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A MANAGERIAL ANALYSIS OF ECONOMIC LOSSES ATTRIBUTABLE TO SMOKING AND THE IMPLEMENTATION OF NON-SMOKING AREA POLICIES

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ABSTRACT

Backround: *Smoking has caused a heavy economic burden around the world. In Indonesia, in the South Sulawesi Region, smoking has become a habit. The economic losses caused by smoking have reached unreasonable limits, coupled with the increase in smoking in various regions of Indonesia, affecting the social life of the community.*
Objective: *This research attempts to look at the economic losses due to smoking which are associated with people's smoking habits and their compliance with the KTR policy in Palopo City.*
Methods: *This study used qualitative and quantitative methods with a sample of 400 respondents from the total population of Palopo City. The qualitative method uses rapid ethnography to directly observe the habits of the people in the KTR. The quantitative method uses a survey of economic loss and community compliance with regional regulations and smoking habits in Palopo City.*
Result: *The results show that the people of Palopo City are able to smoke an average of 14 cigarettes a day (1.70 USD), which is 420 cigarettes a month (51.06 USD), and are able to spend 5110 cigarettes (18637.99 USD) a year for one smoker. These costs are spent only on purchasing cigarettes and do not include the costs that must be paid by smokers to overcome health problems caused by smoking. This study also examines smokers' habits and their adherence to the KTR policy.*
Conclusion: *The costs incurred for smoking in Palopo City are very high. Cost estimates can be used to evaluate cigarette tax rates and other tobacco-related policies. The habit and need for smoking are one of the factors contributing to the high costs incurred each year to buy cigarettes.*

INTRODUCTION

Smoking has long been recognized as a significant public health problem worldwide. Despite the health risks associated with smoking, there is increasing awareness of the economic impact it has on individuals, communities, and countries (Mehrotra et al., 2019). These highly addictive products are commonly used by various segments of the population including vulnerable groups such as women, youth, and children (Reynales-Shigematsu et al., 2019). More than 15 billion cigarettes are smoked every day worldwide (1,327 billion cigarettes in ASEAN) (Nargis et al., 2022).

In 2017, an estimated 546 billion cigarettes were sold in ASEAN countries with 94% consumed in Indonesia, the Philippines, Thailand, and Vietnam. Due to the expansion of the world population and dynamic economic growth, the number of smokers is expected to reach at least 2 billion people by 2030. Among ASEAN countries, the smoking prevalence of adult men is highest in Indonesia (66%) and lowest in Singapore (21.1%) (Goodchild et al., 2018).

Adult female smoking rates are very high (between 5.8% and 8.4%) in Indonesia, Laos, Myanmar and the Philippines. According to the Central Statistics Agency (BPS), the percentage of smokers in the population ≥ 15 years in Indonesia in 2019 was 28.69%, while in 2020 it increased to 28.96% (Department of Health & Services, 2018), (Setyonaluri et al., 2018).

Smoking imposes a significant economic burden on society, including health care expenditures, lost productivity, and premature death (Pettigrew et al., 2023). The economic costs of smoking are enormous, in both high and low-income countries. Effective interventions, such as increasing the price of tobacco products, can help reduce demand for tobacco products and contribute to improving economic outcomes (Yingst et al., 2021). The economic losses due to smoking do not only occur in high-income countries. Nearly 40% of the total economic losses occurred in low- and middle-income countries, reflecting the huge losses these countries suffered from tobacco use (Goodchild et al., 2018).

Smoking imposes substantial economic and health burdens across various countries. In Russia, smoking-related losses in the labor market amounted to 781.31 billion rubles in 2022, exceeding state income from tobacco sales. Similarly, in eight Latin American countries, smoking annually causes 351,000 deaths and economic losses of US$49.8 billion, representing 1.4% of their combined GDP (Pichon-Riviere et al., 2023).

