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Investment Case for Tobacco Control in Sierra Leone

The case for scaling-up WHO FCTC implementation

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June 2019

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The Case for Investing in WHO FCTC Implementation in Sierra Leone

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June 2019

Funded by UK Government

Over 3,300 lives

are lost every year due to tobacco-related diseases.

Over a quarter of those deaths

are among the poorest income quintile.

Tobacco costs Sierra Leone

SLL 403.9 billion

every year, equivalent to

1.5% of its GDP

in 2017.

Investing now in six FCTC interventions will save nearly

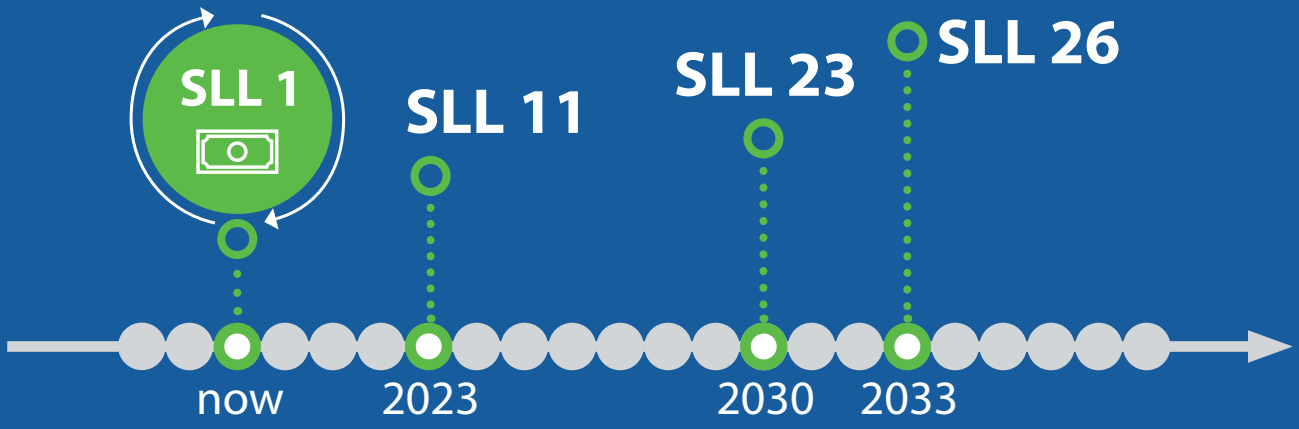
20,000 lives

and avert

SLL 1.9 trillion

in health costs and economic losses by 2033.

For every **Sierra Leonean leone** invested in six FCTC interventions now, Sierra Leone will receive **SLL 11** in averted costs and avoided economic losses by 2023, **SLL 23** by 2030, and **SLL 26** by 2033.



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1. Executive summary

Tobacco is a health and sustainable development issue. Tobacco consumption and production causes early death and disease, results in high healthcare costs and economic losses, widens socioeconomic inequalities, and contributes to environmental degradation.

This report presents the findings of the case for investing in tobacco control in Sierra Leone. In line with the WHO Framework Convention on Tobacco Control (FCTC) Global Strategy to Accelerate Tobacco Control and according to the stated priorities of the Government of Sierra Leone, the report measures the costs and benefits—in health and economic terms—of implementing six priority tobacco control measures. The six measures are: 1) increase cigarette taxation to reduce the affordability of tobacco products; 2) implement and enforce bans on smoking in all public places to protect people from tobacco smoke; 3) implement plain packaging; 4) mandate that tobacco products and packaging carry large graphic health warnings describing the harmful effects of tobacco use; 5) promote and strengthen public awareness about tobacco control issues and the harms of tobacco use through mass media information campaigns; and 6) enact and enforce a comprehensive ban on all forms of tobacco advertising, promotion and sponsorship.

In 2017, tobacco cost the Sierra Leone economy SLL 403.9 billion, equivalent to 1.5 percent of its GDP. These costs include a) SLL 108.4 billion in healthcare expenditures, and b) SLL 295.5 billion in lost productive capacities due to premature mortality, disability, and workplace smoking. The productivity losses from current tobacco use in Sierra Leone—73 percent of all tobacco-related costs—indicate that tobacco use impedes development in Sierra Leone far beyond health impacts. Multisectoral engagement is required for effective tobacco control; businesses and other sectors benefit substantially from supporting tobacco control investments.

