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The Impoverishing Effect of Tobacco Use in Indonesia

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ACKNOWLEDGMENT

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EXECUTIVE SUMMARY

With over a third of adult population consumed tobacco, six out of ten families in Indonesia reported sending on tobacco where they diverted over 11% of the household budget on tobacco products. Tobacco spending is typically counted as a part of total household expenditure despite the notion that tobacco consumption could be arguably considered as wasteful and unproductive spending. This would distort the expenditure data as tobacco spending inflates the total expenditure, which does not reflect the actual resources spent on non-tobacco commodities. Consequently, headcount poverty estimation using the distorted household expenditure would not reflect the actual poverty rate.

The research aims to quantify the impoverishing effect of tobacco spending, which considers the direct spending on tobacco and healthcare costs attributed to smoking as wasteful expenditure. This study employs a large-scale survey from Indonesia's National Socioeconomic Survey (Susenas) from 2018 to 2021, comprising more than a million households.

This study finds that the headcount poverty rate in Indonesia would rise by 2.84 to 3.26 percentage points, affecting 7.5 million to 8.77 million people. The additional poverty is mainly driven by direct tobacco spending rather than tobacco-attributable healthcare cost. Our study emphasizes that a significant number of the population would have been categorized as poor had the tobacco spending and tobacco-attributed healthcare costs been considered wasteful or foregone income. In other words, over 8.8 million people have the same spending as those who live below the poverty line, but they are not officially categorized as poor because tobacco spending inflates household expenditure, which puts them allegedly above the poverty line.

Moreover, we found that the tobacco-adjusted poverty rate is higher in rural compared to urban areas. This is contributed by the fact that, on average, rural households have a higher share of smokers among their members (20.83%) compared to urban households (18.99%). Households living in rural areas also allotted a bigger portion of their budget for tobacco consumption (rural 11.28% vs. urban 9.86%). Moreover, this also could be attributed to a higher share of smoking households in the rural area that fall into the near-poor category (24.86%), compared to 19.19% in the urban area.

The findings from this study reveals the impact of tobacco use on poverty is mainly contributed by the significant resources diverted to direct tobacco spending. Thus, this study supports more robust tobacco control policies to effectively reduce tobacco consumption in Indonesia. Moreover, the tobacco impoverishing effect is more prevalent among rural population as they have higher smoking rate. This study finds suggestive evidence that high tobacco use in rural area is contributed by affordability as smokers consume cheaper brands. Therefore, cigarette affordability and price variability across brands should be reduced to reduce smoking. Lastly, to accurately reflect a household's well-being, welfare measures using a household's expenditure should account for wasteful spending associated with tobacco use.

1

INTRODUCTION

1.1 Background

With a high smoking rate, spending on tobacco accounts for a significant share of the household budget in Indonesia. Global Adult Tobacco Survey (2021) found that around 34.5% of the adult population in the country used tobacco with six out of ten households reporting expenditure on tobacco products[1,2]. Smoking households divert a significant share of resources to tobacco, where around 11% of the monthly budget is used to buy cigarettes and other tobacco products—larger than the allocation for staples (9.7%) or meat (6.5%)[2]. This figure is consistently high across income groups, including the poor and near-poor families, which on average spend 9.2% and 10.4% of their budget on tobacco, respectively. Moreover, tobacco spending in Indonesia is substantially larger than that of China (6.5%) and India (2.9%), which also have a significant smoking population[3,4].

Tobacco consumption is deemed as wasteful and unproductive spending as it diverts household resources from essential commodities such as food, education, healthcare, and housing[2,5]. This is particularly the case for low-income families who are resource-constrained[6,7]. In addition, cigarette consumption increases vulnerability to developing chronic diseases which subsequently raise a household's medical costs while decreasing one's quality of life and productivity[8]. Furthermore, smoking increases the risk of premature death of breadwinners in poor households which leads to a loss of income that supports the entire family[5,8].

While tobacco spending is arguably a forgone resource, it is typically counted as a part of total household expenditure. This would distort the expenditure data as tobacco spending inflates the total expenditure, which does not reflect the actual resources spent on non-tobacco commodities. Consequently, headcount poverty estimation using the distorted household expenditure would not reflect the actual poverty rate. This is because smoking households might have expenditures above the poverty line—categorized as non-poor, while in fact, their expenditure for non-tobacco commodities might be below the poverty line, and therefore should be counted as poor households. The gap between the official number of poor populations and number of poor populations accounting for direct tobacco expenditure and healthcare cost of smoking reflects the impoverishing effect of tobacco use which reveals the actual number of poor populations.

Previous studies have investigated the de facto number of people who lived under the poverty line after accounting for tobacco use. A study in India found 15 million people had a similar expenditure as those living under the poverty line when the tobacco expense was excluded[7]. Meanwhile, another study estimated that nearly 12.1 million of China's population would have fallen into poverty when smoking-attributable medical spending deducted from household income[9]. In addition, 41.8 million of China's population fell under the poverty line when the direct spending on cigarettes has taken out from the total spending[9].

This research aims to quantify the impoverishing effect of tobacco spending, which considers the direct spending on tobacco and healthcare costs attributed to smoking as wasteful expenditure. As the majority of Indonesian families allocate a significant share of the budget for tobacco, it is expected that a substantial number of the population would fall below the poverty line had the wasteful expenditure associated with tobacco use taken out from household expenditure. The number of poor populations after accounting for tobacco use serves as credible evidence of the true cost of smoking where millions of people have actually lived below the poverty line but have not been accounted for in the current statistics. Such evidence is expected to support the improvement of tobacco control policy in the country, particularly to reduce tobacco use and mitigate the adverse impact of tobacco use on low-income households.

2
SMOKING AND POVERTY IN INDONESIA

2.1 Indonesia's smoking-related statistics

Indonesia has one of the largest active smokers in the world, with over 70.2 million tobacco users in 2021, only behind China and India. Global Adult Tobacco Survey (2021) shows that 34.5% of Indonesia's adult population currently uses tobacco, a relatively insignificant drop from 36.1% in 2011[1]. This means that accounting for population growth, there were 8.8 million more adult smokers in 2021 compared to what it was in 2011. Smoking in Indonesia is significantly more prevalent among males, with 65.5% of men using tobacco in 2021, while tobacco use among females is 3.3%[1].

With a relatively high smoking rate, most of Indonesia's households reported spending on tobacco products. Figure 1 shows that according to the National Socioeconomic Survey (Susenas), 6 out of 10 families in Indonesia consume tobacco, and the figure shows insignificant changes over the period 2018 to 2021. The figure also presents that smoking prevalence among the population aged 15 years or older is around 29%. It is noteworthy to acknowledge that smoking prevalence derived from Susenas is typically lower than WHO's smoking rate estimates, about 34%.

Figure 1. Smoking prevalence (2018 -2021)

	2018	2019	2020	2021
Smoking of household with tobacco spending	63.76%	63.11%	62.55%	63.07%
Smoking prevalence (15+years old)		29.03%	28.69%	28.96%
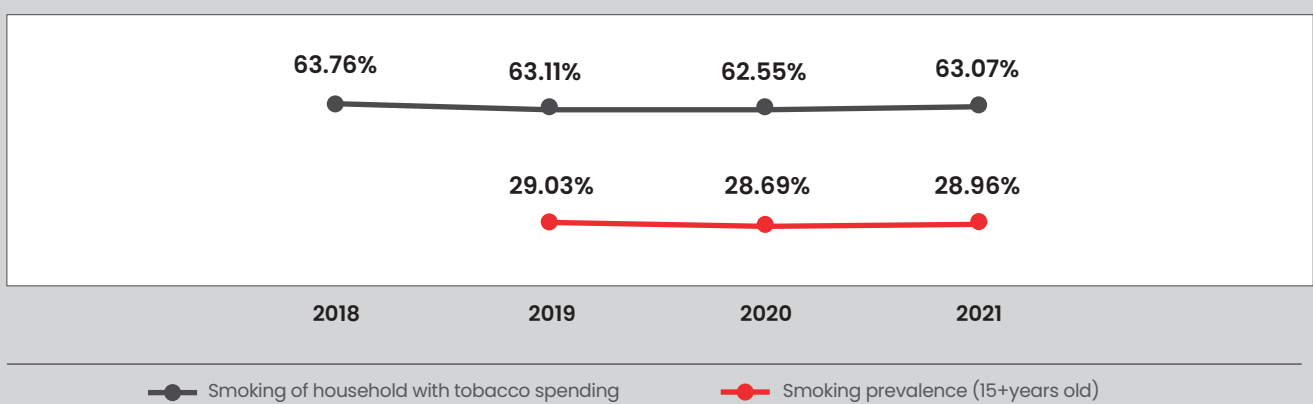
Source: Susenas (March) 2018-2021. **Notes:** Smoking prevalence is unavailable in Susenas 2018.

To provide more context on tobacco use in Indonesia, Figure 2 illustrates the number of households that reported spending on tobacco products. In 2021, 47.7 million out of 75.6 million households (63.1%) allocated a portion of their monthly budget to tobacco, mainly to buy cigarettes. The were over 184.5 million people lived in those tobacco-spending households which accounted around 67.9% of the total populations. This indicates that a considerable share of the population could be adversely affected by a diversion of household resources to tobacco. Evidence has shown that tobacco expenditure among Indonesian households crowds out the budget share allocated to other commodities, including food, housing, clothing, education, and healthcare[10,11]. Consequently, individuals, particularly children living in smoking households, have lower outcomes, such as lower protein intake, higher odds of stunting, and lower cognitive scores than those living in non-smoking households[12–14].