In India, different tobacco products contribute significantly to mortality and morbidity, with bidis causing the highest burden of 11.7 million DALYs and 478,000 deaths annually (Jain et al., 2023). Indonesia

faces a comparable challenge, with smoking-attributable economic costs ranging from 1.16% to 2.59% of GDP in 2019 (Meilissa et al., 2022). These studies highlight the urgent need for comprehensive tobacco control measures, including increased taxation, to mitigate the substantial health and economic impacts of smoking across diverse geographical contexts.

The economic losses associated with excess levels of morbidity and mortality caused by smoking-related diseases have been calculated using the human capital method (HCM), which calculates the present value of the loss of labor productivity due to morbidity and mortality (Suarjana et al., 2022). The economic costs of smoking include health care expenditures, lost productivity due to smoking-related diseases and health conditions, and lost productivity due to premature death due to exposure to secondhand smoke (Bhalerao et al., 2019).

Smoking caused greater losses in the United States of $600 billion in 2018, namely more than $240 billion in health spending (Xu et al., 2021), nearly $185 billion in lost productivity due to smoking-related diseases and health conditions (Shrestha et al., 2022), nearly $180 billion in lost productivity from premature deaths from smoking, and $7 billion in lost productivity from premature deaths from secondhand smoke exposure.

Governments and organizations around the world have implemented smoke-free area policies to limit smoking habits. Smoke-free area policies have a positive impact on smoking habits, for example, comprehensive smoke-free legislation reduces smoking disparities, reduces the prevalence of tobacco use, and helps smokers quit smoking (Yunarman et al., 2020). Smoke-free policies improve health outcomes by reducing exposure to secondhand smoke (Gravely et al., 2021).

Evidence shows that comprehensive smoke-free policies have high levels of public support and compliance and do not have negative economic impacts (Philpot et al., 2016). Community compliance with KTR policies is still a problem in various regions in Indonesia. In some circumstances, there is still hesitation in implementing this social policy, even though participants have tried to intervene in the past. Promotion of KTR by the government and concrete enforcement by city officials is the first step towards social strengthening of the smoke-free policy.

Challenges faced in implementing the KTR policy in various regions include limited budgets for law enforcement, lack of outreach, no KTR monitoring system, no enforcement of regulations, lack of support from local non-governmental organizations, and differences in levels of compliance between regions (Kang et al., 2021). Overcoming these challenges can help increase compliance with KTR policies and encourage a smoke-free environment

(Wahyuti et al., 2019). This research attempts to look at the economic losses due to smoking which are associated with people's smoking habits and their compliance with the KTR policy in Palopo City.

METHOD

This research uses qualitative and quantitative methods with a cross-sectional survey design with a sample of 400 respondents from the total population of Palopo City. Sampling technique using Accidental Sampling.

The qualitative method uses rapid ethnography to directly observe people's habits in Smoke-Free Areas (KTR) for one month, focusing on specific behaviors such as the function of smoking, smoking intensity, smoking time, and smoking location.

The quantitative method uses a survey of economic losses and community compliance with regional regulations and smoking habits in Palopo City. The research instruments used have been tested for validity and reliability so that the validity of the research can be maintained.

This study consisted of 7 women and 393 men and included smokers. This research aims to see the amount of individual spending on purchasing cigarettes and analyze smoking habits and smokers' compliance with smoke-free areas (KTR) in Palopo City. Analysis of economic losses and compliance with KTR using Microsoft Excel and SPSS 25.

This study uses data obtained through a self-reported questionnaire on smoking habits and individual spending on purchasing cigarettes. However, this method has several limitations, including the potential for self-reported bias. Respondents may not always provide accurate information due to factors such as social desirability bias, where they tend to report lower smoking habits than reality, or recall bias, where they do not fully remember the number of cigarettes consumed or the expenses incurred. To minimize this bias, this study ensures respondent anonymity and uses validation questions to improve data accuracy.

The characteristics of the respondents sampled in this study are described as follows.