Every year tobacco kills 3,300 Sierra Leoneans. More than 900 of these lives lost are due to exposure to second-hand smoke, 68 percent of deaths are among individuals under age 70, and over a quarter of deaths are among the poorest income quintile.

By acting now, the Government of Sierra Leone can curb the burden of tobacco use. The investment case findings demonstrate that enacting and enforcing six FCTC tobacco-control measures would:

Avert SLL 1.9 trillion in economic losses over the next 15 years. This would include SLL 1.3 trillion in economic output losses averted. The tobacco-control measures stimulate economic growth by ensuring that fewer citizens 1) drop out of the workforce due to premature mortality, 2) miss days of work due to disability or sickness, and 3) work at a reduced capacity due to smoking.

Lead to SLL 504 billion in savings through avoidance of tobacco-attributable healthcare expenditures. Of this, Sierra Leoneans will save SLL 209 billion in out-of-pocket health-care costs, and the Government will save SLL 153 billion in healthcare expenditures.

Save nearly 20,000 lives and reduce the incidence of disease. The WHO FCTC provisions will contribute to Sierra Leone's efforts to meet SDG Target 3.4 to reduce by one-third premature mortality (under age 70) from NCDs by 2030. Enacting the FCTC measures would prevent almost 6,000 premature deaths from the four main NCDs by 2030, the equivalent of about 13 percent of the needed reduction in premature mortality to fulfill SDG Target 3.4.

Provide economic benefits (SLL 1.9 trillion) that significantly outweigh the costs (SLL 71.9 billion). Each of the WHO FCTC provisions is highly cost-effective. Banning tobacco advertising, promotion, and sponsorship has the highest ROI (115:1), followed by increasing cigarette taxes (107:1), graphic warning labels (62:1), enforcing bans on smoking in public places (24:1), implementing plain packaging of tobacco products (16:1) and mass media campaigns (13:1).

Strengthening tobacco control in Sierra Leone will confer social benefits to all, but particularly to the poor. Fifty-three percent of all smokers belong to the poorest 40 percent of the population. As a result, tobacco-attributable deaths occur disproportionately among lower income earners. Under the first year of the tax scale up, 34 percent of the deaths averted from increasing cigarette taxes will be among the poorest income quintile. The poorest 20 percent of the population cease smoking at a higher rate than wealthier individuals, helping them to avoid illness and catastrophic healthcare expenditures. Cigarette tax increases would further benefit the poor if the resulting Government tax revenue were reinvested in national development priorities such as universal health coverage including tobacco cessation support. Evidence from around the world indicates that overall government revenue goes up, not down, from raised cigarette taxes.

The FCTC Investment Case results for Sierra Leone show that there is an evidence-based opportunity to reduce the health, economic and other development burdens of tobacco through preventative actions that target tobacco use. By investing now in tobacco control measures, Sierra Leone can accelerate its efforts towards achieving the Sustainable Development Goals.

The report recommends concrete actions the Government of Sierra Leone can take to strengthen a whole-of-government approach to tobacco and its development consequences. Through the FCTC 2030 Project, the FCTC Secretariat, UNDP and WHO stand ready to support the Government of Sierra Leone to reduce the social, economic and environmental burdens that tobacco continues to place on its country.

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2. Introduction

Tobacco is one of the world's leading health threats, and a main risk factor for non-communicable diseases (NCDs) including cancers, diabetes, chronic respiratory disease and cardiovascular disease. In Sierra Leone, 28.6 percent of men and 8.2 percent of women use tobacco [1]. Tobacco use in Sierra Leone kills approximately 3,330 citizens per year, with 68 percent of deaths occurring under age 70 [2].

Alongside the cost to health, tobacco imposes a substantial economic burden. In 2012, worldwide, health care expenditures to treat diseases and injuries caused by tobacco use totaled nearly six percent of global health expenditure [3]. Further, tobacco use can reduce productivity by permanently or temporarily removing individuals from the labor market due to poor health [4]. When individuals die prematurely, the labor output that they would have produced in their remaining years is lost. In addition, individuals with poor health are more likely to miss days of work (absenteeism) or to work at a reduced capacity while at work (presenteeism) [5, 6].