Figure 2. Number of tobacco spending households (2018 -2021)

Legend:
- Total households (million)
- Households with tobacco spending (million)
- Total populations (million)
- Populations living in tobacco-spending households (million)
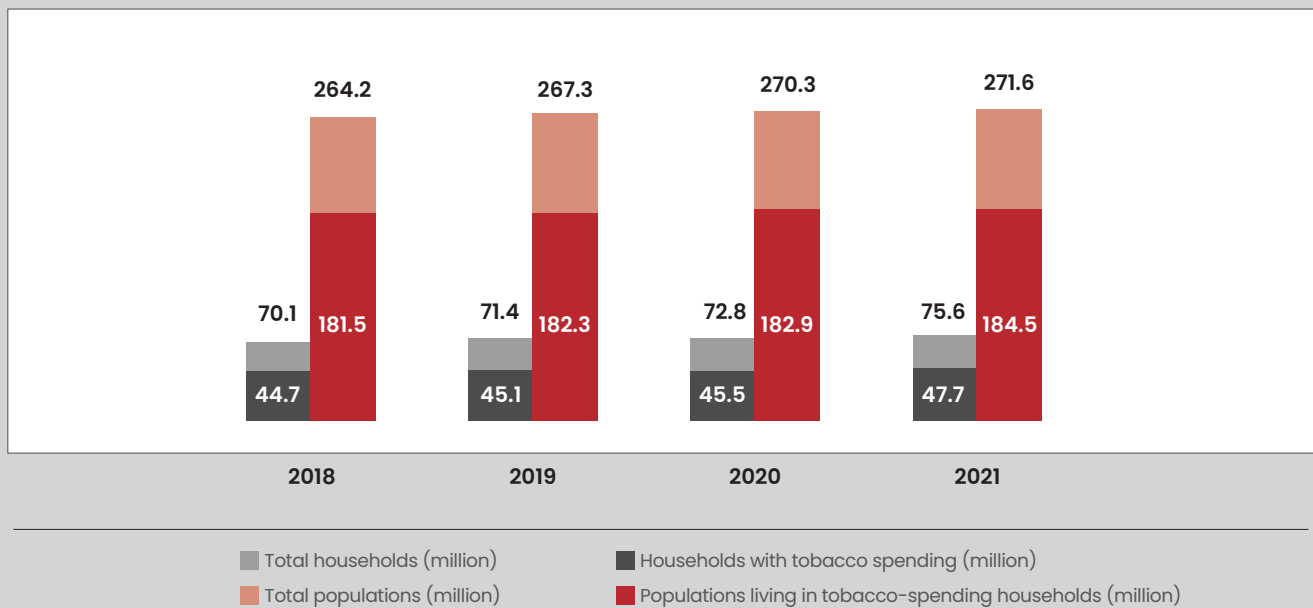
Source: Susenas (March) 2018-2021.

Tobacco-consuming households in Indonesia divert a significant share of their budget to tobacco. Figure 3 shows that smoking households, on average, allocate 11% of monthly expenditure for tobacco, which is quite significant as it is higher than the allocation for staples (9.7%), vegetables and fruit (7.4%), or meat (6.5%). Moreover, the budget share allotted for tobacco in Indonesia is significantly higher compared to that of other countries such as China (6.5%), India (2.9%), Pakistan (2.7%), and Vietnam (1.92%)[3,4,15,16]. Figure 3 also shows that smoking households typically allocate 1.3% to 1.6% of their budget on healthcare spending.

Figure 3. Tobacco and healthcare expenditure among the tobacco-spending households (2018 -2021)

	Per capita tobacco expenditure (2018 price)	Share of tobacco expenditure
	Per capita healthcare expenditure (2018 price)	Share of healthcare expenditure
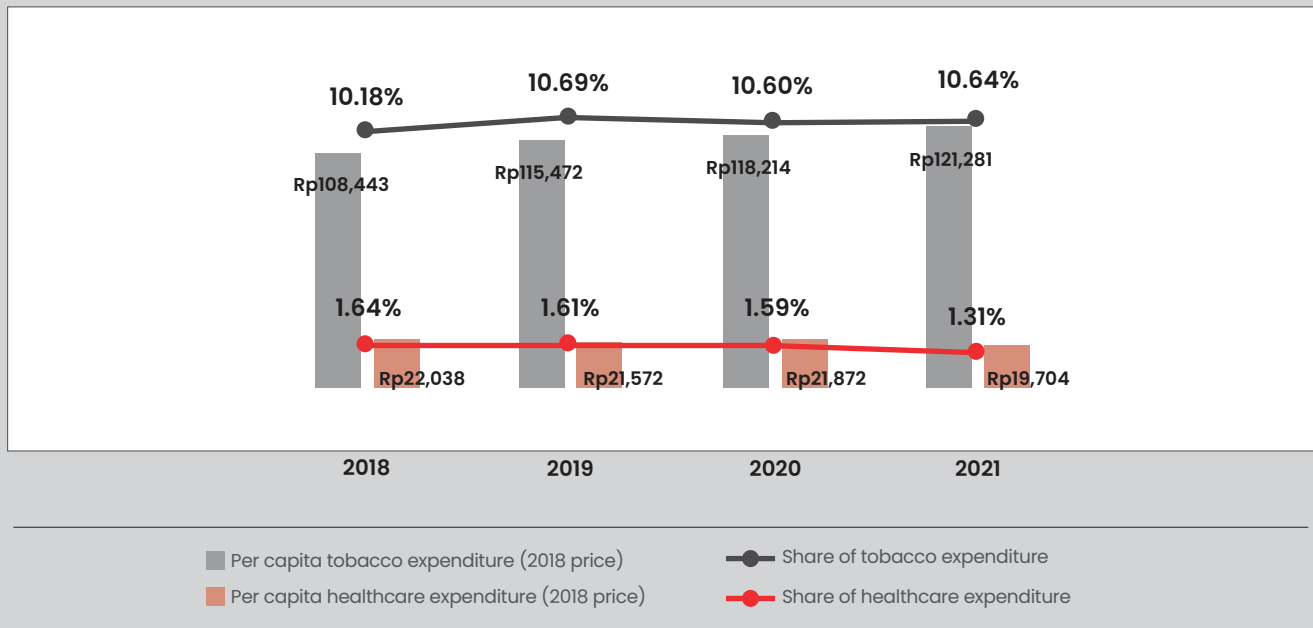
Source: Susenas (March) 2018-2021.

Table 1 shows that smoking prevalence is relatively high across the income groups, where more than half of the households have some spending on tobacco. Smoking among middle-income households is slightly higher compared to low earners (poor and near-poor) and top-income households. For instance, 67% of middle-income households reported spending on tobacco products, which is higher compared to poor households (61.7%), near-poor (66.5%), and high-income households (57%).

The amount of money spent on tobacco rises as households become wealthier. Poor households, on average, spend Rp32,081 per capita on tobacco products monthly, while near-poor families spend Rp55,559 and the top earners devote Rp195,569 to tobacco. Relative to the total expenditures, households

allocate 9% to 11% of their budget for smoking, with no significant differences across the income groups. Poor households, on average, divert 9.2% of their budget to smoking. The figure is slightly higher among near-poor households (10.4%) and middle-income families (11.2%), while the top-income households spend almost 10% on tobacco.

The relatively high share of household budget allocated for cigarettes across the income groups indicates that smoking households tend to divert a significant share of the budget to buy cigarettes, not only among the poor and non-poor but also among middle- and high-income families. Further analysis not shown in the table suggests that higher-income smokers tend to consume a higher quantity of cigarettes and opt for more expensive brands than low-income smokers.

	Overall	**Poor** (PCE<PL)	**Near-poor** (PL ≤ PCE < 1.5PL)	**Middle- income** (1.5PL ≤ PCE < 3PL)	**High- income** (PCE ≥ 3PL)
Table 1. Smoking-related statistics across the poor and non-poor households					
Smoking prevalence (15+ years old)*	28.90%	25.78%	28.56%	30.52%	27.82%
Share of households with tobacco spending	63.12%	61.73%	66.49%	67.04%	56.97%

Among the tobacco-spending households:

	Overall	**Poor**	**Near-poor**	**Middle- income**	**High- income**
Per capita tobacco expenditure (in 2018 price)	Rp73,184	Rp32,081	Rp55,559	Rp101,213	Rp195,596
Share of tobacco expenditure out of total household spending	10.53%	9.19%	10.39%	11.22%	9.99%
Average number of smokers in the household*	0.79	0.79	0.84	0.85	0.69
Household size	3.70	5.00	4.55	4.02	3.36
Per capita healthcare expenditure (in 2018 price)	Rp28,580	Rp3,346	Rp5,489	Rp13,307	Rp46,820
Share of healthcare expenditure out of total household spending	1.78%	0.98%	1.04%	1.46%	2.10%

Source: Susenas (March) 2018-2021. * indicates statistics are only derived from Susenas 2019-2021 as Susenas 2018 did not ask the smoking status of the household member. PCE is a household's per capita monthly expenditure. PL is the poverty line.