Table 1. Respondent Characteristics

Respondent Characteristics	n	%
Gender		
Man	393	98.3
Woman	7	1.8
Ethnic group		
Buginese	93	23.3
Luwu	189	47.3
Java	15	3.8
Toraja	83	20.8
Makassar	6	1.5
Others	14	3.5
Age (Years)		
15-20	80	20.0
21-25	74	18.5
26-30	49	12.3
31-35	30	7.5
36-40	38	9.5
41-45	30	7.5
46-50	35	8.8
51-55	26	6.5
> 55	38	9.5
Total	**400**	**100**

Table 1 shows that many respondents were male with a percentage of 98.3% and 1.7% female. The population of male smokers is greater than females in Palopo City. The Luwu tribe dominates the sample population with a percentage of 47.3%, followed by the Bugis tribe at 23.3%. This shows that the Luwu tribe population dominates the sample population because most of the population is from the Luwu tribe. The age of the respondents is dominated by the range of 15-20 years and 21-25 years with a percentage of 20% and 18.5%, which means that many respondents who smoke are respondents of productive age so they may be at risk of continuing to smoke for a long time.

Expenditures Due to Cigarettes

Expenditures due to smoking were analyzed based on age, duration of smoking, number of cigarettes consumed per day, expenditure on cigarettes per day, per month, and year.

Table 2. Expenditures due to smoking

Variable	Mean	Median	Elementary School	Range	Minimum	Maximum
Age (years)	34.25	30	14.58	63	15	78
Length of smoking (years)	14.58	10	11.70	54	1	55
Number of cigarettes consumed per day (sticks)	13.93	15	9.16	59	1	60
Expenditure on cigarettes per day (Rp)	25,303	25,000	11,094	119,973	2000	120000

The table shows that the average age of respondents is 34 years with a minimum age of 15 years and a maximum age of 78 years. This shows that many people smoke at their productive age. The average duration of smoking is 15 years with a minimum duration of smoking of 1 year and a maximum duration of smoking of 55 years. This shows that people start smoking at the age of less than 20 years based on the average age of smokers and that they can smoke for 55 years. Regarding the amount of cigarette consumption, on average respondents were able to consume 14 cigarettes per day with a minimum of 1 cigarette per day and a maximum of 60 cigarettes per day. This shows the high level of cigarette consumption among the people of Palopo City. Expenditures on cigarettes per day are also quite high. On average, respondents spent IDR225,303 (US$ 14.83) to buy cigarettes per day with a minimum cost of IDR2000 rupiah and a maximum of IDR120,000 (US$7.89) per day. This shows the high costs of buying cigarettes in a day.

The results show that the people of Palopo City can smoke an average of 14 cigarettes a day, which is 420 cigarettes a month can spend 5110 cigarettes a year for one smoker. Meanwhile, the average amount spent per month per smoker for buying cigarettes is IDR750,900 (US$49.36) and IDR9,010,800 (US$592.29) per year and the maximum of the cost for buying cigarettes is IDR43,200,000 (US$2839.59).

Smoking Habits and KTR Compliance in Palopo City

Community habits and compliance were analyzed by cross-tabulation to see the magnitude of the risk to community habits and compliance. The results are described as follows.

Table 3. Smoking Habits and KTR Compliance in Palopo City

Habits	Compliance		Total	P-Value
	Good	Not good		
High Risk	139	206	345	0.470
Low Risk	25	30	55	
Total	164	236	**100**	

The table shows that many respondents have a high risk related to smoking habits, namely 354 respondents, and a low risk of 55 respondents. The level of public compliance regarding the KTR policy shows that many respondents have poor compliance, namely 236 respondents, and good compliance, namely 164 respondents. Most of the respondents who had high-risk habits had poor compliance, namely 206 respondents and 139 good respondents.

The habits of people with low risk are also dominated by people who do not comply with the KTR policy, namely 30 respondents and 25 respondents with good compliance. This shows that communities with high and low risks are both dominated by communities with poor compliance. The p-value shows a value of 0.470 > 0.05 at a 95% confidence level, which shows that there is no relationship between respondents' smoking habits and their compliance with the KTR policy. This means that the habits of people with both high risk and low risk do not influence their compliance with the existing KTR policy in Palopo City. These findings indicate that both individuals with high-risk and low-risk smoking habits are predominantly characterized by poor compliance with the smoke-free area (KTR) policy.

