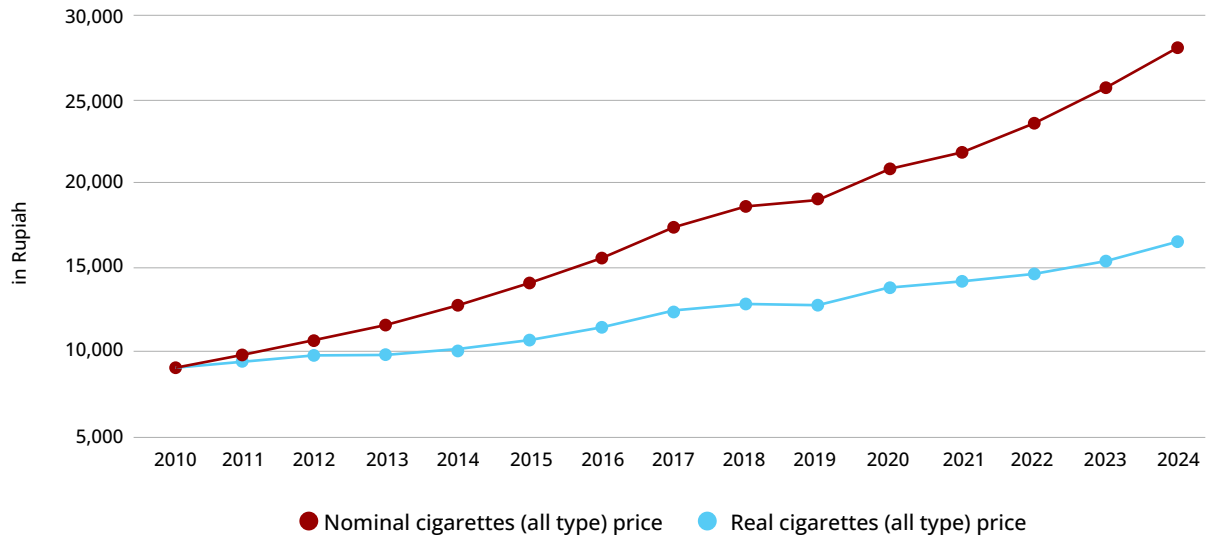
Note: The original data are reported as total household disposable income. Disposable income per capita is calculated by dividing the total by Indonesia's population. Real disposable income per capita is obtained by adjusting with CPI from BPS.

Cigarette prices

To analyze the trend in affordability, we utilize cigarette retail price data from the National Consumer Price of Selected Goods and Services survey, released by Statistics Indonesia (*Badan Pusat Statistik*/BPS), covering the period 2010–2024. The survey includes per-pack retail prices for three types of cigarettes—kretek (cloves cigarettes), filtered kretek, and white cigarettes (that is, regular tobacco without cloves)—collected across different cities. The price data were collected for cigarette brands that are commonly purchased by consumers and are widely available. The average cigarette prices are constructed using an arithmetic mean, without weights, due to the absence of data on quantities sold in surveyed cities, which would be required to compute weighted average price.

As shown in Figure 5, both nominal and real average cigarette prices increased steadily over the period, but the pace of growth differed considerably. While nominal prices escalated much faster, almost tripling between 2010 and 2024, real prices only began to rise more noticeably after 2016. This significant gap between nominal and real prices suggests that much of the increase was driven by inflation rather than a genuine rise in cigarette prices. Consequently, even though nominal prices have risen more noticeably in recent years, inflation has continued to erode the real increase, leaving cigarette prices very low in real terms.

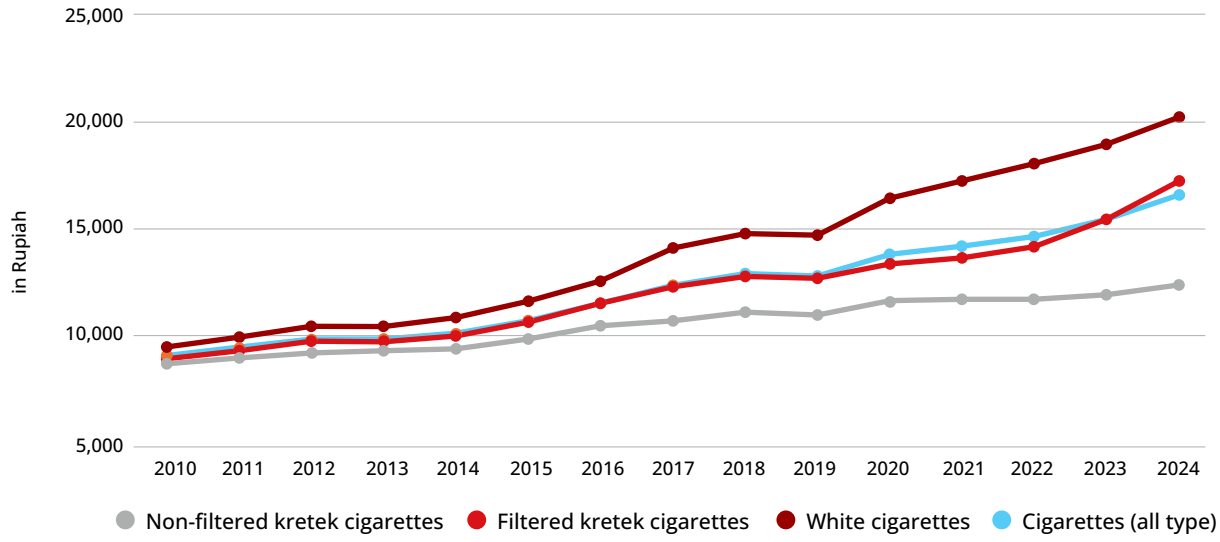
Figure 5. Cigarette prices in Indonesia: Nominal and real averages



Source: Authors' elaboration based on the National Consumer Price of Selected Goods and Services and CPI from BPS

Figure 6 further disaggregates the real price trends by cigarette type. While all cigarette types experienced gradual real price increases, filtered kretek and white cigarettes saw the steepest growth after 2016. In contrast, non-filtered kretek prices remained relatively stable, widening the price gap among types. This uneven pattern suggests that tax and price policies have affected cigarette segments differently, with cheaper (non-filter) kretek products remaining more affordable for consumers.

Figure 6. Cigarette prices in Indonesia: Real prices by cigarette types



Source: Authors' elaboration based on the National Consumer Price of Selected Goods and Services and CPI from BPS

Note: The 2024 National Consumer Price of Selected Goods and Services adopted a new cigarette price classification (SKT, SKM, and SPM), resulting in unrealistically lower price levels. To ensure consistency, 2024 cigarette prices were estimated using the 2023 price growth rate, reflecting the multi-year excise tax increase of about 10 percent in both 2023 and 2024.

Data to estimate affordability elasticity

For the second part of the analysis which aims to evaluate the impact of cigarette affordability on household smoking behaviour, we use the 2017–2024 Indonesia Socio-economic Survey (*Survei Sosial-ekonomi Nasional or "*Susenas"). The survey includes information on household cigarette consumption and expenditure in the past seven days, alongside data on household monthly total expenditure, size, structure, and sociodemographic characteristics. The survey is conducted annually by Statistics Indonesia in March and September. In this study, we use the March round of Susenas, which is representative up to the district/city ***(****kabupaten/kota****)*** level. This dataset enables us to investigate the impact of cigarette affordability on household cigarette consumption, which varies across demographic and income groups. However, it is important to note that the survey does not include information on the retail price per pack or the specific recall price of cigarettes per pack that are consumed by households.

In evaluating the impact of affordability on cigarette consumption using Susenas data, we use a modified affordability indicator, which is computed as the ratio of the cost to purchase 100 packs of cigarettes to total household income **(11)**. The price of a pack of cigarettes is proxied by the unit values (the ratio of cigarette expenditure to the number of cigarette sticks consumed) multiplied by 20 sticks of cigarettes **(11,25)**. We cluster the price estimates at the district level and by survey year to address potential endogeneity in unit values. As household income is not reported by Susenas, we use the annualized total household expenditure information captured by the survey. The average unit values and monthly household expenditure are shown in Table 1.

Table 1. Average unit values and income per household

Year	Average unit values (Rp)	Average monthly expenditure (Rp)
2017	942	3,904,388
2018	987	4,239,308
2019	1,036	4,360,078
2020	1,102	4,551,602
2021	1,144	4,541,994
2022	1,257	4,997,192
2023	1,393	5,500,130
2024	1,407	5,764,162

Source: Authors' calculations based on Susenas data
Note: Average unit values and monthly expenditure are presented in nominal terms.