Table 1 also presents that lower-income households, on average, have larger family members relative to the higher earners. The average household size of a poor tobacco-spending household is 5 persons, where on average, 1 in 5 of them is a smoker. Meanwhile, the household size is slightly smaller for the near-poor household at 4.5, 4 persons for middle-income households, and 3.4 for the top income household. Lower-income families also allocate a smaller share of their budget for healthcare compared to high income families, where poor households, on average, spend a shy of 1% for healthcare.

2.2 Poverty in Indonesia

Indonesia's poverty headcount rate has declined in the last decades, from 19.14% in 2000 to 12.49% in 2011, and reached an all-time low in 2019 with a 9.41% population living below the poverty line. Nevertheless, Figure 4 shows that poverty has increased in 2020 to 9.78% and has risen further to 10.14% in 2021, which was attributed to reduced household income during the COVID-19 pandemic[17]. With a 10.14% poverty rate in 2021, there were 27.5 million people across 6.14 million households in Indonesia lived below the poverty line.

Figure 4. Indonesia's poverty rate (2011 - 2021)

Source: Statistics Indonesia and Susenas (March) 2018-2021.

Disaggregating the poverty headcount rate by household's smoking status, Figure 4 shows that, on average, poverty is lower among those who live in tobacco-spending households compared to those who live in non-smoking households. In 2021, poverty among individuals living in smoking families was 9.96%, lower than the 10.54% poverty rate for the non-smoking households. The lower poverty rate among smoking families could be attributed to the fact that tobacco expenditure, which takes up 11% of the household budget, distorts the per capita expenditure (PCE), putting them above or slightly above the poverty line.

Furthermore, Figure 5 shows a higher share of individuals living in tobacco-spending households falls into the near-poor category—those whose PCE is equal to or above the poverty line but less than 1.5 of the poverty line—compared to those living in non-smoking families. The near-poor populations are particularly vulnerable to falling below the poverty line, especially when the PCE is subtracted to adjust for direct tobacco spending and healthcare cost attributed to smoking. Therefore, we would expect that the poverty rate among the tobacco spender, and hence poverty for the overall population, would have increased had tobacco spending excluded from the household PCE.

Figure 5. Share of the poor and near-poor populations disaggregated by household's smoking status

	Poor (PCE < PL)	Near-poor (PL ≤ PCE < 1.5PL)	Middle-income (1.5PL ≤ PCE < 3PL)	High-income (PCE ≥ 3PL)
Population living in tobacco-spending households	9.64%	21.86%	42.79%	25.70%
Population living in the households without tobacco expenditure	10.10%	18.78%	36.28%	34.84%

Legend:
- Poor (PCE < PL)
- Near-poor (PL ≤ PCE < 1.5PL)
- Middle-income (1.5PL ≤ PCE < 3PL)
- High-income (PCE ≥ 3PL)

Source: Susenas (March) 2018-2021.

3
METHOD
AND DATA

3.1 Data

This study employs Indonesia's National Socioeconomic Survey (Susenas) from 2018 to 2021. The survey is conducted twice a year, in March and September, collecting information on the household's socioeconomic characteristics, including household expenditure for food, non-food, and tobacco. We use the March survey as it has a larger sample than the September round. The March survey typically comprises 290,000 to 340,000 household samples representing population up to the district level. It is worth noting that Statistics Indonesia employs Susenas both for March and September rounds to construct the official poverty line and the poverty rate. We use Susenas's household expenditure data to replicate the official poverty rate and estimate the poverty rate after adjusting for tobacco expenditure and tobacco-attributed healthcare cost.

3.2 Poverty measurement in Indonesia

Indonesia's s poverty rate is estimated based on the number of populations in province j and region k (urban or rural) whose monthly per capita expenditure (PCE) is below the poverty line for that area (z_{jk}). PCE is total household expenditure divided by the household's size. There are 67 poverty lines in Indonesia as each of the 33 provinces has both urban and rural poverty lines, while one province—DKI Jakarta—only has an urban poverty line.

Indonesia's poverty lines are constructed based on the basic needs approach, which consists of food and non-food poverty line[18]. The food poverty line is the sum of expenditures required to buy food items equal to 2100 calories per day. It should be noted that spending on *kretek* (clove flavoured cigarettes) is also included in calculating the food poverty line, although it has zero calories. In fact, *kretek* is the second biggest commodity that contributes to the poverty line (11%) after spending on rice (24%)[19]. On the other hand, the non-food poverty line is the minimum expenditure required for essential non-food goods and services such as housing, clothing, healthcare, education, and other basic non-food commodities[18].

On average, the urban poverty line is higher than the rural poverty line. For instance, the national average of urban poverty line in 2021 (March) was Rp489,848, while the rural poverty line was Rp450,185. The contribution of the food poverty line to the overall poverty line is higher for rural areas (76.5%) than in urban areas (72.2%). The variation of poverty lines across provinces ranges from 0.75 to 1.70 to the national average, which reflects spatial variation in price and consumption patterns.

3.3 Calculating the tobacco-adjusted poverty rate

The impoverishing effects of tobacco expenditure are calculated by comparing the number of people living below the poverty line before and after subtracting households' PCE with tobacco spending and tobacco-attributable healthcare spending (See Equation 1-3). This approach follows the previous research in India, which has been adopted in the toolkit for economic research on tobacco control[5,7].

$$P_{jk}^0 = \frac{1}{N_{jk}} \sum_{i=1}^{N_{jk}} I(x_i < z_{jk}) \qquad \text{Equation 1}$$

$$P_{jk}^1 = \frac{1}{N_{jk}} \sum_{i=1}^{N_{jk}} I([x_i - t_i - h_i] < z_{jk}) \qquad \text{Equation 2}$$

$$E_{jk} = (P_{jk}^1 - P_{jk}^0) N_{jk} \qquad \text{Equation 3}$$

P^0 is the official poverty rate, while P^1 and E are the poverty rate and the number of poor populations after subtracting tobacco spending and tobacco-attributable healthcare spending, respectively. N_{jk} is the total population of province j region k, x_i is household's monthly per capita expenditure, and z_{jk} is the poverty line for province j region k. $I(.)$ is a function with a value of 1 if x_i or $x_i - t_i - h_i$ is less than z_{jk}, and value 0 if otherwise.

t_i is per capita tobacco expenditure, the total household spending on cigarettes and other tobacco products divided by household size. Meanwhile, h_i denotes per capita tobacco-attributable healthcare spending, which refers to the share of healthcare spending attributed to tobacco use. Therefore, parameter t_i and h_i are only relevant for tobacco-consuming households, and their value is zero for non-smoking households.

The portion of healthcare spending attributed to smoking is known as the smoking-attributable fraction (SAF). There are two main approaches to estimating the SAF: econometric and epidemiological approach[20]. The econometric approach requires extensive nationally representative individual-level data on smoking history, healthcare expenditure, medical condition, health status, health-seeking behavior, and other socioeconomic information. The annual healthcare expenditure is predicted for all individuals using a series of structural equation models. Then predicted smokers' healthcare spending is compared to non-smokers' to determine the excess healthcare spending of the smokers. Finally, the excess healthcare spending for the smokers is divided by the total healthcare cost of all individuals to obtain the SAF.

The second method is the epidemiological approach, where mortality or healthcare cost of smoking is estimated based on a specific formula. Unlike the econometric approach, this method only requires aggregate data on smoking prevalence and relative risk of mortality or relative risk of having tobacco-related disease among smokers compared to non-smokers. Due to data availability, we cannot estimate the SAF using an econometric approach or SAF for disease-specific approach. This is because the individual-level data in Indonesia do not provide adequate health-related information, particularly on tobacco-related diseases. Therefore, we estimate the SAF using an inclusive epidemiological approach following a previous study in India[7].