Tobacco use may displace household expenditure on basic needs, including food and education [7-9], contributing to pushing families into poverty and hunger [10, 11]. It imposes health and socio-economic challenges on the poor, women, youth and other vulnerable populations [12]. Meanwhile, tobacco production causes environmental damage including soil degradation, water pollution and deforestation [13–15]. Given the far-reaching development impacts of tobacco, effective tobacco control requires the engagement of non-health sectors within the context of a whole-of-government approach.

The 2030 Agenda recognizes that current tobacco use trends, in Sierra Leone and around the world, are incompatible with sustainable development. Through Sustainable Development Goal (SDG) Target 3.4., Agenda 2030 commits Member States to achieve a one-third reduction in premature mortality from NCDs (i.e. deaths between 35 and 69) by 2030. Accelerating progress on NCDs requires strengthened implementation of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC). Tobacco control is not just a primary means to improve population health, but also a proven approach to reduce poverty and inequalities, grow the economy and advance sustainable development broadly. However, more work must be done to reverse the tobacco epidemic. Sierra Leone ratified the WHO Framework Convention on Tobacco Control (WHO FCTC) in 2009 [16], but with the exception of increasing tobacco taxes and conducting an anti-tobacco mass media campaign [17, 18], it has not meaningfully advanced the policy measures obligated under the treaty.

Intensifying existing policies and implementing new measures can further reduce the tobacco use prevalence curve and generate additional health and economic gains. For example, opportunities exist to ban smoking in public places, implement plain packaging and graphic warning labels, and ban tobacco advertising, promotion, and sponsorship. Realizing the full potential benefits of such measures depends on concerted and coordinated efforts from multiple sectors of government, as well as high-level leadership and an informed public.

Given these considerations, in 2018 the WHO FCTC Convention Secretariat, UNDP, WHO and the FCTC Knowledge Hub undertook a joint mission to Sierra Leone to launch an investment case as part of the FCTC 2030 Project. The FCTC 2030 Project is a global initiative funded by the UK Government to support countries to strengthen FCTC implementation to achieve the SDGs. Sierra Leone is one of the 15 countries worldwide receiving dedicated FCTC 2030 Project support.

An investment case analyzes the health and economic costs of tobacco use as well as the potential gains from scaled up implementation of FCTC measures. It identifies which FCTC demand-reduction measures can produce the largest health and economic returns for Sierra Leone (the return on investment; ROI). In consultation with the Government of Sierra Leone, and in line with the WHO FCTC Global Strategy to Accelerate Tobacco Control [19], six FCTC provisions were selected to model within the investment case:

Increase tobacco taxation to reduce the affordability of tobacco products. *(WHO FCTC Article 6)*

Enforce bans on smoking in all public places to protect people from tobacco smoke. *(WHO FCTC Article 8)*

Mandate that tobacco products carry health warnings that cover 50 percent of the packaging, and regularly rotate warning labels to maintain the warning's salience.
(WHO FCTC Article 11)

Implement plain packaging of tobacco products.
(FCTC Article 11: Guidelines for Implementation)

Increase the frequency and coverage of mass media campaigns.
(FCTC Article 12)

Implement and enforce a comprehensive ban on all forms of tobacco advertising, promotion and sponsorship. *(FCTC Article 13)*

This report proceeds in four sections. **Section 3** provides an overview of tobacco control in Sierra Leone, including a discussion of tobacco use prevalence as well as challenges and opportunities. **Section 4** summarizes the methodology of the investment case, and **Section 5** reports the main findings of the economic analysis, including the equity impact of tax increases on different socio-economic groups. The report concludes under **Section 6** with a set of recommendations. An Annex provides supplemental information on the investment case methodology.

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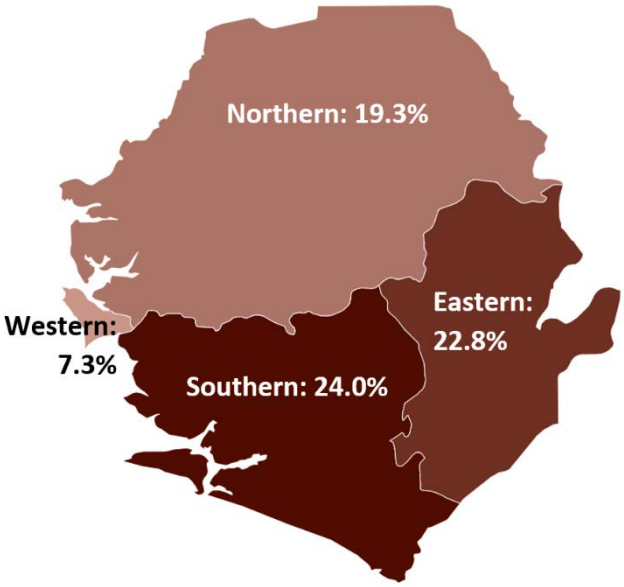
3. Tobacco control in Sierra Leone: Status and context

3.1 Tobacco use prevalence, social norms, and awareness-raising

The 2013 Demographic and Health Survey (DHS) finds that approximately 18 percent of adults age 15 to 49 in Sierra Leone use at least one form of tobacco [1].