In our analysis, we also control for various sociodemographic variables such as household size, residency (urban or rural), the ratio of male household members, the ratio of adult household members, the average age of household members, the household head's gender, the household head's employment status, and the household head's educational attainment. Finally, to assess the robustness of our analysis, we use average cigarette prices from the National Consumer Price Index for Selected Goods and Services survey.

Estimation strategy

In the first part of our analysis, we conducted a comprehensive descriptive analysis of cigarette affordability indicators. This analysis enables us to identify any variations and trends in cigarette affordability in Indonesia from year to year. We assessed affordability trends across the entire cigarette market as well as by each cigarette type: kretek, filtered kretek, and white cigarettes. While assessing affordability trends across income groups and cigarette categories by selling price (low, medium, premium) is meaningful, we were unable to conduct such an analysis due to data limitations.

In the second part of the analysis, we estimate the affordability elasticity to estimate the impact of cigarette affordability on household smoking behaviour. The affordability elasticity is estimated using a two-part model, which consists of two stages of estimation **(25)**. In the first stage of the model, the impact of cigarette affordability on the likelihood of household smoking participation is evaluated using a logit model, as shown in Equation (2):

$$P(CCig_i = 1)_i = \alpha_0 + \alpha_1 Affordability_i + \alpha 2X_i + e \quad \text{..... (2)}$$

Where the likelihood of smoking participation is represented by a generated binary indicator equal to 0 if there is no reported cigarette expenditure (or consumption) in the household *i* and 1 otherwise. The smoking participation probability is modelled as a function of the affordability index (*Affordability*) and a vector of household demographic characteristics (*X*). The marginal effect of the first-stage estimation is defined as the prevalence elasticity.

In the second stage of estimation, the impact of affordability on the cigarette consumption of households is estimated using a generalized linear model (GLM) with a log link function and family gamma, conditional on households that reported having cigarette expenditure. The marginal effect from the second-stage estimation yields the conditional elasticity of cigarette consumption. Then, after performing the second-stage estimation, we compute the total affordability elasticity, which is the sum of the prevalence elasticity and the conditional elasticity of cigarette consumption.

In our analysis, we compute elasticities across different household income groups: low-income (below 41 percent), middle-income (41–89 percent), and high-income (above 80 percent). We also run diagnostic tests (that is, VIF test) during post-estimation to validate the model's adequacy (**Table A7** in the Appendix).

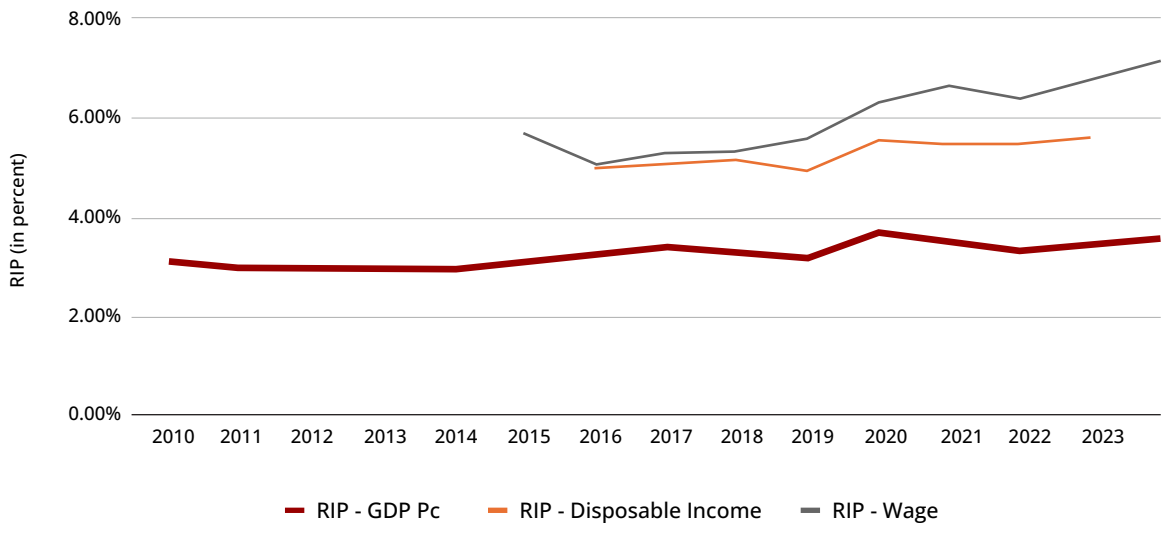
3
RESULTS

Descriptive statistics

The cigarette affordability levels, trends, and magnitudes are assessed using RIP, computed from cigarette price data (from the National Consumer Price of Selected Goods survey) and different income proxies: GDP per capita, wages, and disposable income. Despite data gaps, Figure 7 shows that RIPs computed using different price data and income proxies exhibit a similar trend: the RIP indicator increased by only 1–2 percentage points over the past decade (depending on the income proxy used), indicating that cigarettes became less affordable. However, the modest magnitude of this change suggests limited progress in reducing cigarette affordability despite more than a decade of policy efforts. Furthermore, the level of RIPs has been around 3–7 percent, depending on which income proxy is used, indicating that cigarettes are still cheap relative to income. The level of RIP computed using GDP per capita is lower compared to RIP levels computed using average wage and disposable income per capita. This is due to the nature of average wages and disposable income per capita, which are much lower compared to GDP per capita.

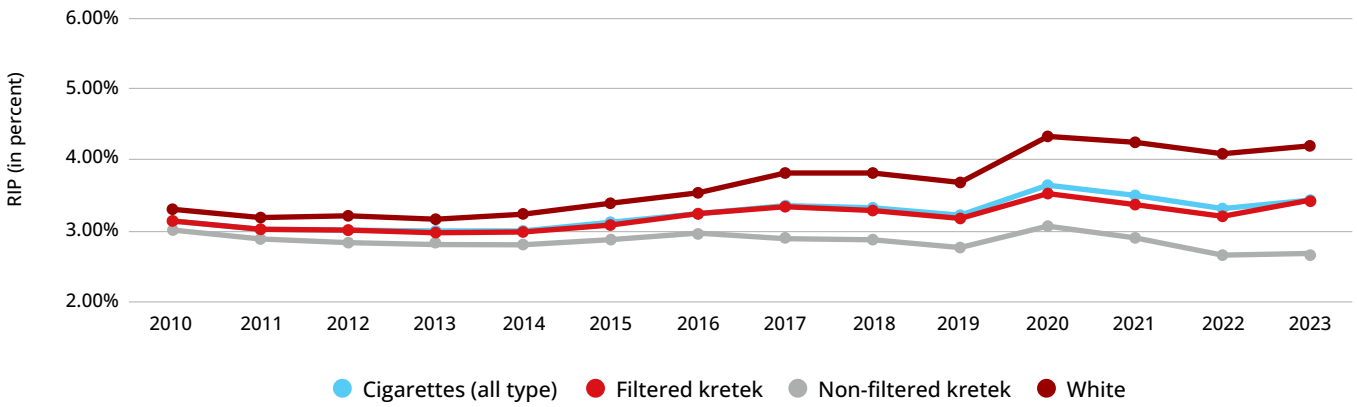
Based on the type of cigarettes, non-filtered kretek cigarettes, which are typically hand-rolled (SKT) **(11)**, have been the most affordable compared to the less affordable filtered kretek and the least affordable, white cigarettes (Figure 8). Given that hand-rolled kreteks have gained even greater popularity, and their market share along with production volume have increased significantly in recent years (Figure A1-A2 in the Appendix), substitution toward these products may dampen the overall impact of excise tax increases, resulting in relatively little change in overall cigarette affordability.