$$SAF = \frac{PE\,(RR-1)}{PN + PE\,(RR)} \qquad \text{Equation 4}$$

Equation 4 illustrates the formula to estimate the SAF. PN refers to the percentage of the population who never consumed tobacco, while PE is the percentage of the population who consumed tobacco. Based on Susenas in 2017, 70.75% of Indonesia's population aged 15 years and older never consumed tobacco, while the rest, 29.25%, consumed tobacco products. RR is the relative risk of all-cause death between the smoking and non-smoking population. We use RR for all-cause death (inclusive) and not disease-specific RR for two main reasons. First, RR for all-cause death reflects the impact of tobacco use on all types of medical expenditure and goes beyond the expenses on tobacco-related diseases. Second, RR for tobacco-disease specific is unavailable in Indonesia. Based on a recent study, the RR for all-cause death in Indonesia is 1.48[21]. Applying relevant parameters to Equation 4, we estimate the SAF for Indonesia is 12.31%, meaning that 12.31% of healthcare spending by the smoking households could be attributed to tobacco use.
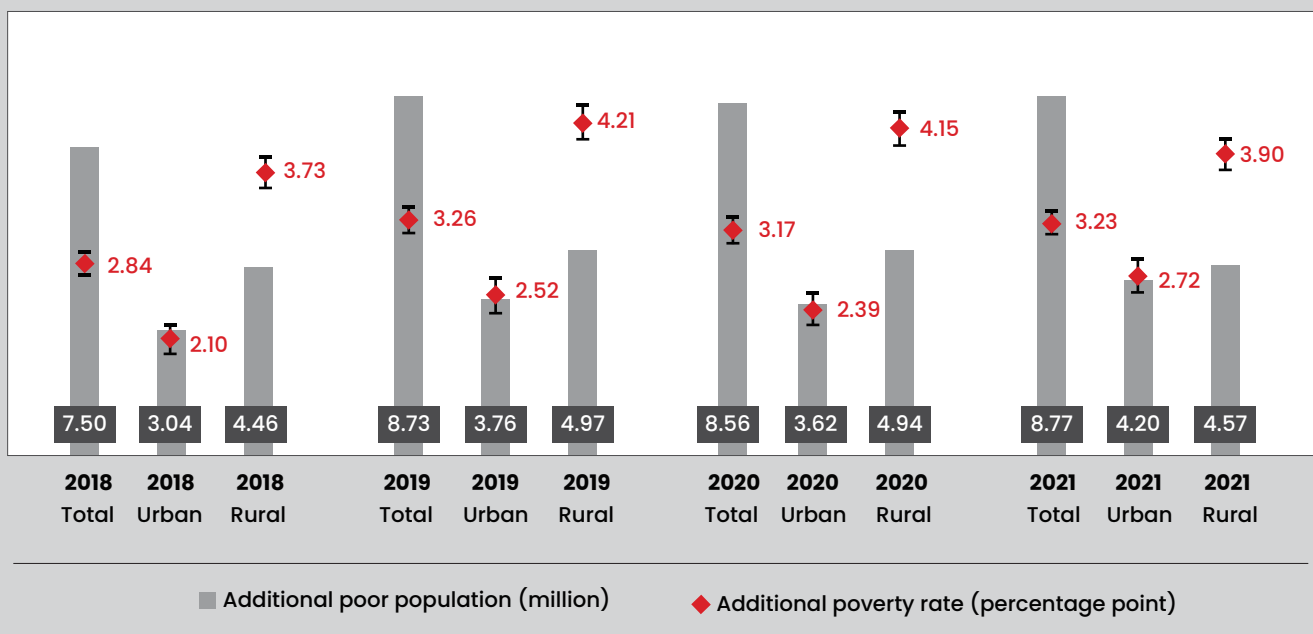
4
RESULT

4.1 Tobacco-adjusted poverty rate

Subtracting the direct tobacco spending and healthcare cost attributed to smoking from a household's total expenditure would have two significant consequences. First, it would reduce the total spending among the tobacco-spending households, which might pull them to fall below the poverty line. This is particularly the case for the near-poor households whose per capita expenditure (PCE) is slightly above the poverty line. Second, the tobacco-adjusted PCE would show the undistorted PCE as it reflects the number of resources allotted for non-tobacco goods and services by the smoking households.

Figure 6 illustrates the additional poverty headcount rate if the PCE of the smoking households is adjusted for the direct tobacco spending and healthcare cost due to smoking. The figure shows that the poverty rate would increase by 3.23 percentage points (pp) in 2021 from the official estimate of 10.14% to 13.37%, equivalent to putting an additional 8.77 million people (1.89 million households) in poverty. Estimates for 2019 and 2020 are relatively similar, with the poverty rate increasing by 3.26 pp (2019) and 3.17 pp (2020), affecting over 8.73 and 8.56 million people, respectively. Meanwhile, the estimate for 2018 is lower, with the headcount of poverty rising by 2.84 pp, putting 7.49 million people from 1.57 households into poverty.

Figure 6. Tobacco-adjusted poverty rate (2018 –2021)

2018 Total	2018 Urban	2018 Rural	2019 Total	2019 Urban	2019 Rural	2020 Total	2020 Urban	2020 Rural	2021 Total	2021 Urban	2021 Rural
7.50	3.04	4.46	8.73	3.76	4.97	8.56	3.62	4.94	8.77	4.20	4.57

Additional poverty rate (percentage point): 2.84 (2018 Total), 2.10 (2018 Urban), 3.73 (2018 Rural), 3.26 (2019 Total), 2.52 (2019 Urban), 4.21 (2019 Rural), 3.17 (2020 Total), 2.39 (2020 Urban), 4.15 (2020 Rural), 3.23 (2021 Total), 2.72 (2021 Urban), 3.90 (2021 Rural)

■ Additional poor population (million)   ◆ Additional poverty rate (percentage point)

Source: Susenas (March) 2018-2021. **Notes:** The complete data is provided in Table A1-A3 in the Appendix.

This analysis shows that additional poverty is higher among the rural population compared to the urban population in terms of percentage and number of people. For instance, accounting for wasteful spending of tobacco use, the poverty among the rural population in 2021 would increase by 3.90 pp from 13.10% to 17% affecting 4.57 million people from over 998 thousand households. Meanwhile, the additional urban poverty rate is lower at 2.72 pp from 7.89% to 10.61%, impacting 4.19 million individuals. Over the observed years, additional poverty accounting for tobacco spending is consistently higher for the rural population compared to its urban counterparts.

Figure 7. Impact of tobacco expenditure and smoking-attributable healthcare cost on the poverty rate
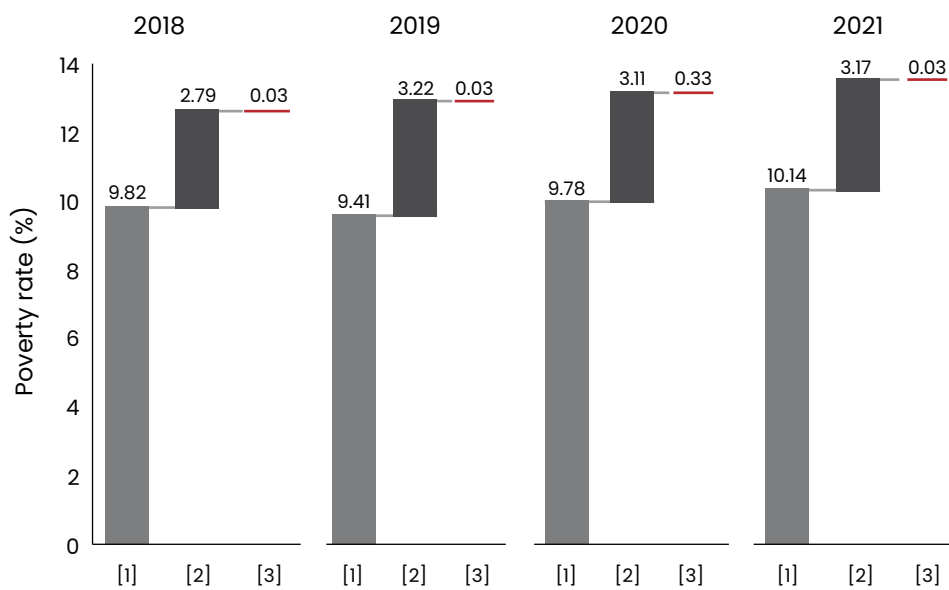
[1] Official poverty rate
[2] Additional poverty due to direct tobacco spending
[3] Additional poverty due to smoking-attributable healthcare spending

Source: Susenas (March) 2018-21. **Notes:** Additional poverty in [2] and [3] are computed individually. Due to survey weight, the summation of [2] and [3] does not necessarily equal to the additional poverty rate (pp) as shown in Figure 6. For instance, in 2021, 3.17 + 0.03 = 3.20, which is less than 3.23, the additional poverty rate when both [2] and [3] are deducted from household's PCE.

The additional poverty rate is mainly driven by direct tobacco spending rather than tobacco-attributable healthcare spending. This is because the former accounts for a significant share of a household's budget (11%) compared to smoking-related healthcare, which only takes up 0.22% of the household's budget[1]. Figure 7 shows that adjusting for foregone resources due to tobacco spending, the poverty rate in 2021 would rise by 3.17 percentage points (pp) from 10.14% to 13.31%. On the other hand, accounting for the foregone budget due to healthcare costs associated with smoking, the poverty rate would only increase by 0.03 pp. The estimate is relatively consistent over the period 2018-2021, where healthcare costs due to smoking on average would increase the headcount poverty rate by 0.03 pp, while direct tobacco spending would drive up the poverty rate by 2.79 to 3.22 pp.