Fig.1: Tobacco use prevalence by region

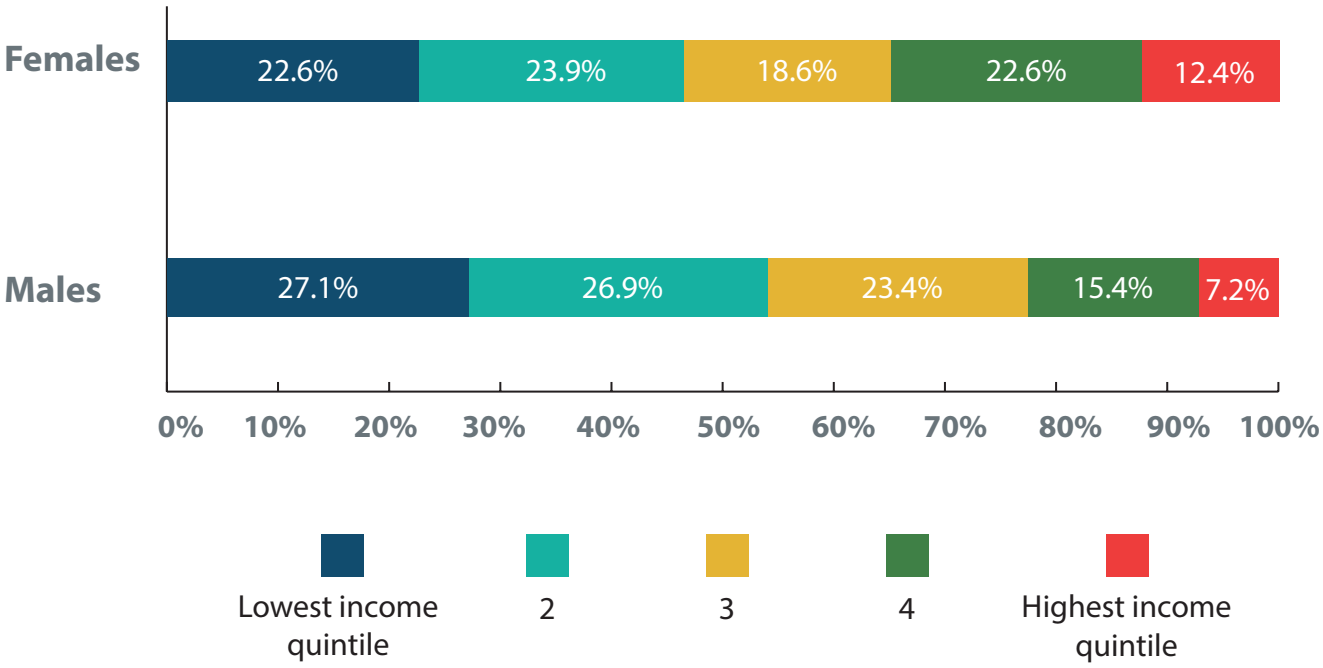


The vast majority of tobacco is consumed by smoking cigarettes. Previously, the 2009 STEPS survey showed that most smokers (87 percent) smoke every day, and that smokers on average consume 7.2 cigarettes per day [20]. Less than three percent of adults use smokeless tobacco [1].

Rates of tobacco use differ among demographic profiles. Rural areas have a higher prevalence of tobacco use (35.1 percent of men and 9.7 percent of women) compared to urban areas (14.2 percent of men and 5.5 percent of women) [1], as reflected in Figure 1 which shows lower rates of use in the urbanized Western region that contains the capital, Freetown. Tobacco use prevalence is higher among men than women (28.6 percent of men use tobacco, compared to 8.2 percent of women) [1].