Figure 7. Relative income price (RIP) index computed using various income proxies



Source: Authors' calculations

Figure 8. RIP index by cigarette type



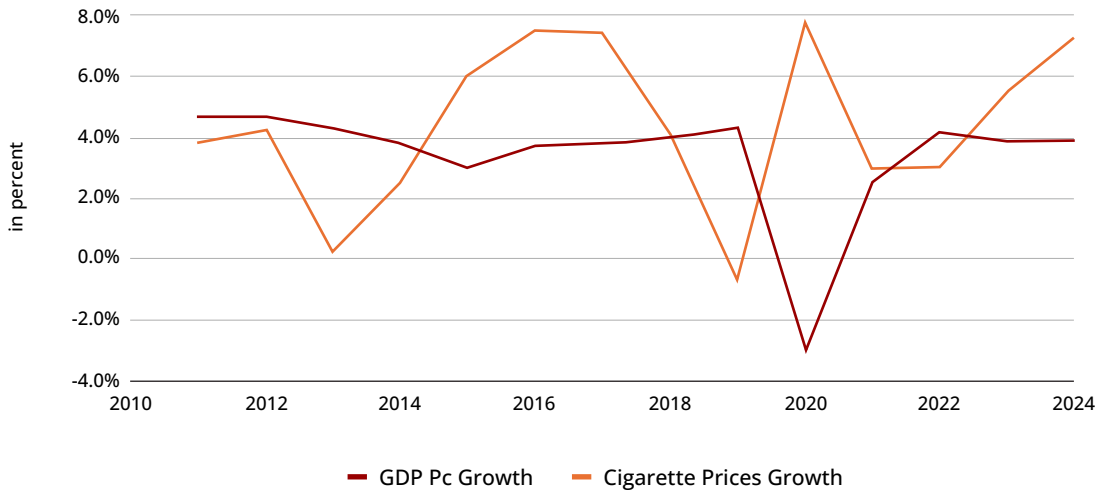
Source: Authors' calculations

Figure 9 shows the growth trends in real cigarette prices compared with the growth trends of real GDP per capita. From 2010 to 2014, GDP per capita growth was higher than cigarette price growth, which explains the flat affordability trend during that period. From 2015 to 2017, the growth rate of cigarette prices was considerably higher compared to the growth in GDP per capita, resulting in a slight upward trend of RIP.

In 2020, despite the major economic downturn due to the pandemic, the growth rate of cigarette prices was considerably higher and caused a slightly more noticeable upward trend in RIP for that year. Moreover, the government also set a more aggressive excise tax tariff hike (that is, 23 percent) compared to the previous year and slightly simplified the excise tax structure (tier reduction from 12 to 10), which likely resulted in somewhat higher cigarette price growth across the board in 2020.

During the post-pandemic recovery, cigarette prices increased at a slower pace than GDP per capita in 2021 and 2022, resulting in a relatively flat affordability trend. However, price growth accelerated in 2023–2024 following a multi-year excise tax increase with an average rate of approximately 10 percent per year (see Figure A3 in the Appendix for breakdown by cigarette type) as well as further tax structure simplification (tier reduction from 10 to 8).

Figure 9. Growth rate of GDP per capita and cigarettes (all types) price

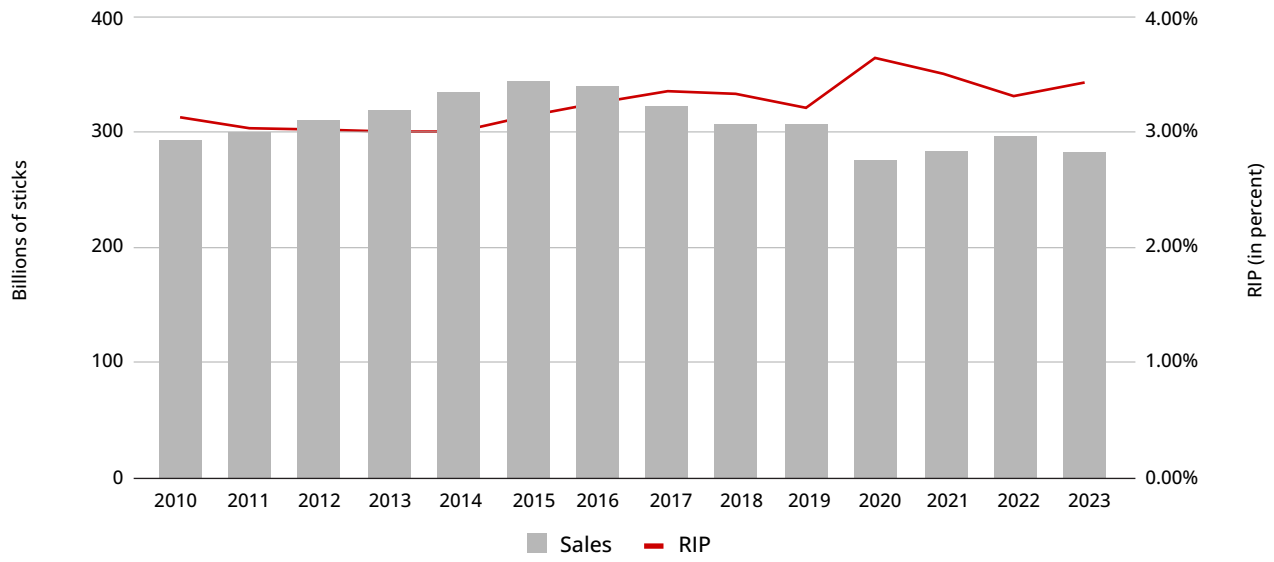


Source: Authors' calculations

The impact of affordability on smoking behaviour

Comparing the trend of affordability and the quantity of cigarettes sold, there is a strong indication of an inverse relationship between affordability and consumption (Figure 10). When RIP increased, the sales of cigarettes declined, which is noticeable starting in 2015, when the RIP started to take off. This is even more noticeable when RIP increased from 3.20 percent to 3.64 percent and the sales of cigarettes declined from 306 billion sticks in 2019 to 276 billion sticks in 2020.

Figure 10. Quantity of cigarettes sold and affordability of cigarettes



Source: Authors' calculations based on Euromonitor data

We assess this hypothetical relationship between affordability and consumption by computing affordability elasticity. In the first part of the elasticity estimation, we conduct a logistic regression of affordability on household smoking participation by incorporating several demographic characteristics and separating the model into three categories of income groups: low-, middle-, and high-income. Moreover, we include the fixed effects of year and district in our estimation.

The results of the first-part estimation presented in **Table 2** illustrate that prevalence elasticity for the whole sample is approximately -0.33. This means a 10-percent decrease in affordability could reduce the prevalence of cigarette consumption among households by 3.3 percent. The estimated elasticity is substantially larger in magnitude for low-income households than for middle-income households, indicating that cigarette consumption among low-income groups is more responsive to changes in affordability. Consequently, a decline in affordability is expected to lead to a proportionally greater reduction in prevalence among low-income households than among their middle-income counterparts.

The prevalence elasticity among higher-income households is positive in magnitude, which is likely influenced by data irregularities and certain methodological limitations. The relatively small share of households in the higher-income category—compared to the much larger proportions of low- and middle-income households—may have contributed to statistical instability and less reliable estimates. Other possible explanations include differences in consumption behaviour, reporting bias, or the influence of unobserved factors or disparities that could be more pronounced within the upper-income population segment **(26)**.

Additionally, we find that the likelihood of households reporting cigarette consumption increases with larger household sizes, as well as with a greater number of male and adult members. In contrast, households with an older average member age exhibit a lower probability of cigarette consumption. Regarding the gender of the household head, male-headed households are more likely to report cigarette consumption. Similarly, households with an employed head are more likely to consume cigarettes compared to those with an unemployed head. Educational attainment of the household head also shows a clear gradient: households with a head who has attended school are less likely to report cigarette consumption than those with a head who has not, and the probability declines further as the education level increases. Finally, households in rural areas demonstrate a lower probability of cigarette consumption compared to those in urban settings.

Table 2. Average unit values and income per household

Variables	Whole sample (coef.)	Low-income group (coef.)	Middle-income group (coef.)	High-income group (coef.)
Affordability	-10.118***	-11.066***	-8.496***	12.138***
	(0.237)	(0.215)	(1.139)	(2.157)
Household size	0.170***	0.166***	0.151***	0.202***
	(0.004)	(0.006)	(0.005)	(0.005)
Male ratio	1.571***	1.639***	1.480***	1.376***
	(0.017)	(0.022)	(0.019)	(0.027)
Adult ratio	0.929***	1.028***	0.766***	0.914***
	(0.024)	(0.034)	(0.028)	(0.033)
Average age of HH member (Ref: <25)				
25–44	-0.236***	-0.298***	-0.184***	-0.131***
	(0.008)	(0.011)	(0.009)	(0.013)
44–65	-0.553***	-0.543***	-0.496***	-0.515***
	(0.012)	(0.018)	(0.014)	(0.020)
>65	-1.304***	-1.175***	-1.534***	-1.723***
	(0.020)	(0.023)	(0.025)	(0.047)
Household head's gender Male (Ref: female)	0.976***	1.087***	0.939***	0.668***
	(0.014)	(0.019)	(0.014)	(0.018)
Household head's employment status Employed (Ref: unemployed)	0.239***	0.247***	0.247***	0.224***
	(0.008)	(0.010)	(0.010)	(0.014)
Household head's educational attainment (Ref: did not attend school)				
Primary school/equivalent	0.012	-0.065***	0.016	0.231***
	(0.022)	(0.020)	(0.032)	(0.061)
Junior high school/equivalent	-0.096***	-0.167***	-0.136***	0.101*
	(0.024)	(0.023)	(0.034)	(0.061)
Senior high school/equivalent	-0.474***	-0.463***	-0.537***	-0.273***
	(0.026)	(0.025)	(0.036)	(0.062)
University	-1.335***	-1.094***	-1.326***	-1.025***
	(0.031)	(0.035)	(0.040)	(0.060)
Residence - rural (Ref: urban)	-0.118***	-0.013	-0.158***	-0.241***
	(0.010)	(0.013)	(0.011)	(0.017)
Number of observations	2,607,229	1,085,220	1,061,831	460,169
Prevalence elasticity (Marginal effect of affordability coef.)	-0.330***	-0.658***	-0.133***	0.104***
	(0.008)	(0.013)	(0.018)	(0.018)

*** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations

Notes: Standard errors in parentheses. The models include year and district fixed effects. Equality test - Tests showed the presence of statistically significant differences between affordability elasticity among all income groups: low-income and middle-income groups (x2(1)=127.09), prob>x2=0.000); low-income and high-income groups (x2(1)=2504.05), prob>x2=0.000); middle-income and high-income groups (x2(1)=1654.80), prob>x2=0.000).

In the second stage of estimation, we estimate the conditional elasticity of cigarette consumption using GLM with a gamma family and log link. The results presented in **Table 3** illustrate that the conditional elasticity among the whole sample is -0.44. This suggests that a 10-percent decline in affordability could reduce cigarette spending or consumption by approximately 4.4 percent. Consistent with the prevalence elasticity (the first-stage results), the conditional elasticity is greater among low-income households than among middle- and high-income households, indicating that the cigarette consumption of the former is more responsive to changes in affordability.

Taking into account the sociodemographic patterns observed across the full sample, we conclude that cigarette consumption is higher among larger households, those headed by men, and those with a greater number of male and adult members. In contrast, consumption is lower among households with older members, more highly educated heads, and those residing in rural areas.

Table 3. Average unit values and income per household

Variables	Whole sample (coef.)	Low-income group (coef.)	Middle-income group (coef.)	High-income group (coef.)
Affordability	-7.860***	-6.405***	-10.180***	-10.993***
	(0.185)	(0.111)	(0.519)	(0.897)
Household size	0.065***	0.023***	0.055***	0.076***
	(0.002)	(0.002)	(0.002)	(0.002)
Male ratio	0.384***	0.260***	0.401***	0.526***
	(0.005)	(0.006)	(0.006)	(0.008)
Adult ratio	0.447***	0.242***	0.411***	0.545***
	(0.007)	(0.011)	(0.009)	(0.012)
Average age of HH member (Ref: <25)				
25–44	0.000	-0.012***	0.008***	-0.004
	(0.002)	(0.003)	(0.002)	(0.004)
44–65	0.003	0.001	0.009**	-0.042***
	(0.004)	(0.005)	(0.004)	(0.007)
>65	-0.031***	-0.073***	-0.127***	-0.167***
	(0.010)	(0.008)	(0.009)	(0.024)
Household head's gender Male (Ref: female)	0.044***	0.039***	0.049***	0.067***
	(0.003)	(0.005)	(0.004)	(0.007)
Household head's employment status Employed (Ref: unemployed)	0.064***	0.056***	0.064***	0.086***
	(0.003)	(0.004)	(0.003)	(0.005)
Household head's educational attainment (Ref: Did not attend school)				
Primary school/equivalent	-0.026***	-0.027***	-0.025***	0.005
	(0.007)	(0.006)	(0.008)	(0.018)
Junior high school/equivalent	-0.062***	-0.059***	-0.077***	-0.049***
	(0.007)	(0.007)	(0.009)	(0.018)
Senior high school/equivalent	-0.115***	-0.105***	-0.143***	-0.129***
	(0.008)	(0.007)	(0.009)	(0.020)
University	-0.195***	-0.176***	-0.231***	-0.250***
	(0.010)	(0.010)	(0.011)	(0.021)
Residence - rural (Ref: urban)	-0.008*	0.012*	-0.018***	-0.056***
	(0.005)	(0.006)	(0.005)	(0.006)
Number of observations	1,531,120	535,969	713,017	282,134
Conditional elasticity (Marginal effect of affordability coef.)	**-0.439*** **	**-0.556*** **	**-0.462*** **	**-0.256*** **
	(0.010)	(0.010)	(0.024)	(0.021)

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

Source: Authors' calculations

Notes: Standard errors in parentheses. The models include year and district fixed effects. Equality test - Tests showed the presence of statistically significant differences between affordability elasticity among all income groups: low-income and middle-income groups (x2(1)=368.73), prob>x2=0.000); low-income and high-income groups (x2(1)=2.135.56), prob>x2=0.000); middle-income and high-income groups (x2(1)=1.508.08), prob>x2=0.000).

Finally, based on the estimated prevalence and conditional elasticity of cigarette consumption, we calculate the overall affordability elasticity of demand for all households at –0.77 (Table 4). This implies that a 10-percent decline in affordability would lead to a 7.7-percent reduction in cigarette demand. The variation in elasticity across income groups further indicates that changes in affordability have a more pronounced impact on low-income households compared to middle-income households.

For the high-income households, the total affordability elasticity is not reported because the prevalence elasticity and conditional elasticities exhibited opposite signs. Additionally, prevalence elasticity is not statistically significant. In such cases, aggregating the two components is not theoretically appropriate, as total demand is conventionally decomposed into participation and conditional impacts only when these impacts are directionally consistent **(27,28)**. We also conduct an equality test, and the results confirm that the impact differs significantly across the remaining two income groups.

Table 4. Total affordability elasticity of demand

	Whole sample	Low-income group	Middle-income group	High-income group
Total affordability elasticity	**-0.769*** **	**-1.214*** **	**-0.595*** **	**-**
	(0.013)	(0.016)	(0.030)	-

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

Source: Authors' calculations

Notes: Standard errors in parentheses. The models include year and district fixed effects. Equality test - Tests showed the absence of statistically significant differences between affordability elasticity among income groups: low-income and middle-income groups (x2(1)=6.06), prob>x2=0.013);

To ensure the robustness of our results, we estimate an alternative model using cigarette price data obtained from the National Consumer Price of Selected Goods and Services survey (Table 5). The results show that our estimated total affordability elasticity is robust across different price data sources.

Table 5. Robustness: Total affordability elasticity of demand

	Whole sample	Low-income group	Middle-income group	High-income group
Total affordability elasticity	**-0.768*** **	**-1.217*** **	**-0.644*** **	**-**
	(0.010)	(0.016)	(0.011)	**-**

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

Source: Authors' calculations

Note: Standard errors in parentheses.

4 DISCUSSION

This study demonstrates that cigarette affordability in Indonesia has declined only modestly over the past decade, from 2010 to 2024, as reflected in a slight increase in the relative income price (RIP) of up to two percentage points, depending on the income proxy. Despite this gradual change, the absolute RIP level has remained within a low and narrow range of 3–7 percent (depending on the income proxy used), indicating that cigarettes continue to be highly affordable relative to income.

This outcome is particularly significant given that Indonesia, although it has been classified as an upper-middle-income country (UMIC) since mid-2023, still exhibits a stagnant affordability trend that resembles those typically observed in lower- and middle-income settings **(7)**. These findings are consistent with a previous Indonesian study **(11)** and global evidence showing that tobacco products in many low- and middle-income countries (LMICs) remain inexpensive due to insufficient tax adjustments and industry strategies designed to maintain access to low-cost brands **(9,29)**. The persistence of high cigarette affordability provides an important explanation for Indonesia's exceptionally high smoking prevalence, which remains among the highest worldwide **(9,30)**.

The inverse relationship between cigarette affordability and quantity sold, as observed in our trend analysis, underscores the importance of affordability as a determinant of tobacco consumption. The estimated affordability elasticity of –0.77 indicates that a 10-percent reduction in affordability could lead to a 7.7-percent decline in cigarette demand among households. This finding is consistent with international evidence suggesting that affordability measures are strong predictors of cigarette demand **(6,9)**. It further emphasizes that evaluating affordability, rather than just price levels, provides more meaningful insights into how taxation policies influence smoking behaviour.