This suggests that challenges remain in the implementation and enforcement of the KTR policy within society. To improve compliance with the KTR policy, more effective strategies are needed, such as more intensive educational campaigns, stricter law enforcement, increased tobacco taxes, and the provision of designated smoking areas to

make the policy more acceptable to the public.

DISCUSSION

Economic Costs Due to Cigarettes

The large amount of cigarette consumption and expenditure due to smoking illustrates the health problems and economic losses that can be caused by smoking. The research results show a high value for cigarette consumption, the average number of cigarettes consumed by people in a day is 420 cigarettes in a month and 5,110 cigarettes in a year for one smoker. Meanwhile, the average amount spent per month per smoker for buying cigarettes is IDR750,900 (US$49.36) and IDR9,010,800 (US$592.29) per year and a maximum of the cost for buying cigarettes is IDR43,200,000 (US$2839.59).

This is significantly higher than the average per capita expenditure on cigarettes in Indonesia, which is Rp82,183 per month (BPS, 2022)**.** This number reflects the average spending of the entire Indonesian population, including those who do not smoke, meaning that the average expenditure per active smoker is likely to be higher. Also, this value is higher than research from Al Asyary & Veruswati (Asyary & Veruswati, 2023) with an average monthly expenditure on cigarettes reaching around IDR 607,521.74 (US$ 39.98), which means an annual cost of around IDR 7,548,065.22 (US$ 496.69) per smoker in Tegal Regency, Central Java Province, Indonesia.

Cigarettes in Indonesia are relatively inexpensive compared to many other countries, with prices starting at IDR16,000 (US$1.05) per pack. The availability of individual cigarette sales further increases accessibility, particularly for younger individuals and those with limited financial resources (Zheng et al., 2019). The economic burden of cigarette purchases has a significant impact on Indonesian families, particularly those on low incomes. The high percentage of household income spent on tobacco can lead to reduced spending on essential goods and services, while smoking-related health costs further exacerbate financial challenges. Addressing these economic challenges through effective tobacco control policies could alleviate some of the financial burden on households across the country.

The economic costs of smoking in Indonesia are significant, but lower than the costs in several other countries. The total economic loss due to smoking varies between countries, ranging from 1.4% to 3.6% of GDP in different regions. According to research conducted by Koronaiou, et. al., (Koronaiou et al., 2021) estimates from high-income countries, the cost of smoking ranges from 2.1% to 3.4% of gross domestic product (GDP) in Australia, from 1.4% to 1.9% of GDP in Canada, and from 2.5% to 3.6% of GDP in Canada.

The economic burden of cigarette purchases for families in Indonesia is quite large, which has an impact on household budgets and overall financial stability. On average, households in Indonesia spend about a third of their income on cigarettes. This expenditure is included in the top five household expenses, only surpassed by necessities such as rice and mobile phone credit (Yunarman et al., 2021). In addition to direct expenditures on cigarettes, families also incur indirect costs related to health care for smoking-related diseases. These additional medical costs can further burden household finances, especially since smokers may face chronic health problems that require ongoing care (Xin et al., 2009).

Smoking is a health problem, the effects of which include disease, pain, sadness, and misery. However, tobacco use also imposes a significant economic burden on society. In addition to the direct medical costs of treating tobacco-related illnesses, there are other indirect costs including lost productivity, fire damage, and environmental damage from cigarette waste and destructive agricultural practices. The total burden posed by tobacco products exceeds the economic benefits of manufacturing and selling them. Tobacco use also imposes a significant economic burden on society, costing the world economy more than US$1 trillion annually in terms of healthcare expenditures and lost productivity (Amy Y. Hafez et al., 2019).