Wealth also correlates with tobacco use. **Figure 2** shows the percent of all smokers, by gender, who fall within various income quintiles. Quintiles divide the Sierra Leonean population into five equal groups, by income, where quintile 1 is composed of the poorest 20 percent of Sierra Leonean people and quintile 5 is composed of the wealthiest 20 percent. All things being equal, it would be expected that smokers would be divided evenly so that 20 percent of all smokers would belong to each income quintile. However, low income earners are more likely to use tobacco. **Figure 2** shows that over a quarter of all male smokers (27.1 percent) are among the lowest income earners in Sierra Leone, and that 22.6 percent of female smokers are among the lowest income earners [1].

Fig. 2: Proportion of smokers, by income quintile (%)



3.2 Tobacco control regulatory measures

In 2018, Sierra Leone demonstrated its commitment to tobacco control by increasing taxes on tobacco products. However, to further protect the health of its population, Sierra Leone must commit to honoring its obligations as a Party to the Framework Convention on Tobacco Control by implementing a package of policy measures proven to reduce demand for tobacco.

Taxes

In 2018, Sierra Leone successfully enacted a 30 percent excise tax on tobacco products [18]. The level of taxation remains short of the WHO recommendation that taxes represent at least 75 percent of the retail price of tobacco products, inclusive of at least a 70 percent excise tax. Additional **tax increases**—and ensuring uniform taxation across all tobacco products—can further draw the prevalence curve downward, achieving health and revenue gains for the government.

Ban Smoking in Public Places

Sierra Leone does not currently **ban smoking in public places**, such as healthcare facilities, educational facilities, government buildings, offices, public transportation, restaurants, and cafes [17]. Enacting a complete ban on smoking in public places will help to change norms around smoking, and protect citizens from being exposed to secondhand smoke.

Graphic Warning Labels

Currently, Sierra Leone does not require tobacco product packaging to carry **graphic warning labels**, nor does it mandate **plain packaging**—neutral-color packaging, without branding and logos [17]. Graphic warning labels confront tobacco users with the consequences of tobacco use. Plain packaging works synergistically with warning labels to reduce the appeal of tobacco products by removing opportunities for tobacco companies to brand and promote their products.

Anti-tobacco Mass Media Campaigns

Sierra Leone has undertaken **information campaigns** to raise awareness about tobacco control issues, and to educate the public about the harms of tobacco use and the benefits of tobacco cessation [17]. However, the campaigns were not aired on mass media platforms (e.g. television, radio, internet). Targeted, national-scale mass media campaigns that are researched and tested for impact, and that reach a wide audience through major forms of media, are important for tobacco control.

Tobacco advertising, promotion, and sponsorship (TAPS)

Tobacco advertising, promotion, and sponsorship (TAPS) are not regulated in Sierra Leone [17]. By banning direct advertisements on TV, radio, newspapers, the internet, and other media outlets, and also banning indirect advertising through mediums such as point-of-sale advertising, or product placement in television or films, Sierra Leone can reduce the channels through which tobacco companies promote products to consumers. Bans on promotional activities—such as free distribution of tobacco products or promotional discounts—and sponsorship offer additional opportunities to restrict marketing.

Table 1 summarizes the existing state of FCTC demand-reduction measures that are analyzed in the investment case and compares them against the FCTC target goals for each measure. Reaching target goals can further reduce tobacco consumption and its consequences.

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Table 1: Summary of the current state of FCTC demand reduction measures in Sierra Leone, and target goals

Tobacco Policy	Baseline	Target
Increase tobacco taxation to reduce the affordability of tobacco products. *(FCTC Article 6)*	Excise taxes equivalent to 30 percent of the retail price of the most sold brand of cigarettes [21].	Increase taxes on cigarettes to the recommended 75 percent of the retail price.
Implement and enforce bans on smoking in all public places to protect people from tobacco smoke. *(FCTC Article 8)*	Smoking is currently not banned in public places.	Enact and enforce a ban on smoking in all public places.
Mandate that tobacco products and packaging carry large graphic health warnings describing the harmful effects of tobacco use. *(FCTC Article 11)*	No warning labels are required on tobacco products.	Require a graphic warning label that covers at least 50 percent of the tobacco product. Regularly rotate (update) the content of graphic warning labels.
Mandate plain packaging of all tobacco products. *(FCTC Article 11: Guidelines)*	No law mandates plain packaging of tobacco products.	Implement a law requiring plain packaging.
Promote and strengthen public awareness about tobacco control issues and the harms of tobacco use through mass media information campaigns. *(FCTC Article 12)*	Sierra Leone held a nationwide anti-smoking campaign between 2014–2016. The campaign did not air on major media platforms.	Air national-scale, mass media campaigns that are researched and tested with a targeted audience, aired on TV and radio for at least three months, and evaluated for impact.
Enact and enforce a comprehensive ban on all forms of tobacco advertising sponsorship and promotion. *(FCTC Article 13)*	Tobacco advertising, promotion, and sponsorship is not regulated.	Implement a law banning all forms of tobacco advertising, promotion and sponsorship.