Our analysis also reveals heterogeneity across income groups, with lower-income households displaying a higher affordability elasticity compared to middle- and higher-income groups. This result mirrors global evidence where lower-income households are generally more responsive to changes in cigarette prices or affordability **(25,31–33)**. Considering that smoking prevalence is disproportionately higher among populations with lower economic status in Indonesia **(15,34)**, increasing cigarette excise taxes to reduce affordability is likely to yield greater health benefits for socioeconomically disadvantaged populations. Thus, fiscal measures aimed at lowering affordability may also contribute to reducing health inequities.

The findings provide strong support for using excise tax policy as a tool to reduce cigarette affordability. International evidence consistently shows that sustained significant increases in excise taxes are the single most effective intervention to reduce cigarette affordability and tobacco consumption **(35,36)**. For example, in the Philippines, cigarette affordability declined sharply following the 2012 Sin Tax Reform, with the relative income price (RIP) rising by more than one-third in 2013 and affordability for low-priced brands halving by 2015 **(37)**. This sharp decline in affordability was accompanied by a significant drop in smoking prevalence, from around 28 percent in 2009 (pre-reform) to 18.5 percent in 2021 **(38)**.

Similarly, in Australia, successive annual excise hikes since 2013 have made cigarettes among the least affordable globally, with the work time required to purchase a pack increasing roughly threefold compared to the mid-1990s (39), contributing to a steady decline in adult smoking rates to below 12 percent in recent years **(40)**.

In Indonesia, where the tax system remains highly complex and allows significant price gaps between premium and low-price brands, reforms should focus on simplifying the tax tiers and increasing the minimum tax rate to prevent downtrading to cheaper cigarettes. In this regard, these policies would lead to an affordability reduction that can be particularly effective in achieving both public health goals and equity objectives.

This study makes a significant contribution to the literature by providing the most recent empirical evidence on cigarette affordability in Indonesia. Earlier research conducted by the World Bank relied on data from 2002–2016 and focused narrowly on price trends without linking affordability to household smoking behaviour **(11,41)**. To our knowledge, this is the first study to estimate affordability elasticity using household-level data, thereby advancing the evidence base on tobacco control in Indonesia and enriching the global evidence on cigarette affordability across newly rising UMICs. A further contribution lies in the use of alternative income proxies—average wages and disposable income per capita—to compute the trend of the relative income price (RIP). Unlike GDP per capita, which could misrepresent purchasing power in unequal economies, these measures could provide a more accurate assessment of cigarette affordability and its policy implications.

This study has several limitations. First, Indonesia's cigarette market is highly segmented by type (for example, SKT, SKM, and white cigarettes), brand, and price category. Yet the absence of detailed product-level data (including the types of cigarettes) raises the risk that cheaper brands overestimated our affordability elasticity. These limitations highlight the need for future research to incorporate more comprehensive price data to strengthen affordability analyses. Furthermore, the average cigarette price data used in the calculation of affordability is unweighted due to data limitations to constructing appropriate weights.

Second, we did not assess affordability using other measurements such as the minutes of labour (MoL) approach, which measures the work time required to purchase a pack of cigarettes (42,43). Although widely applied in other contexts, this indicator is less suitable for Indonesia, where much of the labor force is employed informally (59.4 percent in 2025, according to Statistics Indonesia) **(44)** and wage data largely reflect the formal sector. Relying on MoL in this setting would likely produce biased affordability estimates.

Third, while affordability elasticity analysis is more ideally conducted at the individual level, this study applies the best available approach given the lack of individual-level smoking data in Indonesia. Finally, alternative income proxies such as average wages and disposable income per capita could provide a more accurate RIP measure, yet their use was constrained by data gaps, limiting the comprehensiveness of the affordability assessment. These limitations collectively highlight the need for policy makers, statistics offices, and research institutions to improve data collection to support more accurate analyses in the future.

5
CONCLUSION

This study provides new empirical evidence that cigarettes have remained persistently affordable in Indonesia with only modest increases in the relative income price over the past decade. Particularly concerning is that non-filtered kretek cigarettes, which are typically hand-rolled (SKT), have become increasingly more affordable, enabling smokers to switch to these cheaper products. By linking affordability trends to household smoking behaviour, the analysis demonstrates that affordability—as opposed to price alone—serves as a stronger predictor of cigarette demand. The estimated affordability elasticity of –0.77 suggests that even relatively small reductions in affordability could generate substantial declines in cigarette demand, particularly among lower-income households.

These findings underscore the urgent need for stronger fiscal measures in Indonesia, since tobacco taxation policies over the last decade have been insufficient in making cigarettes unaffordable. In particular, continuously raising the excise tax tariff significantly above the combination of inflation and real income growth and simplifying Indonesia's highly complex multi-tier tax system are critical steps to ensure reductions in affordability and cigarette consumption.

At the same time, our findings highlight important implications for health equity. Given that poorer households are more responsive to changes in affordability, raising cigarette taxes and closing price gaps between brand tiers could generate disproportionate health benefits for marginalized groups, thereby contributing to reduced health inequities. Nevertheless, the study also acknowledges key limitations, including data gaps on income measures and brand-level prices. Addressing these gaps in future research would strengthen the evidence base for policy. Overall, this study advances the literature on tobacco control in Indonesia and offers timely insights for policy makers seeking to align tax reforms with both public health and equity objectives.

REFERENCES

1. Badan Kebijakan Pembangunan Kesehatan. Survei Kesehatan Indonesia (SKI) Dalam Angka. Jakarta: Kementerian Kesehatan RI; 2023.

2. Kementrian Kesehatan. Perokok Aktif di Indonesia Tembus 70 Juta Orang, Mayoritas Anak Muda. 2024 May 29; Available from: https://kemkes.go.id/eng/%20perokok-aktif-di-indonesia-tembus-70-juta-orang-mayoritas-anak-muda

3. Kristina SA, Endarti D, Wiedyaningsih C, Fahamsya A, Faizah N. Health Care Cost of Noncommunicable Diseases Related to Smoking in Indonesia, 2015. Asia-Pacific Journal of Public Health. 2018;30(1):29–35.

4. Meilissa Y, Nugroho D, Luntungan NN, Dartanto T. The 2019 economic cost of smoking-attributable diseases in Indonesia. Tob Control. 2022 Sept;31(Suppl 2):s133–9.

5. Kosen S, Thabrany H, Kusumawardani N. Health and Economic Cost of Tobacco in Indonesia: Review of Evidence Series. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2018.

6. Blecher EH, Van Walbeek CP. An international analysis of cigarette affordability. Tob Control. 2004 Dec;13(4):339–46.

7. He Y, Shang C, Chaloupka FJ. The association between cigarette affordability and consumption: An update. Husain MJ, editor. PLoS ONE. 2018 Dec 5;13(12):e0200665.

8. Goodchild M, Nargis N, Tursan d'Espaignet E. Global economic cost of smoking-attributable diseases. Tob Control. 2018 Jan;27(1):58–64.

9. Blecher, E. Affordability of Tobacco Products: The Case of Cigarettes [Internet]. Chicago, IL: Tobacconomics, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago; 2020. Available from: http://www.tobacconomics.org/

10. WHO Technical Manual on Tobacco Tax Policy and Administration [Internet]. 1st ed. Geneva: World Health Organization; 2021. 1 p. Available from: https://iris.who.int/server/api/core/bitstreams/89e10697-e083-47ca-8b96-3bb009158296/content

11. Zheng R. Cigarette Affordability in Indonesia : 2002 - 2017. World Bank Organization [Internet]. 2018 May; Available from: http://hdl.handle.net/10986/30027

12. Kementrian Keuangan RI. Perubahan Kedua atas Peraturan Menteri Keuangan Nomor 192/PMK.010/2021 tentang Tarif Cukai Hasil Tembakau Berupa Sigaret, Cerutu, Rokok Daun atau Klobot, dan Tembakau Iris [Internet]. 2022. Available from: https://peraturan.bpk.go.id/Details/234018/pmk-no-191pmk0102022

13. Tobacconomics. Cigarette Tax Scorecard: Spotlight on Indonesia [Internet]. 2024 June. Available from: https://www.economicsforhealth.org/files/research/946/indonesia-2022-final.pdf

14. Center for Indonesia's Strategic Development Initiatives. The impacts of cigarette prices on adult smoking cessation in Indonesia. Jakarta: CISDI; 2024.