[1] The average share of a household's healthcare cost is 1.78%, since the SAF shows that 12.31% of the healthcare spending could be attributed to tobacco consumption, the smoking-attributable healthcare spending is 12.31%*1.78%, which equals to 0.219%.
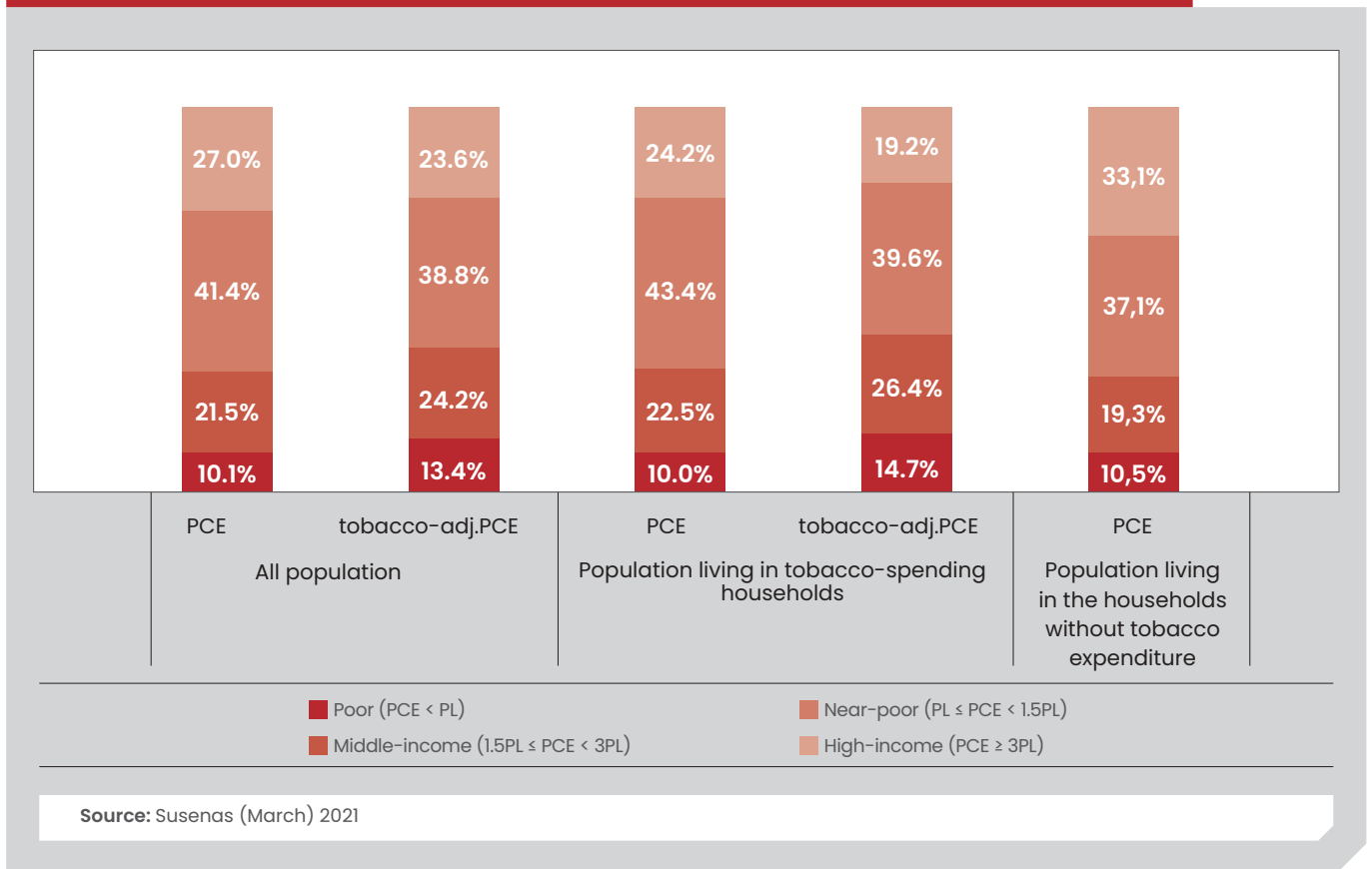
4.2 The dynamic of tobacco-adjusted poverty

Figure 8 shows the distribution of poor, near-poor, middle-income, and high-income populations in 2021. As mentioned earlier, subtracting direct tobacco spending and tobacco-attributed healthcare costs from a household's PCE would increase the poverty rate for the overall population by 3.23 pp from 10.14% to 13.37%. Furthermore, the share of the near-poor population also rises from 21.5% to 24.2%. On the other hand, the percentage of middle-income and higher-income people reduces. Before accounting for tobacco, 27.0% and 41.4% of the population belong to the high-income and middle-income groups, respectively. However, after adjusting for tobacco spending, the share of high-income drops to 23.6%, while middle-income reduces to 38.4%.

Figure 8. Share of poor and non-poor populations before and after adjusting for tobacco spending (2021)

Legend:
- Poor (PCE < PL)
- Near-poor (PL ≤ PCE < 1.5PL)
- Middle-income (1.5PL ≤ PCE < 3PL)
- High-income (PCE ≥ 3PL)

Source: Susenas (March) 2021

Disaggregating the figures based on household's smoking status, i.e., tobacco-spending households or non-spender households, the dynamic changes of poor and non-poor categories only occur among the population living in tobacco-spending households (Figure 8). The poverty rate for individuals living in tobacco-spending ho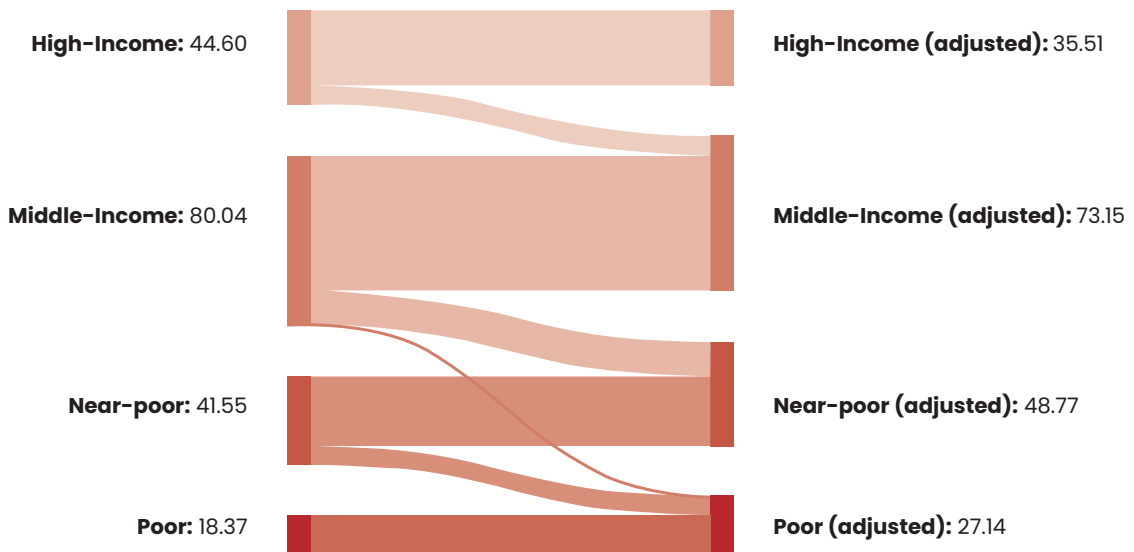useholds increases from 10% to 14.7%, while the share of the near-poor population rises from 22.5% to 26.4%. Meanwhile, there is no change among the non-smoking households as they do not have tobacco expenditure and tobacco-attributable healthcare costs. Therefore, their PCE is unchanged as it already reflects the actual expenditure, undistorted by tobacco spending.
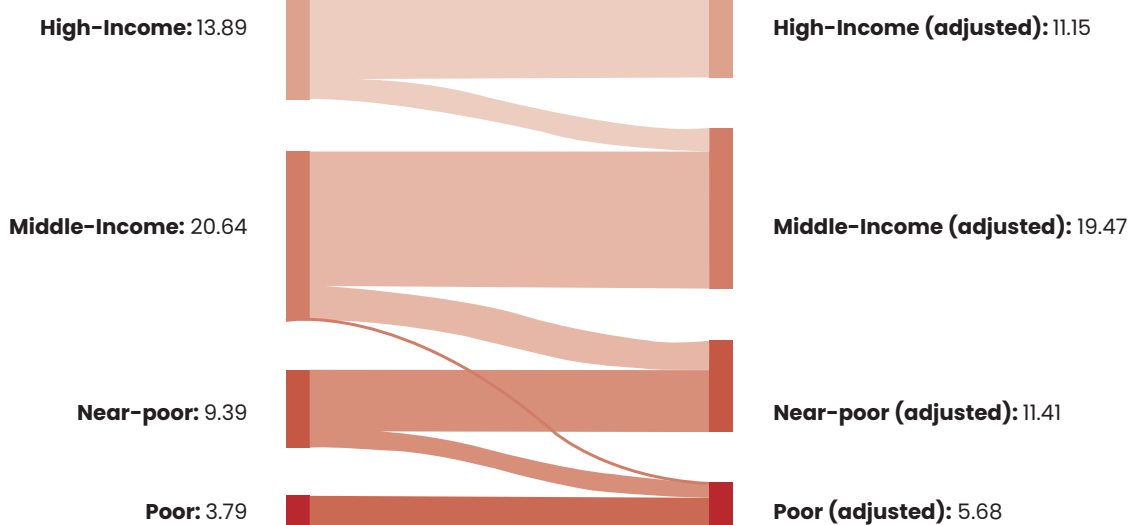
Looking at the dynamic transition in terms of number populations, Figure 9 shows that the number of poor populations in 2021 increased by 8.76 million people (1.89 million households), of whom around 8.71 million people were previously near-poor and about 60 thousand belonged to the middle-income group. The figure also shows that near-poor populations increased by 7.21 million people (2.01 million households) who previously belonged to the middle-income group. On the other hand, the middle-income populations are reduced by 6.89 million people (1.17 million households). At the same time, the high-income group dropped by 9.09 million people (2.74 million households).