In addition, diseases caused by smoking place a huge burden on the health care system in Indonesia. These costs include costs related to hospitalization, medication, doctor visits, and other health services. It is estimated that smoking-related health care costs in Indonesia reach billions of dollars each year. Smoking-related diseases also cause loss of labor productivity. When someone falls ill or dies prematurely because of smoking, they are unable to make maximum contributions to the economy. This results in a decline in economic output and a decline in the country's overall productivity.

Smoking is the main cause of premature death in Indonesia. The premature death of individuals of productive age is a significant economic loss. These people would contribute to the workforce and the economy if they did not develop smoking-related illnesses. Smoking also has a bad impact on the environment. Cigarette production and consumption contribute to pollution and environmental degradation, which can have economic implications in terms of cleanup and health-related costs. In addition to tangible economic costs, there are intangible costs associated with smoking, such as the pain and suffering experienced by individuals with smoking-related illnesses and their families. While these costs are difficult to quantify, they are significant.

Smoking Habits and Compliance with KTR Policies

Research shows that the large number of respondents who have a high-risk habit of smoking is associated with poor compliance with policies. High-risk habits are associated with the amount of cigarette consumption and smoking habits they do, for example, they feel like they can't think when they don't smoke, smoke after eating, smoke after waking up, and other bad habits that are associated with a high risk of problems health due to smoking.

Research shows that high-risk smoking habits in Indonesia include a high prevalence of smoking (Meilissa et al., 2022), a high prevalence of smoking among teenagers (Fithria et al., 2021), a high prevalence of smoking among men, a high risk of death from all causes (Holipah et al., 2020), and low cigarette prices. These factors contribute to the significant economic losses and health problems caused by smoking in Indonesia. There are effective interventions to reduce the demand for tobacco products, but these measures are underutilized.

Socioeconomic factors such as income, education, and employment status were found to be associated with smoking behavior in Indonesia (Sadarang, 2021). Easy access and low cigarette prices encourage tobacco use. A pack of cigarettes in Indonesia can be purchased for less than US$1, one of the lowest and most affordable prices in the world. Low real cigarette prices, population growth, increasing household income, and mechanization of the kretek industry have contributed to a sharp increase in smoking rates in Indonesia (Rezaei et al., 2016). The low price of cigarettes could be the cause of the increasing prevalence of smoking in Indonesia (Setyonaluri et al., n.d.). Increasing cigarette prices through increasing tobacco taxes is one of the most effective policies to reduce cigarette consumption in Indonesia. Addressing these factors can help reduce smoking behavior in Indonesia and promote a smoke-free environment.

Compliance with KTR policies is also an issue that must be addressed. Poor public compliance with this policy is due to a lack of public awareness and a lack of strict sanctions applied in several regions in Indonesia, one of which is Palopo City. A lack of law enforcement and funding for KTR policies is seen at the provincial and district levels, reducing the ability to enforce compliance and create designated smoking rooms in offices (Asyary & Veruswati, 2023).

Compliance with Regional Regulations on Non-Smoking Areas is the behavior of people in an area not to smoke in public facilities. Several Compliance Indicators for Non-Smoking Areas that are used as a reference are: there are no smoking boards or signs, no smoking rooms, no ashtrays, no people smoking in closed spaces, and no cigarette sales/ promotions/

advertisements in non-smoking areas. People are aware of policies and signs that prohibit smoking, but because of the habit of smoking and the desire to smoke, it usually appears when someone is in an uncomfortable situation, such as cold, lonely, bored, angry, and stressed, then smoking can provide comfort and calm, giving rise to a positive outlook in the meaning of smoking. Apart from that, usually, when you gather with friends who also smoke, this is one of the things that can affect a person's compliance with KTR implementation.

The lack of public compliance with the implementation of KTR regulations in Palopo City can be linked to public perceptions of the KTR policy itself. Public perception of KTR significantly influences their level of compliance, where low awareness and understanding of the objectives and benefits of KTR can lead to a tendency to disregard the existing regulations.

Some people may perceive KTR as a restriction of individual rights rather than an effort to protect public health. Additionally, the lack of socialization and education about the dangers of passive smoking can result in a low understanding of the urgency of this policy. If people do not see the direct benefits of implementing KTR, they will be more likely to ignore it.