15. Swarnata A, Kamilah FZ, Wisana IDGK, Meilissa Y, Kusnadi G. Crowding-out effect of tobacco consumption in Indonesia. Tobacco Control [Internet]. 2024 Jan 22 [cited 2024 Apr 2]; Available from: https://tobaccocontrol.bmj.com/content/early/2024/01/22/tc-2022-057843

16. Shang C, Lee HM, Chaloupka FJ, Fong GT, Thompson M, O'Connor RJ. Association between tax structure and cigarette consumption: findings from the International Tobacco Control Policy Evaluation (ITC) Project. Tob Control. 2019 May;28(Suppl 1):s31–6.

17. International Labour Organization. Global wage report 2022-23: the impact of inflation and COVID-19 on wages and purchasing power [Internet]. 1st ed. Geneva: ILO; 2022 [cited 2026 Jan 21]. Available from: https://researchrepository.ilo.org/esploro/outputs/report/995264896002676

18. OECD. Household disposable income [Internet]. Available from: https://www.oecd.org/en/data/indicators/household-disposable-income.html#:~:text=Household%20disposable%20income%20is%20the,and%20income%20from%20financial%20investments

19. International Monetary Fund. The Pandemic and Its Scarring Effects in Indonesia [Internet]. 2022. Available from: https://www.elibrary.imf.org/downloadpdf/view/journals/002/2022/085/article-A001-en.pdf

20. World Bank. Perekonomian Indonesia Mengalami Kebangkitan pada Tahun 2022 Setelah Dibuka Kembali Pasca COVID. 2022 Dec 15; Available from: https://www.worldbank.org/in/news/press-release/2022/12/15/indonesia-s-economy-sees-rebound-in-2022-following-post-covid-reopening

21. World Bank. Financial Deepening for Stronger Growth and Sustainable Recovery [Internet]. 2022 June. Available from: https://openknowledge.worldbank.org/server/api/core/bitstreams/1d693935-3fad-55e1-91f4-3feae60dd23c/content

22. Kementrian Keuangan RI. Macroeconomic and Fiscal Policy Updates [Internet]. 2022 July; Jakarta. Available from: https://fiskal.kemenkeu.go.id/files/red/file/1660287505_fpa_red_july_2022.pdf

23. Asian Development Bank. Asian Development Outlook [Internet]. 2024 Apr. Available from: https://www.adb.org/sites/default/files/publication/957856/ino-ado-april-2024

24. The Jakarta Post. COVID-19 takes severe toll on wages. 2021 June 15; Available from: https://www.thejakartapost.com/paper/2021/06/14/covid-19-takes-severe-toll-on-wages.html

25. Čizmović M, Vlahović A, Ivanović I, Kovačević, M. Cigarette affordability in Montenegro (Economics for Health Working Paper No. 24/12/2) [Internet]. ISEA; 2024. Available from: https://www.economicsforhealth.org/research/cigarette-affordability-in-montenegro-working-paper-series/

26. Morrissey TW, Cha Y, Wolf S, Khan M. Household economic instability: Constructs, measurement, and implications. Child Youth Serv Rev. 2020 Nov;118:105502.

27. Chaloupka FJ, Warner, Kenneth E. Chaloupka, Frank J. and Warner, Kenneth E., The Economics of Smoking (March 1999). NBER Working Paper No. w7047, Available at SSRN: https://ssrn.com/abstract=157596

28. Deaton A, Muellbauer J. Economics and Consumer Behavior. January. (Cambridge University Press, number 9780521296762).

29. Marquez PV, Moreno-Dodson B. Tobacco Tax Reform at the Crossroads of Health and Development [Internet]. World Bank, Washington, DC; 2017 [cited 2026 Jan 21]. Available from: https://hdl.handle.net/10986/28494

30. World Health Organization. Global Adult Tobacco Survey (GATS) Indonesia Report 2021 [Internet]. 2024. Available from: https://www.who.int/indonesia/news/detail/22-08-2024-ministry-of-health-and-who-release-global-adult-tobacco-survey-indonesia-report-2021

31. Mena AC, Paraje G. Tobacco price elasticity by socioeconomic characteristics in Ecuador. Teran E, editor. PLoS ONE. 2024 Apr 19;19(4):e0302293.

32. Gligorić D, Preradović Kulovac D, Mićić L, Pepić A. Price and income elasticity of cigarette demand in Bosnia and Herzegovina by different socioeconomic groups. Tob Control. 2022 Sept;31(Suppl 2):s101–9.

33. Huque R, Abdullah SM, Hossain MN, Nargis N. Price elasticity of cigarette smoking in Bangladesh: evidence from the Global Adult Tobacco Surveys (GATS). Tob Control. 2024 June;33(Suppl 2):s51–8.

34. Swarnata A, Kamilah FZ, Melinda G, Adrison V. The Impoverishing Effect of Tobacco Use in Indonesia. Nicotine and Tobacco Research. 2024 Sept 23;26(10):1331–8.

35. Guindon GE, Boisclair D. Past, Current and Future Trends in Tobacco Use [Internet]. World Bank, Washington, DC; 2003 [cited 2026 Jan 21]. Available from: https://hdl.handle.net/10986/13726

36. World Health Organization. Raising taxes on tobacco. Available from: https://www.who.int/activities/raising-taxes-on-tobacco

37. Campaign for Tobacco-Free Kids. Tax Reform Case Study: Philippines [Internet]. 2017 June. Available from: https://assets.tobaccofreekids.org/global/pdfs/en/Philippines_Tax_Reform_Case_Study.pdf

38. Cheng KJG, Estrada MAG. Price Elasticity of cigarette smoking demand in the Philippines after the 2012 Sin Tax Reform Act. Preventive Medicine. 2020 May;134:106042.

39. Bayly M, Scollo M. 13.5 How affordable are cigarettes in Australia? Tobacco in Australia: Facts and issues [Internet]. 2025; Available from: https://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-5-how-affordable-are-cigarettes-in-australia

40. Australian Bureau of Statistics. Smoking and vaping. 2022; Available from: https://www.abs.gov.au/statistics/health/health-conditions-and-risks/smoking-and-vaping/2022

41. Adioetomo SM, Djutaharta T, Hendratno K. Cigarette consumption, taxation, and household income: Indonesia case study [Internet]. Washington, D.C.: World Bank; 2005. (Health, Nutrition and Population (HNP) discussion paper. Economics of tobacco control paper series|no. 26). Available from: http://documents.worldbank.org/curated/en/607961468258307588

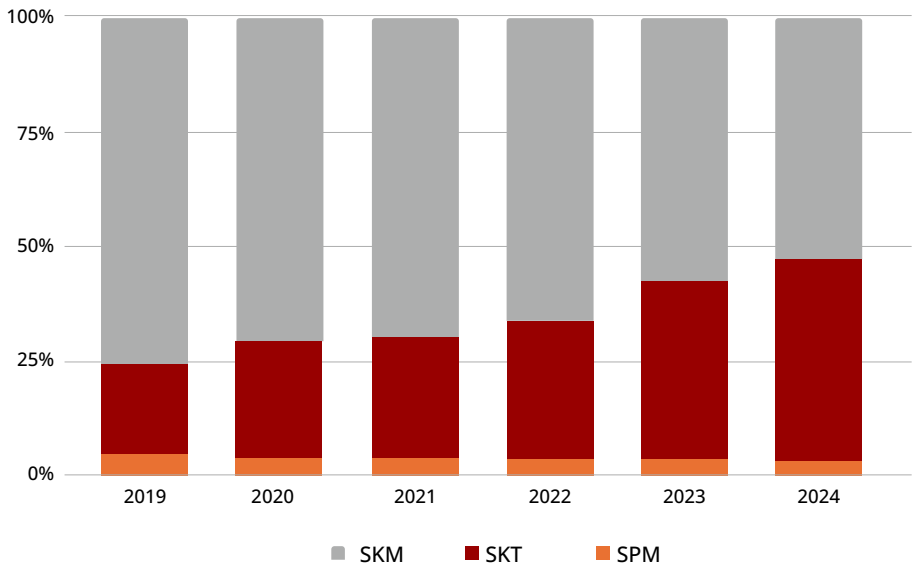
42. Guindon GE, Tobin S, Yach D. Trends and affordability of cigarette prices: ample room for tax increases and related health gains. Tob Control. 2002 Mar;11(1):35–43.

43. Blecher EH, Van Walbeek CP. Cigarette affordability trends: an update and some methodological comments. Tob Control. 2009 June;18(3):167–75.