Figure 9. The dynamic of poor populations after adjusting for tobacco spending (2021)

High-Income: 44.60 → High-Income (adjusted): 35.51

Middle-Income: 80.04 → Middle-Income (adjusted): 73.15

Near-poor: 41.55 → Near-poor (adjusted): 48.77

Poor: 18.37 → Poor (adjusted): 27.14

Number of populations living in tobacco-spending households (million)

High-Income: 13.89 → High-Income (adjusted): 11.15

Middle-Income: 20.64 → Middle-Income (adjusted): 19.47

Near-poor: 9.39 → Near-poor (adjusted): 11.41

Poor: 3.79 → Poor (adjusted): 5.68

Number of tobacco-spending households (million)

Source: Susenas (March) 2021. **Notes:** Poor (PCE<PL), Near-poor (PL ≤ PCE < 1.5PL), Middle-income (1.5PL ≤ PCE < 3PL), High-income (PCE ≥ 3PL).
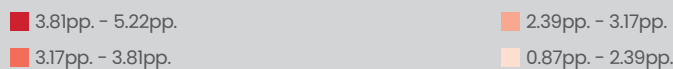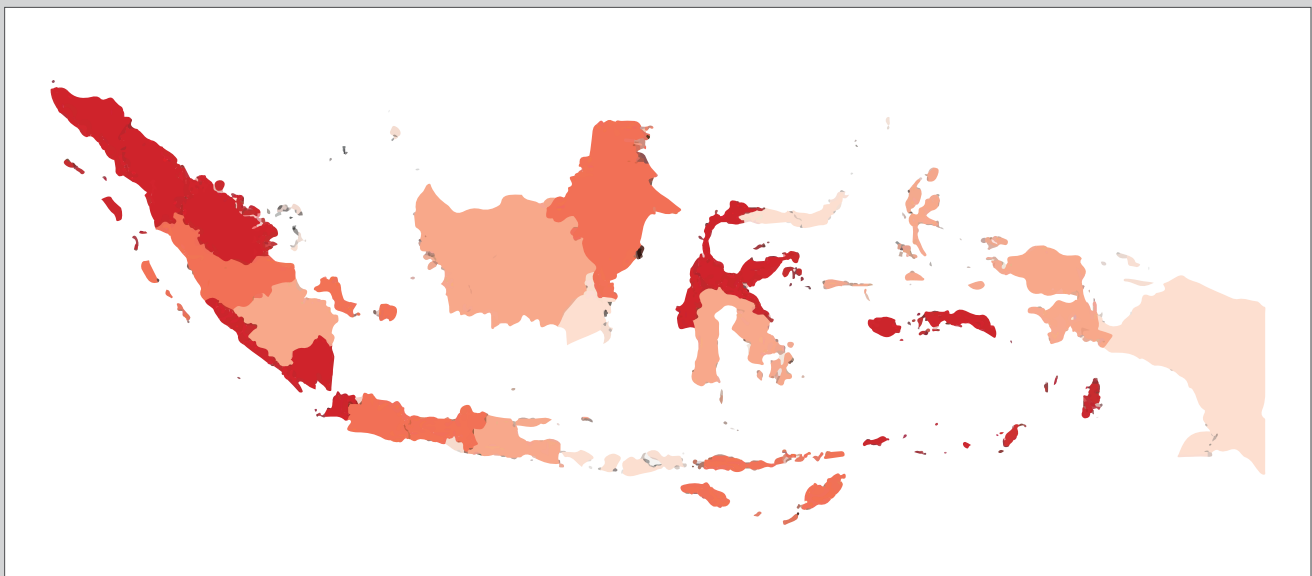
4.3 Tobacco-adjusted poverty across provinces

Spatial analysis shows heterogeneity in the tobacco-adjusted poverty rate across Indonesia's 34 provinces (Figure 10). Central Sulawesi has the highest increase in poverty headcount rate in 2021 with a 5.22 pp increase from 13% to 18.22%, putting 162,249 more populations in that province into poverty. The second and third provinces with the highest increase in poverty rate are West Sulawesi and Lampung, with a 4.87 pp and 4.71 pp increase in the headcount poverty rate, respectively. Meanwhile, the lowest increase in poverty is observed in Bali, with only a 0.88 pp increase in the headcount rate, from 4.53% to 5.40% affecting 38,598 populations. Other provinces with the lowest poverty increase are Gorontalo and West Nusa Tenggara, with a 1.3 pp and 1.39 pp increase in the headcount poverty rate, respectively.

Figure 10. Additional poverty rate after adjusting for tobacco spending across the province (2021)

- 3.81pp. – 5.22pp.
- 3.17pp. – 3.81pp.
- 2.39pp. – 3.17pp.
- 0.87pp. – 2.39pp.

Source: Susenas (March) 2021. **Notes:** The complete data is provided in Table A4 in the Appendix.

Further analysis shows that adult smoking prevalence in the province is moderately correlated (r=0.486) with the tobacco-adjusted headcount poverty rate (Figure 11). Meanwhile, the share of the near-poor populations in the province is strongly correlated with the additional poverty with a correlation coefficient of 0.789.

Figure 11. Correlation of smoking prevalence and share of the near-poor population with the additional poverty rate across the province (2021)
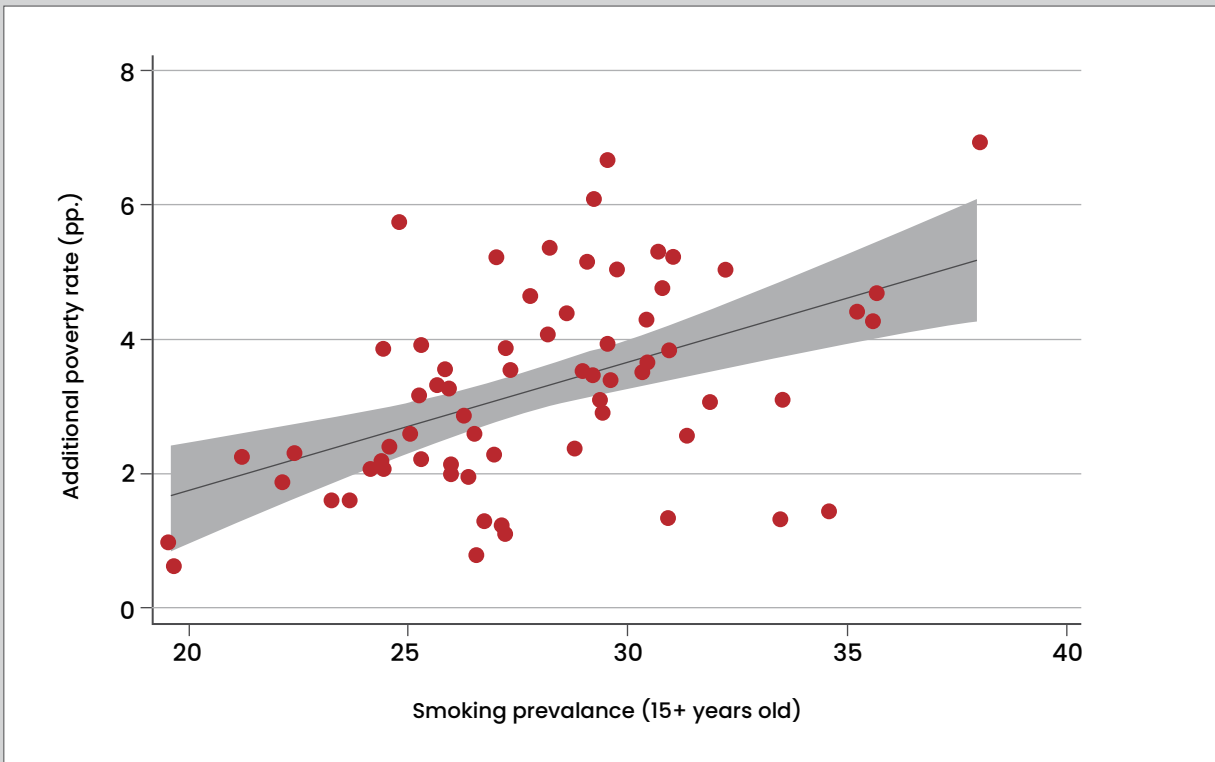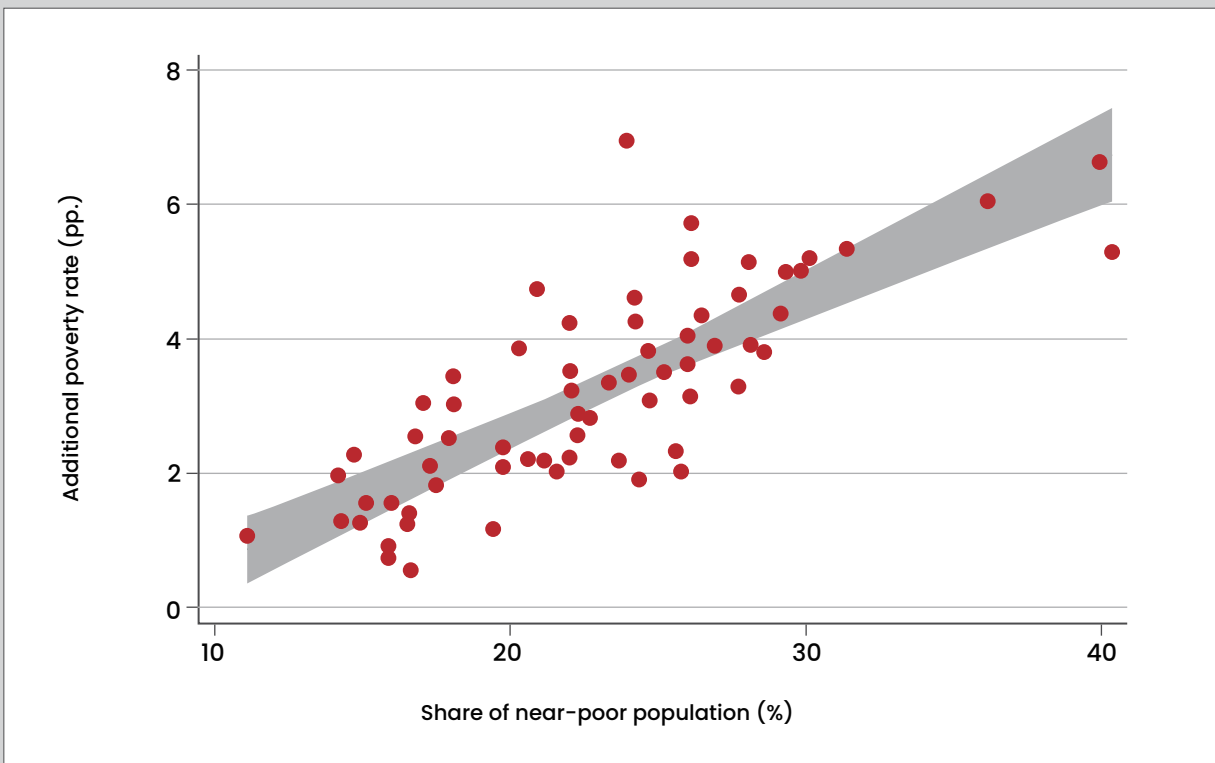
Source: Susenas (March) 2021. **Notes:** Each dot represents the region (rural or urban) for each province