* Source: Report on the Global Tobacco Epidemic: Country profile – Sierra Leone [17].

3.3 National coordination, strategy and planning

Sierra Leone does not currently have a comprehensive tobacco control law, but the Government has prioritized drafting and passing tobacco control legislation. Tobacco control legislation is the most impactful step the Government can take to reduce the burden of tobacco. The tobacco control measures listed in **Table 1** can be mandated through passage of a single comprehensive tobacco control law. Such a law, if passed and implemented, would not only reduce the health burden caused by tobacco—thereby resulting in savings to the Government and citizens of Sierra Leone—but it would result in substantial tax revenue increases which the Government can use to finance development. By raising taxes on tobacco products, a new tobacco control law would assist Sierra Leone in becoming less dependent on donor contributions.

Sierra Leone will need to build capacity and strengthen multisectoral coordination to effectively implement tobacco control measures. The tobacco control law could mandate a multisectoral task force to oversee and coordinate implementation of tobacco control measures. Such a task force was created ad-hoc several years ago but has not been active. Further, to support the passage and implementation of a new tobacco control law, the Government—led by the Ministry of Health and Sanitation—can draft and adopt a multisectoral national strategy for tobacco control. There was a national tobacco control strategy through 2016 but it has not been renewed. Stronger coordination through a multisectoral, national task force and strategy can help Sierra Leone overcome challenges in capacity to implement, including effective tax administration and reducing illicit trade.

Sierra Leone faces the challenge of illicit trade stemming from neighboring Guinea and Liberia. Coordination between law enforcement and border authorities including customs, can help stem this issue. Sierra Leone does not have a tax stamp regime and has not signed and ratified the Protocol to Eliminate Illicit Trade in Tobacco Products. This protocol includes measures that would help the Government combat illicit trade.

4. Methodology

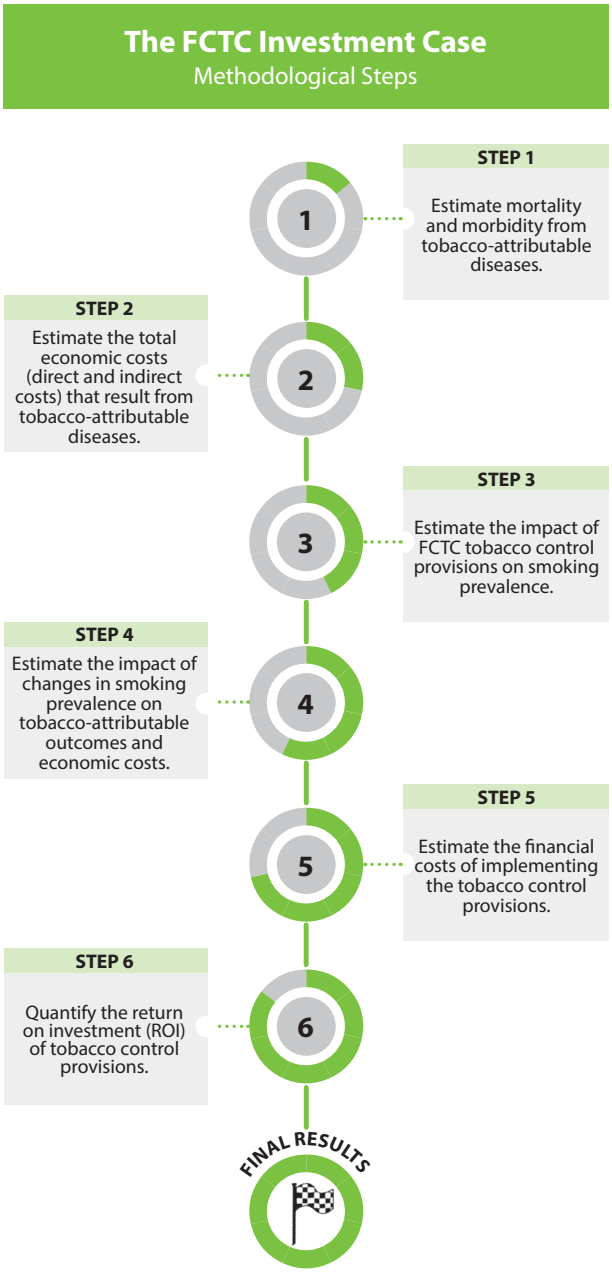
The purpose of the FCTC Investment Case is to: quantify the current health and economic burden of tobacco use in Sierra Leone; estimate the impact that implementing tobacco measures would have on reducing the burden; and provide analysis of other impacts—e.g., equity—that may factor into government decisions to implement tobacco control measures.