44. Booklet Sakernas Februari 2025. Badan Pusat Statistik;2025.

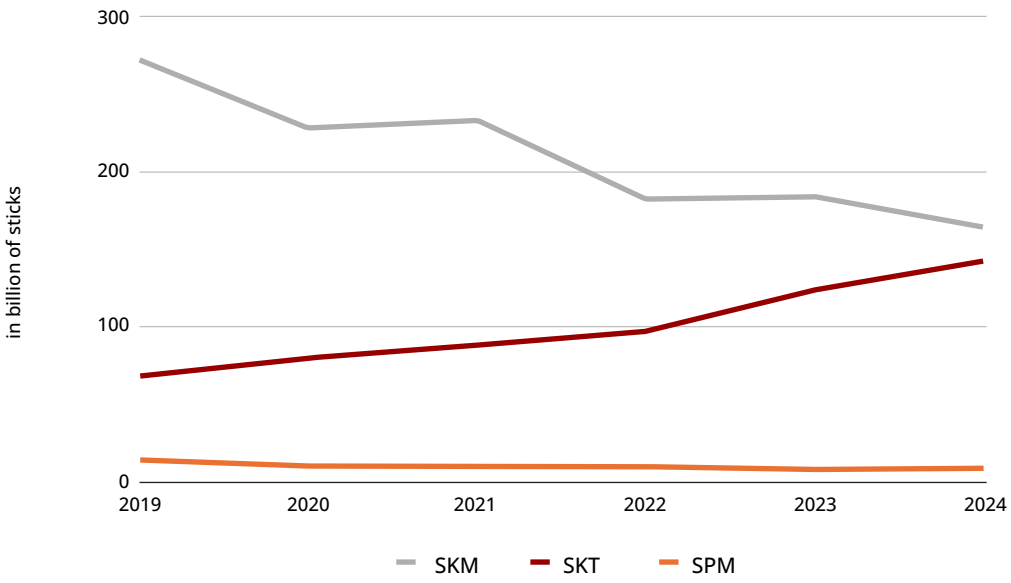
APPENDIX

Figure A1. Market share by cigarette type



Source: Ministry of Finance

Figure A2. Production volume by cigarette type



Source: Ministry of Finance

Figure A3. Trends in excise tax increase

Source: Ministry of Finance

Table A1. Nominal and real GDP per capita (in Rp and annual growth rate)

Year	Nominal GDP per capita	Real GDP per capita	Nominal GDP per capita growth rate	Real GDP per capita growth rate
2010	28,778,170	28,778,170	-	-
2011	32,336,260	30,112,370	12.36%	4.64%
2012	35,338,480	31,519,930	9.28%	4.67%
2013	38,632,670	32,874,760	9.32%	4.30%
2014	42,432,080	34,127,720	9.83%	3.81%
2015	45,119,610	35,161,890	6.33%	3.03%
2016	47,937,720	36,468,620	6.25%	3.72%
2017	51,891,180	37,851,370	8.25%	3.79%
2018	55,992,070	39,340,560	7.90%	3.93%
2019	59,317,910	41,021,610	5.94%	4.27%
2020	57,289,590	39,778,680	-3.42%	-3.03%
2021	62,259,070	40,780,750	8.67%	2.52%
2022	71,044,780	42,471,450	14.11%	4.15%
2023	74,964,600	44,139,370	5.52%	3.93%
2024	78,617,420	45,881,060	4.87%	3.95%

Source: Ministry of Finance

Table A2. Average monthly nominal and real wages of employees (in Rp)

Year	Average nominal wage	Average real wage	Average real wage growth rate (%)
2015	2,069,306	2,069,306	-
2016	2,552,962	2,476,373	19.67%
2017	2,742,621	2,578,064	4.11%
2018	2,913,897	2,651,646	2.85%
2019	2,829,130	2,489,634	-6.11%
2020	2,756,345	2,398,020	-3.68%
2021	2,736,463	2,325,994	-3.00%
2022	3,070,756	2,487,312	6.94%
2023	3,178,227	2,510,799	0.94%
2024	3,267,618	2,548,742	1.51%

Source: Statistics Indonesia, Labour Force Survey (Sakernas, August)

Note: Data on average nominal wages are sourced from Statistics Indonesia, while average real wages are derived by the authors using the CPI published by BPS.

Table A3. Disposable income per capita (in Rp)

Year	Nominal disposable income Pc	Real disposable income Pc
2016	31,200,134	31,200,134
2017	34,283,201	33,254,705
2018	36,218,986	34,045,847
2019	38,837,323	35,341,964
2020	37,583,674	33,825,307
2021	39,932,004	35,140,164
2022	42,945,488	35,644,755
2023	45,490,146	36,847,018

Source: Statistics Indonesia

Note: The original data are reported as total household disposable income. Disposable income per capita is calculated by dividing the total by Indonesia's population. Real disposable income per capita is obtained by adjusting with CPI from BPS.

Table A4. Cigarette prices in Indonesia (in Rp)

Year	Cigarettes (all types)		Kretek		Filtered kretek		White	
	Nominal price	Real price	Nominal price	Real price	Nominal price	Real price	Nominal price	Real price
2010	9,078	9,078	8,747	8,747	8,975	8,975	9,514	9,514
2011	9,822	9,429	9,359	8,985	9,764	9,373	10,342	9,928
2012	10,680	9,826	10,013	9,212	10,665	9,812	11,361	10,452
2013	11,594	9,855	10,996	9,347	11,511	9,784	12,275	10,434
2014	12,786	10,101	11,926	9,422	12,691	10,026	13,742	10,856
2015	14,090	10,708	12,974	9,860	13,990	10,632	15,306	11,633
2016	15,558	11,513	14,160	10,478	15,560	11,514	16,954	12,546
2017	17,418	12,367	15,082	10,708	17,336	12,309	19,835	14,083
2018	18,662	12,877	16,118	11,121	18,483	12,753	21,386	14,756
2019	19,085	12,787	16,421	11,002	18,916	12,674	21,918	14,685
2020	20,874	13,777	17,564	11,592	20,248	13,364	24,811	16,375
2021	21,824	14,186	18,009	11,706	21,005	13,653	26,456	17,196
2022	23,578	14,618	18,875	11,703	22,811	14,143	29,047	18,009
2023	25,708	15,425	19,880	11,928	25,753	15,452	31,490	18,894
2024	28,050	16,550	20,939	12,354	29,074	17,154	34,138	20,142

Source: Authors' elaboration based on the National Consumer Price of Selected Goods and Services and CPI from BPS

Note: The 2024 National Consumer Price of Selected Goods and Services adopted a new cigarette price classification (SKT, SKM, and SPM), resulting in unrealistically low price levels. To ensure consistency, 2024 cigarette prices were estimated using the 2023 price growth rate, reflecting the multi-year excise tax increase of about 10 percent in both 2023 and 2024.

Table A5. Sociodemographic characteristics of households – Susenas data

Variable	Observations	Mean	Std. dev	Min	Max
Household size	577,897,147	3.75	1.58	1	34
Male ratio (%)	286,112,863	49.51	0.22	0	1
Adult ratio 15+ (%)	454,161,077	78.59	0.20	0	1
Average age of HH member (%)					
<25	169,257,161	29.29	0.46	0	1
25–44	283,711,613	49.09	0.50	0	1
44–65	93,261,419	16.14	0.37	0	1
>65	31,666,954	5.48	0.23	0	1
Household head's gender - male (%)	496,135,524	85.59	0.35	0	1
Household head's employment status - employed (%)	488,076,461	84.46	0.36	0	1
Household head's education attainment (%)					
Did not attend school	24,177,162	4.18	0.20	0	1
Primary school/equivalent	240,686,971	41.65	0.49	0	1
Junior high school/equivalent	98,786,806	17.09	0.38	0	1
Senior high school/equivalent	155,884,217	26.97	0.44	0	1
University	58,361,991	10.10	0.30	0	1

Source: Authors' calculations based on Susenas data

Table A6. Affordability indicators

Year	RIP GDP Pc	RIP wage	RIP disposable income
2010	3.15%		
2011	3.04%		
2012	3.02%		
2013	3.00%		
2014	3.01%		
2015	3.12%	5.67%	
2016	3.25%	5.08%	4.99%
2017	3.36%	5.29%	5.08%
2018	3.33%	5.34%	5.15%
2019	3.22%	5.62%	4.91%
2020	3.64%	6.31%	5.55%
2021	3.51%	6.65%	5.47%
2022	3.32%	6.40%	5.49%
2023	3.43%	6.74%	5.65%
2024	3.57%	-	7.15%

Source: Authors' calculations

Table A7. VIF test

Mean VIF	Model 1			
	Whole sample	Low-income group	Middle-income group	High-income group
	1.35	1.33	1.45	1.53