5
DISCUSSION AND CONCLUSION

This research aims to quantify the impoverishing effect of tobacco consumption, which considers the direct spending on tobacco and healthcare costs attributed to smoking as wasteful spending and therefore is excluded from the household expenditure. This study found that the headcount poverty rate in Indonesia would rise by 2.84 to 3.26 percentage points, affecting 7.5 million to 8.77 million people. This indicates that a significant number of the population would have been categorized as poor had the tobacco spending and tobacco-attributed healthcare costs been considered wasteful or foregone income. In other words, over 8.77 million people have the same spending as those who live below the poverty line, but they are not officially categorized as poor because tobacco spending inflates household expenditure, which puts them allegedly above the poverty line.

The analysis shows that the additional poverty is mainly driven by direct tobacco spending. This could be attributed because smoking households in Indonesia are spending a significant share of their budget on tobacco (11%), which is substantially higher compared to other countries such as China (6.5%) and India (2.9%), which also have a significant smoking population[3,4]. Poor households in Indonesia, on average, diverted 9.19% of the budget for tobacco; the figure is even higher for the near-poor household at 10.39%. This illustrates that instead of allocating the money for foods and necessities, low-income families waste over a tenth of their budget on tobacco products, which has been linked to lower spending on essential commodities, including foods, that may lead to poor diet quality[2,13,22].

This study reveals that the tobacco-attributable healthcare cost only contributes insignificantly to the additional poverty rate. This is because a relatively low share of healthcare spending among the smoking households which on average only accounts for 1.78% of the total budget. It should be noted that the relatively low healthcare spending shown in this study only reflects the current or short-run healthcare cost. Research have suggested that the healthcare cost of smoking would be higher over the longer period[23]. Therefore, the impoverishing effect of tobacco use due to increased healthcare costs would be more pronounced in the long run.

The tobacco-adjusted poverty rate is higher in rural compared to urban areas. This is contributed by the fact that smoking prevalence is higher among the rural population (30.8%) compared to urban's (27.5%). Therefore, rural households on average have a higher share of smokers among their members (20.83%) compared to urban households (18.99%). Households living in rural areas also allotted a bigger portion of their budget for tobacco consumption (rural 11.28% vs. urban 9.86%). This is partly driven by cigarette affordability where on average rural smokers paid a lower price per stick of cigarette (Rp970) compared to urban smokers who pay Rp1,050 per stick of cigarette (See Table A5). In addition, the higher tobacco impoverishing effects found among the rural population could also be attributed to a higher share of smoking households in the area that fall into the near-poor category (24.86%), compared to 19.19% in the urban area. Therefore, one would expect that the poverty rate would have increased higher in the rural area if tobacco spending were deducted from the household's PCE.

The finding from this study reveals the impact of tobacco use on poverty in which over 8.8 million people would have the same expenditure as the poor had the household expenditure adjusted for the wasteful spending attributed to tobacco use. As the impoverishing effect is mainly driven by direct tobacco spending, this study supports more robust tobacco control policies to effectively reduce tobacco consumption in Indonesia. Reduced cigarette spending would be beneficial to improve household welfare as it would free up resources allocated for essential goods and services[2,24].

Moreover, this research also finds suggestive evidence that high tobacco use among the rural population, which causes greater impoverishment, is partly driven by tobacco affordability, in which rural smokers tend to consume cheaper brands. Therefore, reducing cigarette affordability for all brands, and hence reducing cigarette price variation across brands is essential to reducing smoking in the country. Lastly, to accurately reflect a household's well-being, welfare measures using a household's expenditure should account for wasteful spending associated with tobacco use.

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Table A1. Tobacco-adjusted poverty on the overall populations

Poverty	2018			2019			2020			2021		
	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)
[1] Official estimate	9.82 (0.08)	25,949.8	5,652.1	9.41 (0.11)	25,144.7	5,377.9	9.78 (0.12)	26,424.0	5,672.6	10.14 (0.11)	27,542.8	6,137.8
[2] Accounting for tobacco expenditure	12.61 (0.10)	33,317.3	7,193.4	12.63 (0.14)	33,750.0	7,164.0	12.89 (0.13)	34,844.1	7,433.6	13.31 (0.13)	36,160.8	8,001.4
[3] Accounting for tobacco-attributable healthcare expenditure	9.84 (0.08)	25,996.9	5,660.8	9.43 (0.11)	25,215.4	5,391.2	9.80 (0.12)	26,503.0	5,689.2	10.17 (0.11)	27,614.2	6,153.2
[4] Accounting for [2] and [3]	12.66 (0.10)	33,445.5	7,220.3	12.67 (0.14)	33,871.0	7,189.7	12.94 (0.13)	34,985.0	7,465.3	13.37 (0.13)	36,308.1	8,037.1
[5] Additional poverty [4] – [1]	2.84 (0.05)	7,495.7	1,568.2	3.26 (0.06)	8,726.3	1,811.8	3.17 (0.06)	8,561.0	1,792.7	3.23 (0.06)	8,765.4	1,899.3

Table A2. Tobacco-adjusted poverty in urban populations

Poverty	2018			2019			2020			2021		
	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)
[1] Official estimate	7.02 (0.11)	10,144.4	2,164.6	6.69 (0.15)	9,994.8	2,080.6	7.38 (0.16)	11,162.0	2,350.0	7.89 (0.16)	12,176.6	2,692.7
[2] Accounting for tobacco expenditure	9.08 (0.13)	13,118.4	2,767.3	9.17 (0.18)	13,695.9	2,836.6	9.73 (0.19)	14,713.6	3,074.2	10.56 (0.18)	16,289.8	3,572.6
[3] Accounting for tobacco-attributable healthcare expenditure	7.03 (0.11)	10,160.0	2,167.4	6.72 (0.15)	10,031.6	2,087.7	7.41 (0.16)	11,204.4	2,358.2	7.92 (0.16)	12,221.3	2,702.1
[4] Accounting for [2] and [3]	9.12 (0.13)	13,179.7	2,781.1	9.21 (0.18)	13,753.5	2,848.1	9.78 (0.19)	14,783.5	3,089.8	10.61 (0.18)	16,373.4	3,593.5
[5] Additional poverty [4] - [1]	2.10 (0.07)	3,035.3	616.5	2.52 (0.09)	3,758.7	767.5	2.39 (0.08)	3,621.6	739.7	2.72 (0.08)	4,196.8	900.9

Table A3. Tobacco-adjusted poverty in rural populations

Poverty	2018			2019			2020			2021		
	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)	% (SE)	Population (x 1000)	Household (x 1000)
[1] Official estimate	13.20 (0.12)	15,805.4	3,487.5	12.85 (0.17)	15,149.9	3,297.3	12.82 (0.16)	15,262.1	3,322.6	13.10 (0.16)	15,366.2	3,445.2
[2] Accounting for tobacco expenditure	16.87 (0.14)	20,198.9	4,426.0	17.00 (0.20)	20,054.1	4,327.4	16.90 (0.19)	20,130.5	4,359.4	16.95 (0.19)	19,871.1	4,428.8
[3] Accounting for tobacco-attributable healthcare expenditure	13.23 (0.12)	15,836.9	3,493.4	12.87 (0.17)	15,183.8	3,303.6	12.85 (0.17)	15,298.6	3,330.9	13.13 (0.16)	15,392.9	3,451.1
[4] Accounting for [2] and [3]	16.93 (0.14)	20,265.9	4,439.2	17.06 (0.20)	20,117.5	4,341.6	16.96 (0.19)	20,201.5	4,375.5	17.00 (0.19)	19,934.7	4,443.6
[5] Additional poverty [4] – [1]	3.73 (0.08)	4,460.4	951.7	4.21 (0.09)	4,967.6	1,044.3	4.15 (0.08)	4,939.4	1,052.9	3.90 (0.08)	4,568.6	998.5

