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Reducing Noncommunicable Disease Risk Factors in Adolescents: An Investment Case for Indonesia

Ishu Kataria, Jessica Hale, David Watkins, Nupoor Kulkarni, Brian Hutchinson, Rachel Nugent

Noncommunicable diseases (NCDs) are diseases that are not caused by an infection and not spread through contact with another person.

NCDs such as cardiovascular disease, diabetes, cancer, respiratory disorders, and mental and neurological disorders are the cause of 71% of deaths in Indonesia.¹

Adolescents—young people between the ages of 11 and 19—make up 20% of Indonesia’s population.² Their ongoing neural, psychosocial, and physical development makes them especially vulnerable to the four main risk factors for NCDs^{1,3}:

Unhealthy diet, lack of physical activity, alcohol use, and tobacco use

In this brief, we examine the benefits and costs of a set of effective interventions for reducing NCD risk factors among adolescents in Indonesia. When people initiate these (and other) unhealthy behaviors in adolescence, they often adopt these behaviors for life, which increases their risk for NCDs as they age. The three dominant NCD risk factors affecting adolescents are alcohol, tobacco use, and physical inactivity.



What You Need to Know

- Adolescents make up 20% of Indonesia’s population.
- They are constantly exposed to risk factors for NCDs, putting them at high risk of lifetime diseases and early death.
- Implementing evidence-based interventions that target adolescents could avert between 70,000 and 2.5 million premature NCD deaths from 2020 to 2070.
- Avoiding these deaths would provide economic benefits ranging from USD 800 million to USD 27 billion.
- One way to reduce the use of tobacco and consumption of sugar-sweetened beverages (SSBs) among adolescents in Indonesia is with well-designed excise taxes.

About
77%
 of adolescents
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 secondhand
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 homes.⁴

In Indonesia, tobacco use is common among 13- to 15-year-old boys, with 36% using tobacco, as compared with 5% of girls in the same age group. Additionally, 77% of adolescents are exposed to secondhand smoke in their homes.⁴ Also, 15% of 15- to 19-year-old adolescent boys occasionally use alcohol, as compared with 1% of girls in the same age group. Further, 0.2% of adolescent boys consume alcohol every day.⁵ Moreover, 10.8% of 10- to 18-year-old adolescent girls are overweight or obese, as compared with 8.7% of boys in the same age group, with variability across geographic location in the country.⁶ These risk factors are modifiable, and the adolescent life stage offers opportunities to embed healthy behaviors that will endure as they age.³

The Government of Indonesia has developed the National Action Plan on School Age Children and Adolescent Health 2017–2019, which aims to improve policy, planning, and implementation of health programs for Indonesia’s youth. The plan focuses on strengthening evidence-based policies for implementing adolescent programs and services.⁴

Donor programs aimed at adolescent health have made major investments in tobacco control among youth but have not targeted other NCD risks influencing youth health behavior. The emphasis in donor programs has been on sexual and reproductive health and HIV/AIDs prevention, whereas the budget for donor programs targeted to adolescents remains small—only 2.2% of total developmental assistance for health in 2015.⁷ If the current trend of adolescent NCD risk exposure continues, by 2060, there will be 20 million premature deaths globally at an economic cost of USD 300 billion.⁸

Making the Investment Case for Indonesia

This NCD risk factor reduction investment case shows the benefits of investing in cost-effective, policy-level interventions for adolescents in Indonesia to reduce the risk of acquiring NCDs later in life.

Approach

We estimated the health and economic gains that could be realized through maximum implementation of select evidence-based interventions targeted at tobacco use and obesity among adolescents in Indonesia. We looked at the current implementation level for these interventions in the country and assessed how closing the gap between current and maximum implementation could reduce premature death among adolescents. Additionally, we estimated the economic consequences of not fully implementing these interventions throughout adulthood to age 70; ultimately, the cost of inaction.