On the other hand, the lack of supervision and strict enforcement of KTR further reinforces the perception that this regulation is not serious and can be violated without consequences, namely supervision that has not been running optimally, monitoring and evaluation of this implementation has not been optimal, there is no recording of reporting results that shows progress for each place that is included in the non-smoking zone area. As a result, people will underestimate and get used to smoking in this area.

Therefore, there is a need for SOPs, namely *Standard Operating Procedures* (SOP) which are created to facilitate the implementation of a policy. SOPs are routine activities carried out by policy implementers every day according to predetermined standards (Hutahayan, 2019). This SOP will help in the successful implementation of KTR, such as providing information about No-Smoking Areas and their sanctions and installing signs that prohibit smoking. Also, there is a need for parties assigned to monitor and supervise the implementation of KTR policies (Kaufman et al., 2015).

The lack of strict enforcement of sanctions in non-smoking areas is a major factor contributing to violations. In-depth interviews conducted in four districts and cities indicate that sanctions for violators are generally limited to verbal warnings, which do not serve as a deterrent. Additionally, the sanctions stipulated in Regional Regulations (PERDA) have not been optimally implemented, partly because they are

considered burdensome for the public, particularly for lower-income groups.

As an effective policy intervention, cigarette taxes play a crucial role in reducing tobacco consumption while simultaneously increasing state revenue to fund public health programs. Higher tobacco taxes also generate broader positive impacts, including reducing poverty rates, improving health equity, and advancing sustainable development goals (Maldonado et al., 2022).

However, the effectiveness of cigarette taxes depends on strict implementation and proper oversight. For instance, Bogotá, Colombia, has successfully reduced smoking in public areas, serving as a relevant example. The city has implemented a combination of policies, including high cigarette taxes, extensive media campaigns, and strict enforcement measures. Additionally, the local government provides smoking cessation services for individuals seeking to overcome addiction.

Furthermore, research suggests that a 10% reduction in smoking prevalence, which could be achieved through current taxation policies, has the potential to significantly lower cancer incidence by 2050 (Sánchez-Franco et al., 2021). Anti-smoking media campaigns have also proven effective in raising awareness and encouraging smoking cessation behaviors (Colston et al., 2021). Moreover, school-based smoking prevention programs tailored to local cultural contexts have been implemented to ensure their effectiveness and sustainability (Sánchez-Franco et al., 2021). This combination of strategies demonstrates that an integrated tobacco control policy—based on regulation, education, and economic interventions—can enhance compliance with smoke-free area policies while mitigating the negative impacts of smoking on public health and the economy.

CONCLUSION

The costs incurred for smoking in Palopo City are very high. Cost estimates can be used to evaluate cigarette tax levels and other cigarette-related policies. The habit and need for smoking are one of the factors in the high costs incurred each year to buy cigarettes. The smoking habit, which carries a high risk of health problems and poor compliance, is a problem that needs to be addressed by the government and policy enforcers. It is important to underline that addressing the economic impact of smoking involves not only considering health and productivity but also implementing tobacco control measures.

To enhance the effectiveness of tobacco control, the government needs to increase cigarette taxes, strengthen the enforcement of Smoke-Free Areas (KTR), and expand public education programs on the dangers of smoking. Strengthening sanctions and involving the community in monitoring are also crucial to improving compliance. Further research is needed to evaluate the

long-term impact of KTR policies on smoking prevalence and the economic burden of tobacco use.

AUTHOR'S CONTRIBUTION STATEMENT

Achmad R. Muttaqien Al-Maidin as a principal investigator, conceptualised and designed the study, Pupin Astuti as conceptualised and designed the study, prepared the draft of the manuscript, provided advice on data analysis and data interpretation; Akhyar Rahmatul Rohim did the data analysis and interpretation; Mutia Nur Rahmah drafted the manuscript conducted research studies and assisted in drafting the manuscript. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

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