Table A4. Tobacco-adjusted poverty rate by province

Poverty headcount rate	2018				2019				2020				2021			
	Official estimate (%)	SE	Tobacco-adjusted (%)	SE	Official estimate (%)	SE	Tobacco-adjusted (%)	SE	Official estimate (%)	SE	Tobacco-adjusted (%)	SE	Official estimate (%)	SE	Tobacco-adjusted (%)	SE
INDONESIA	9.82%	0.08%	12.66%	0.10%	9.41%	0.11%	12.67%	0.14%	9.78%	0.12%	12.94%	0.13%	10.14%	0.11%	13.37%	0.13%
ACEH	15.97%	0.49%	19.94%	0.53%	15.32%	0.80%	20.56%	0.89%	14.99%	0.75%	19.04%	0.82%	15.33%	0.69%	19.14%	0.77%
NORTH SUMATERA	9.22%	0.32%	12.94%	0.37%	8.83%	0.39%	12.72%	0.49%	8.75%	0.38%	12.51%	0.45%	9.01%	0.38%	13.43%	0.47%
WEST SUMATERA	6.65%	0.37%	10.15%	0.44%	6.42%	0.50%	10.30%	0.66%	6.28%	0.41%	10.36%	0.56%	6.63%	0.46%	10.35%	0.54%
RIAU	7.39%	0.44%	10.26%	0.50%	7.08%	0.51%	10.71%	0.62%	6.82%	0.53%	9.64%	0.63%	7.12%	0.53%	10.96%	0.68%
JAMBI	7.92%	0.47%	11.28%	0.55%	7.60%	0.67%	10.60%	0.80%	7.58%	0.58%	11.68%	0.72%	8.09%	0.59%	11.73%	0.71%
SOUTH SUMATERA	12.80%	0.47%	15.80%	0.51%	12.71%	0.65%	16.45%	0.77%	12.66%	0.58%	16.47%	0.66%	12.84%	0.63%	16.00%	0.69%
BENGKULU	15.43%	0.67%	19.56%	0.73%	15.23%	0.90%	19.42%	1.03%	15.03%	0.80%	18.90%	0.93%	15.22%	0.79%	19.87%	0.91%
LAMPUNG	13.14%	0.48%	16.79%	0.53%	12.62%	0.68%	16.31%	0.74%	12.34%	0.64%	17.53%	0.71%	12.62%	0.60%	17.32%	0.73%
BANGKA BELITUNG ISLANDS	5.25%	0.51%	8.25%	0.63%	4.62%	0.52%	7.78%	0.76%	4.53%	0.53%	8.91%	0.74%	4.90%	0.52%	8.50%	0.72%
RIAU ISLANDS	6.20%	0.56%	7.63%	0.61%	5.90%	0.71%	7.46%	0.83%	5.92%	0.56%	7.95%	0.73%	6.12%	0.78%	8.42%	1.11%
SPECIAL CAPITAL REGION OF JAKARTA	3.57%	0.37%	4.84%	0.44%	3.47%	0.47%	5.55%	0.61%	4.53%	0.47%	5.82%	0.55%	4.72%	0.45%	6.79%	0.60%
WEST JAVA	7.45%	0.23%	10.72%	0.29%	6.91%	0.33%	10.42%	0.43%	7.88%	0.37%	10.84%	0.44%	8.40%	0.36%	11.72%	0.42%
CENTRAL JAVA	11.32%	0.27%	13.99%	0.29%	10.80%	0.34%	13.71%	0.38%	11.41%	0.34%	14.39%	0.38%	11.79%	0.33%	14.96%	0.38%
SPECIAL REGION OF YOGYAKARTA	12.13%	0.65%	13.35%	0.68%	11.70%	0.97%	14.04%	1.10%	12.28%	0.81%	14.26%	0.88%	12.80%	0.85%	15.18%	0.93%
EAST JAVA	10.98%	0.24%	13.79%	0.26%	10.37%	0.33%	13.61%	0.38%	11.09%	0.33%	14.59%	0.38%	11.40%	0.32%	14.30%	0.37%
BANTEN	5.24%	0.39%	8.52%	0.48%	5.09%	0.46%	8.30%	0.58%	5.92%	0.55%	9.33%	0.70%	6.66%	0.56%	10.83%	0.68%
BALI	4.01%	0.34%	5.01%	0.39%	3.79%	0.47%	4.55%	0.52%	3.78%	0.39%	4.42%	0.41%	4.53%	0.42%	5.40%	0.47%

Poverty headcount rate	2018				2019				2020				2021			
	Official estimate (%)	SE	Tobacco-adjusted (%)	SE	Official estimate (%)	SE	Tobacco-adjusted (%)	SE	Official estimate (%)	SE	Tobacco-adjusted (%)	SE	Official estimate (%)	SE	Tobacco-adjusted (%)	SE
WEST NUSA TENGGARA	14.75%	0.62%	16.56%	0.65%	14.56%	0.89%	16.72%	0.97%	13.97%	0.80%	16.25%	0.85%	14.14%	0.78%	15.53%	0.81%
EAST NUSA TENGGARA	21.35%	0.56%	23.92%	0.59%	21.09%	0.79%	25.75%	0.88%	20.90%	0.74%	26.04%	0.80%	20.99%	0.71%	24.60%	0.75%
WEST KALIMANTAN	7.77%	0.40%	10.26%	0.46%	7.49%	0.56%	11.26%	0.74%	7.17%	0.50%	11.14%	0.67%	7.15%	0.48%	10.25%	0.59%
EAST KALIMANTAN	5.17%	0.40%	7.67%	0.49%	4.98%	0.51%	7.21%	0.66%	4.82%	0.66%	7.17%	0.73%	5.16%	0.44%	7.73%	0.57%
SOUTH KALIMANTAN	4.54%	0.34%	6.01%	0.38%	4.55%	0.39%	6.64%	0.50%	4.38%	0.40%	6.54%	0.52%	4.83%	0.40%	6.75%	0.47%
EAST KALIMANTAN	6.03%	0.56%	8.70%	0.64%	5.94%	0.66%	8.46%	0.80%	6.10%	0.66%	7.92%	0.75%	6.54%	0.64%	9.77%	0.75%
NORTH KALIMANTAN	7.09%	0.83%	9.87%	0.98%	6.63%	0.94%	10.45%	1.18%	6.80%	1.05%	9.05%	1.24%	7.36%	0.92%	10.90%	1.20%
NORTH SULAWESI	7.80%	0.47%	10.09%	0.52%	7.66%	0.61%	10.29%	0.73%	7.62%	0.57%	10.05%	0.65%	7.77%	0.56%	9.54%	0.62%
CENTRAL SULAWESI	14.01%	0.58%	18.13%	0.64%	13.48%	0.81%	18.25%	0.95%	12.92%	0.85%	17.52%	0.90%	13.00%	0.83%	18.22%	0.92%
SOUTH SULAWESI	9.06%	0.37%	11.42%	0.41%	8.69%	0.43%	12.40%	0.54%	8.72%	0.44%	11.53%	0.52%	8.78%	0.42%	11.76%	0.51%
SOUTHEAST SULAWESI	11.63%	0.72%	14.01%	0.76%	11.24%	0.71%	14.36%	0.86%	11.00%	0.65%	13.55%	0.70%	11.66%	0.69%	14.51%	0.76%
GORONTALO	16.81%	0.93%	19.84%	0.98%	15.52%	1.20%	18.28%	1.30%	15.22%	1.12%	17.40%	1.19%	15.61%	1.06%	16.91%	1.09%
WEST SULAWESI	11.25%	0.79%	15.01%	0.89%	11.02%	1.09%	14.95%	1.26%	10.87%	1.04%	15.31%	1.22%	11.29%	0.97%	16.16%	1.19%
MALUKU	18.12%	0.82%	21.03%	0.87%	17.69%	1.39%	22.42%	1.53%	17.44%	1.21%	21.58%	1.27%	17.87%	0.97%	21.90%	1.06%
NORTH MALUKU	6.64%	0.58%	9.80%	0.71%	6.77%	0.75%	10.02%	0.91%	6.78%	0.71%	9.67%	0.88%	6.89%	0.74%	9.95%	0.87%
PAPUA BARAT	23.01%	0.97%	25.15%	0.99%	22.17%	1.65%	24.80%	1.76%	21.37%	1.16%	24.71%	1.21%	21.84%	1.15%	24.75%	1.26%
WEST PAPUA	27.74%	0.71%	29.30%	0.71%	27.53%	1.15%	29.47%	1.19%	26.64%	0.90%	28.35%	0.92%	26.86%	0.89%	28.95%	0.89%

Table A5. Unit value of cigarette among rural and urban smokers			
	Unit value of cigarette (Rp)		
	Rural	**Urban**	**Difference (R-U)**
Overall	970	1,050	–80***
Poor (PCE<PL)	758	722	36***
Near-poor (PL ≤ PCE < 1.5PL)	797	783	14***
Middle-income (1.5PL ≤ PCE < 3PL)	971	994	–24***
High-income (PCE ≥ 3PL)	1,190	1,271	–81***