Interventions

We conducted structured literature reviews from 2000 to 2018 using multiple databases to identify tobacco and obesity interventions in Indonesia designed specifically for adolescents. We also searched World Health Organization (WHO) materials and Indonesia Ministry of Health policy documents, then reviewed their relevant citations and recommendations. Additionally, we conducted stakeholder interviews with country experts in each domain to substantiate and finalize our selection of interventions.

Although we were not able to identify interventions implemented among Indonesian adolescents for each of our risk factors, we applied the best available evidence from Indonesia and other contexts. Our review suggests that intersectoral and fiscal policies are promising ways to reduce NCD risk in Indonesia. The most promising interventions and the estimates of their effectiveness used in our analysis are summarized in Table 1.

Tobacco Use

The most likely factors to have an impact on tobacco use among adolescents are an increase in the excise tax on tobacco products and point-of-sale advertising bans.

Tobacco taxes are often seen as a “win-win” because they lead to improved health outcomes and contribute to government revenue, which can be used to further tobacco control or other public health programs. Currently, Indonesia taxes cigarettes at about 58% using a range of taxes, including specific excise, ad valorem excise, value-added tax or sales tax, import duty, and regional tax.¹³ However, this level is still below the WHO-recommendation to tax tobacco at 75% of the price. Further, the WHO-recommends excise taxes as the preferred design.

For this study, we defined maximum implementation of the tobacco policy as following the WHO-recommended level. We estimated the percentage price increase needed to reach the WHO-recommended tax by using the state average price of cigarettes¹³ to calculate the amount untaxed and the absolute price needed that would reflect a 75% tax. We then used published data⁹ to calculate the reduction in adolescent smoking prevalence that would result from the tax increase.

Point-of-sale (POS) advertising bans reduce youth exposure to tobacco industry messages and consequently reduce smoking initiation and prevalence among youth. POS advertising bans are often missing from country tobacco control efforts,¹⁴ and Indonesia is no exception.¹³ We defined maximum implementation as full implementation and enforcement of a POS ban in the country. We gathered information about the status of a POS ban in Indonesia¹³ and used estimates of effectiveness¹⁰ from the literature to calculate the reduction in smoking prevalence among adolescents resulting from full compliance.

Table 1. Adolescent Noncommunicable Disease Risk Factor Interventions Selected for Modeling in Indonesia^a

RISK FACTOR	OUTCOME	INTERVENTION	ESTIMATE OF EFFECTIVENESS	SOURCE
Tobacco use	Reduce monthly smoking prevalence among adolescents	Increase in excise tax to 75% of final retail price of tobacco products	For every 10% increase in price, smoking prevalence declines by 7.4% among adolescents	Kostova, Ross, Blecher, & Markowitz, 2011 ⁹
		Point-of-sale advertising bans	Full implementation leads to a 27% reduction in the chance of smoking	Shang, Huang, Cheng, Li, & Chaloupka, 2016 ¹⁰
Obesity (High body mass index [BMI])	Reduce the population mean BMI among adolescents	Addition of 20% excise taxes on sugar-sweetened beverages	A 10% increase in price will lead to a 10% decrease in consumption, considering an elasticity of -1.0	World Health Organization, 2016 ¹¹
		School-based nutrition and physical activity programs to reduce obesity or overweight	Program implementation leads to a long-term -0.29 kg/m ² reduction in BMI	Meng, Xu, Liu, Van Raaij, Bemelmans, Hu, & Ma, 2013 ¹²

^aThe highlighted effectiveness estimate is from a study done in Indonesia.



Obesity

Currently, no tax policy to restrict SSB use is in place in Indonesia.¹⁵ However, there are plans to regulate sugar, salt, and fat in 2018, although more likely through sugar content requirements than through taxes.¹⁶ Consequently, applying a 20% tax is a new and undeveloped policy option for Indonesia. We estimated the health effects of implementing such a policy. We also identified school-based physical and nutrition education programs as being likely to reduce obesity among adolescents. In most countries, schools are a logical site for programs that encourage healthy diet and lifestyle habits.¹⁷ We modeled the effects of maximum implementation of the two interventions, which we defined as uniform execution of an SSB tax (we assumed no SSB tax is currently in place) and scale-up of the nutrition and physical activity programs to every adolescent currently attending school in Indonesia.