Table A8. Estimation of prevalence elasticity – different models

Variables	Model 1				Model 2			
	Whole sample (coef.)	Low-income group (coef.)	Middle-income group (coef.)	High-income group (coef.)	Whole sample (coef.)	Low-income group (coef.)	Middle-income group (coef.)	High-income group (coef.)
Affordability	-10.118***	-11.066***	-8.496***	12.138***				
	(0.237)	(0.215)	(1.139)	(2.157)				
Log affordability					-10.755***	-11.381***	-11.152***	17.535***
					(0.187)	(0.179)	(0.490)	(1.213)
Household size	0.170***	0.166***	0.151***	0.202***	0.167***	0.161***	0.150***	0.203***
	(0.004)	(0.006)	(0.005)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)
Male ratio	1.571***	1.639***	1.480***	1.376***	1.545***	1.605***	1.462***	1.369***
	(0.017)	(0.022)	(0.019)	(0.027)	(0.017)	(0.023)	(0.020)	(0.026)
Adult ratio	0.929***	1.028***	0.766***	0.914***	0.927***	1.019***	0.762***	0.924***
	(0.024)	(0.034)	(0.028)	(0.033)	(0.025)	(0.036)	(0.028)	(0.033)
Average age of HH member (Ref: <25)								
25–44	-0.236***	-0.298***	-0.184***	-0.131***	-0.243***	-0.306***	-0.189***	-0.138***
	(0.008)	(0.011)	(0.009)	(0.013)	(0.008)	(0.011)	(0.009)	(0.013)
44–65	-0.553***	-0.543***	-0.496***	-0.515***	-0.547***	-0.538***	-0.499***	-0.518***
	(0.012)	(0.018)	(0.014)	(0.020)	(0.012)	(0.018)	(0.015)	(0.020)
>65	-1.304***	-1.175***	-1.534***	-1.723***	-1.277***	-1.159***	-1.538***	-1.753***
	(0.020)	(0.023)	(0.025)	(0.047)	(0.020)	(0.023)	(0.025)	(0.046)
Household head's gender Male (Ref: female)	0.976***	1.087***	0.939***	0.668***	0.959***	1.074***	0.929***	0.654***
	(0.014)	(0.019)	(0.014)	(0.018)	(0.014)	(0.019)	(0.014)	(0.019)
Household head's employment status Employed (Ref: unemployed)	0.239***	0.247***	0.247***	0.224***	0.237***	0.248***	0.245***	0.218***
	(0.008)	(0.010)	(0.010)	(0.014)	(0.008)	(0.010)	(0.011)	(0.014)
Household head's educational attainment (Ref: did not attend school)								
Primary school/equivalent	0.012	-0.065***	0.016	0.231***	0.007	-0.072***	0.002	0.224***
	(0.022)	(0.020)	(0.032)	(0.061)	(0.025)	(0.020)	(0.035)	(0.066)
Junior high school/equivalent	-0.096***	-0.167***	-0.136***	0.101*	-0.108***	-0.179***	-0.149***	0.098
	(0.024)	(0.023)	(0.034)	(0.061)	(0.026)	(0.024)	(0.036)	(0.068)
Senior high school/equivalent	-0.474***	-0.463***	-0.537***	-0.273***	-0.489***	-0.473***	-0.555***	-0.274***
	(0.026)	(0.025)	(0.036)	(0.062)	(0.029)	(0.026)	(0.038)	(0.069)
University	-1.335***	-1.094***	-1.326***	-1.025***	-1.342***	-1.098***	-1.345***	-1.017***
	(0.031)	(0.035)	(0.040)	(0.060)	(0.033)	(0.037)	(0.042)	(0.070)
Residence - rural (Ref: urban)	-0.118***	-0.013	-0.158***	-0.241***	-0.118***	-0.007	-0.154***	-0.233***
	(0.010)	(0.013)	(0.011)	(0.017)	(0.010)	(0.014)	(0.011)	(0.017)
Number of observations	2,607,229	1,085,220	1,061,831	460,169	2,263,750	932,591	926,566	404,593
Prevalence elasticity	-0.330***	-0.658***	-0.133***	0.104***	-0.338***	-0.668***	-0.160***	0.131***
	(0.008)	(0.013)	(0.018)	(0.018)	(0.006)	(0.011)	(0.007)	(0.009)

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

Source: Authors' calculations

Note: Standard errors in parentheses. The models include year and district fixed effects.

Table A9. Estimation of intensity elasticity – different models

Variables	Model 1				Model 2			
	Whole sample (coef.)	Low-income group (coef.)	Middle-income group (coef.)	High-income group (coef.)	Whole sample (coef.)	Low-income group (coef.)	Middle-income group (coef.)	High-income group (coef.)
Affordability	-7.860***	-6.405***	-10.180***	-10.993***				
	(0.185)	(0.111)	(0.519)	(0.897)				
Log affordability					-7.892***	-6.260***	-11.171***	-13.106***
					(0.140)	(0.127)	(0.210)	(0.433)
Household size	0.065***	0.023***	0.055***	0.076***	0.066***	0.024***	0.055***	0.075***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Male ratio	0.384***	0.260***	0.401***	0.526***	0.380***	0.254***	0.395***	0.528***
	(0.005)	(0.006)	(0.006)	(0.008)	(0.005)	(0.007)	(0.006)	(0.009)
Adult ratio	0.447***	0.242***	0.411***	0.545***	0.454***	0.240***	0.411***	0.549***
	(0.007)	(0.011)	(0.009)	(0.012)	(0.007)	(0.011)	(0.009)	(0.012)
Average age of HH member (Ref: <25)								
25–44	0.000	-0.012***	0.008***	-0.004	-0.000	-0.013***	0.008***	-0.005
	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.004)
44–65	0.003	0.001	0.009**	-0.042***	0.007**	0.005	0.009**	-0.039***
	(0.004)	(0.005)	(0.004)	(0.007)	(0.004)	(0.005)	(0.004)	(0.007)
>65	-0.031***	-0.073***	-0.127***	-0.167***	-0.015*	-0.068***	-0.123***	-0.168***
	(0.010)	(0.008)	(0.009)	(0.024)	(0.008)	(0.008)	(0.010)	(0.028)
Household head's gender Male (Ref: female)	0.044***	0.039***	0.049***	0.067***	0.042***	0.036***	0.048***	0.067***
	(0.003)	(0.005)	(0.004)	(0.007)	(0.003)	(0.005)	(0.004)	(0.007)
Household head's employment status Employed (Ref: unemployed)	0.064***	0.056***	0.064***	0.086***	0.066***	0.059***	0.065***	0.087***
	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)	(0.004)	(0.005)
Household head's education attainment (Ref: did not attend school)								
Primary school/equivalent	-0.026***	-0.027***	-0.025***	0.005	-0.022**	-0.027***	-0.026***	0.002
	(0.007)	(0.006)	(0.008)	(0.018)	(0.009)	(0.007)	(0.010)	(0.020)
Junior high school/equivalent	-0.062***	-0.059***	-0.077***	-0.049***	-0.058***	-0.058***	-0.078***	-0.054***
	(0.007)	(0.007)	(0.009)	(0.018)	(0.009)	(0.007)	(0.010)	(0.020)
Senior high school/equivalent	-0.115***	-0.105***	-0.143***	-0.129***	-0.109***	-0.103***	-0.144***	-0.133***
	(0.008)	(0.007)	(0.009)	(0.020)	(0.010)	(0.008)	(0.010)	(0.021)
University	-0.195***	-0.176***	-0.231***	-0.250***	-0.180***	-0.171***	-0.233***	-0.254***
	(0.010)	(0.010)	(0.011)	(0.021)	(0.011)	(0.011)	(0.012)	(0.022)
Residence - rural (Ref: urban)	-0.008*	0.012*	-0.018***	-0.056***	-0.005	0.015**	-0.014***	-0.058***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.007)	(0.005)	(0.006)
Number of observations	1,531,120	535,969	713,017	282,134	2,263,750	932,591	926,566	404,593
Conditional elasticity	-0.439***	-0.556***	-0.462***	-0.256***	-0.430***	-0.549***	-0.484***	-0.273***
	(0.010)	(0.010)	(0.024)	(0.021)	(-0.008)	(-0.011)	(-0.009)	(-0.009)

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

Source: Authors' calculations

Note: Standard errors in parentheses. The models include year and district fixed effects.

cisdi

Jl. Probolinggo No.40C 1, RT.1/RW.2, Kec. Gondangdia,
Kec. Menteng, Kota Jakarta Pusat, Daerah Khusus
Ibukota Jakarta 10350