For *SSB taxes*, we collected SSB consumption data for Indonesia,¹⁸ estimates of tax effectiveness,¹¹ and information on the relationship between SSB consumption and body mass index (BMI)¹⁹ to calculate reduction in mean BMI among Indonesian adolescents. The range of SSB taxes currently imposed by countries with taxes is from 20% to 50%. We conservatively modeled the effects of a 20% SSB tax in Indonesia.

For the *school-based education intervention*, we found no examples from Indonesia. Consequently, we drew evidence from a multicomponent model of a nutrition and lifestyle intervention for adolescents conducted in Chinese schools.²⁰ We adjusted our calculations based on secondary school completion rates in Indonesia.²¹

Harmful Use of Alcohol

We did not include any interventions for harmful use of alcohol in this investment case for Indonesia because the country has a predominantly Muslim population (88% of citizens are Muslims),²² and alcohol consumption is prohibited for religious reasons.

Additionally, Indonesia has strict restrictions on alcohol advertising and sponsorship, and provincial taxation of alcohol.²³

What We Found

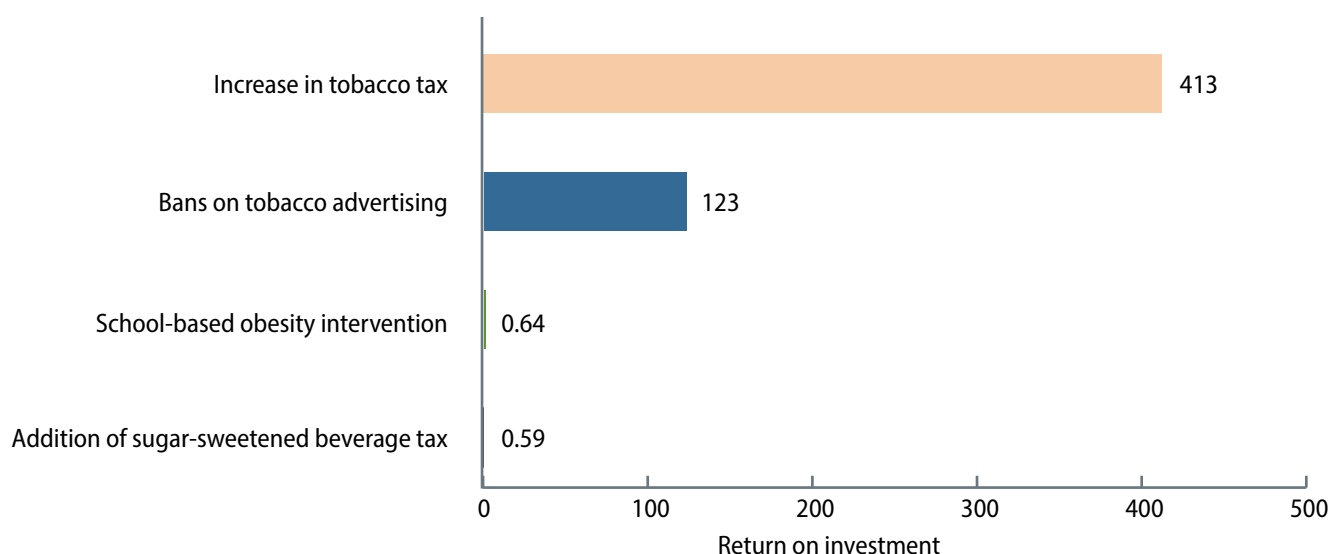
Implementation of adolescent-specific interventions for the two main NCD risk factors for Indonesia—tobacco use and obesity—would result in the following significant health and economic benefits for the country over the long term:

- By increasing tobacco taxes and implementing POS advertising bans, an estimated 1.4 million premature deaths from tobacco use could be avoided over the next 50 years.
- Full implementation of legislated SSB taxes and implementation of school-based obesity reduction programs will avert 130,000 premature deaths.
- Together, these interventions would provide an economic benefit of USD 16 billion from 2020 to 2070 (IDR 215 trillion),^b or USD 320 million annually (IDR 4.2 trillion). The tobacco interventions would provide annual economic benefits of 290 million (IDR 3.8 trillion), and the obesity interventions would provide USD 29 million (IDR 390 billion) annually.^c

The return on investment (ROI) for each intervention is shown in Figure 1. In Indonesia, the highest ROI is expected from interventions for tobacco control, followed by interventions contributing to a reduction in obesity.

To the extent possible, our intervention scenarios are based on experience in Indonesia and comparable countries to demonstrate what can be achieved with maximum effort. Reducing tobacco use and obesity beyond the levels assumed here may be possible by implementing a broader set of interventions. However, the evidence for obesity-specific interventions for Indonesia is lacking, and additional research is needed to support this assertion.

Figure 1. Return on investment for tobacco, alcohol, and obesity interventions for Indonesia (2015–2070)



^bBased on the average 2016 exchange rate of 13,308.327 rupiah per USD.

^cNumbers may not add because of rounding. All figures are rounded to the second significant digit.

Discussion

Policy and programmatic actions to support adolescents to live long and healthy lives have not been fully explored by donors and governments. In Indonesia, where 20% of the population is between the ages of 11 and 19, it is imperative that central, provincial, regental, and city governments prioritize NCD prevention during adolescence by implementing cost-effective interventions to

- reduce NCD risk factors,
- curb the NCD epidemic,
- avoid premature deaths,
- increase productivity, and
- improve the well-being of the future generation.

The low ROI on obesity reduction among school children does not imply this is a poor solution. Although the cost of implementing the intervention in schools is high, the intervention example has shown cost-effectiveness in China. With additional trials to adapt the school-based intervention in other contexts, we anticipate that the implementation costs would decline and the benefits would grow, especially in countries with high and rising youth obesity.

Recommendations

Because the increasing NCD risk in Indonesia threatens to reduce the life expectancy of today's adolescents, the following set of recommended interventions will provide multiple options for the country's NCD action plans:

- **Taxation** for tobacco and SSBs should be a top priority at the country level.
- **Advocacy** for these policies, at the country and global levels, should emphasize the benefits to adolescents.
- **School-based programs** are effective, but they can be resource intensive. However, the school-based intervention needs to be tried in multiple provinces of the country, which would be expected to reduce the cost over time and make the intervention a better investment.



Study Limitations

Our assessment of lives saved relies on existing projections²⁴ of population size and structure during the next several decades and the presumption that current death rates will continue in the future, absent changes such as those identified. To the best extent possible, we used Indonesian adolescent-specific data, although we had to rely on a small number of rigorous intervention studies for reducing NCD risk factors.

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About the authors

Ishu Kataria, PhD, is a Senior Public Health Researcher with RTI International's Global Noncommunicable Diseases Initiative

Jessica Hale, BA, was formerly a Public Health Analyst at RTI International

David Watkins, MD, MPH, is a faculty member in the Department of Medicine at the University of Washington and a Research Associate at the University of Cape Town

Noopur Kulkarni, BS, was an Intern at RTI International's Global Noncommunicable Diseases Initiative

Brian Hutchinson, MPA, is a Research Public Health Analyst at RTI International

Rachel Nugent, PhD, serves as the Vice President of RTI International's Global Noncommunicable Diseases Initiative

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Ishu Kataria, PhD +91.971.864.6101 ikataria@rti.org	Rachel Nugent, PhD +1.206.268.3612 rnugent@rti.org
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RTI International
3040 E. Cornwallis Road
Research Triangle Park, NC 27709-2194 USA

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