RTI International developed a model to conduct the investment case, and perform the methodological steps in **Figure 3**. The tools and methods used to perform these steps are described in this report's Annex. Interested readers are also referred to this report's separate *Technical Appendix* for a more thorough account of the methodology.[1]

The FCTC Investment Case team worked with partners in Sierra Leone to collect national data inputs for the model. Where data was unavailable from Government or other in-country sources, the team utilized publicly available national, regional, and global data from sources such as the World Health Organization (WHO), World Bank database, Global Burden of Disease (GBD) study, and academic literature.

Within the investment case, costs and monetized benefits are reported in constant 2017 leones and discounted at a rate of three percent.

Fig. 3: Investment case: Methodological steps



1 Available upon request

5. Results

5.1. The current burden of tobacco use: health and economic costs[2]

Tobacco use undermines economic growth. In 2017, tobacco use caused 3,330 deaths in Sierra Leone (see **Figure 5**), 68 percent of which occurred among citizens under the age 70 [2]. As a result, Sierra Leone lost productive years in which those individuals would have contributed to the workforce. The economic losses in 2017 due to tobacco-related premature mortality are estimated at SSL 201.1 billion.

While the costs of premature mortality are high, the consequences of tobacco use begin long before death. As individuals begin to suffer from tobacco-attributable diseases (e.g. heart disease, strokes, cancers), expensive medical care is required to treat them. Spending on medical treatment for illnesses caused by smoking cost the Government SSL 32.9 billion in 2017 and caused Sierra Leone citizens to spend SLL 45 billion in out-of-pocket (OOP) healthcare expenditures. OOP healthcare expenditures have significant implications for poverty reduction efforts given the relationship between OOP health spending and impoverishment. Private and other healthcare entities spent about SSL 30.5 billion for treating tobacco-attributable diseases. In total, smoking generated SSL 108.4 billion in healthcare expenditures.

In addition to generating healthcare costs, as individuals become sick, they are more likely to miss days of work (absenteeism) or to be less productive at work (presenteeism). In 2017, the costs of excess absenteeism due to tobacco-related illness were SSL 15.4 billion and the costs of presenteeism due to cigarette smoking were SSL 46.2 billion.

Finally, even in their healthy years, working smokers are less productive than non-smokers. Smokers take at least ten minutes per day more in breaks than non-smoking employees [22]. If ten minutes of time is valued at the average workers' salary, the compounding impact of 415,000 employed daily smokers taking ten minutes per day for smoke breaks is equivalent to losing SSL 32.7 billion in productive output annually.

In total, tobacco use cost Sierra Leone's economy SSL 403.9 billion[3] in 2017, equivalent to about 1.5 percent of Sierra Leone's GDP that year. **Figure 4** breaks down direct and indirect costs, and **Figure 5** and **Figure 6** illustrate the annual health losses that occur due to tobacco use.

2 In assessing the 'current burden' of tobacco use, the economic costs of premature mortality include the cost of premature deaths due to any form of exposure to tobacco (including smoking, second-hand smoke, and the use of other types of tobacco products). Only smoking-attributable (not tobacco-attributable) costs are calculated for healthcare expenditures, absenteeism, presenteeism, and smoking breaks. While other forms of tobacco may also cause losses in these categories, no data is available to pinpoint those losses.

3 Component parts may not add up exactly to 403.9 billion due to rounding.

Credit: © H6 Partners via Flickr

The current burden of tobacco use: health costs

Fig. 4: Breakdown of the share of direct and indirect economic costs (SSL billions)

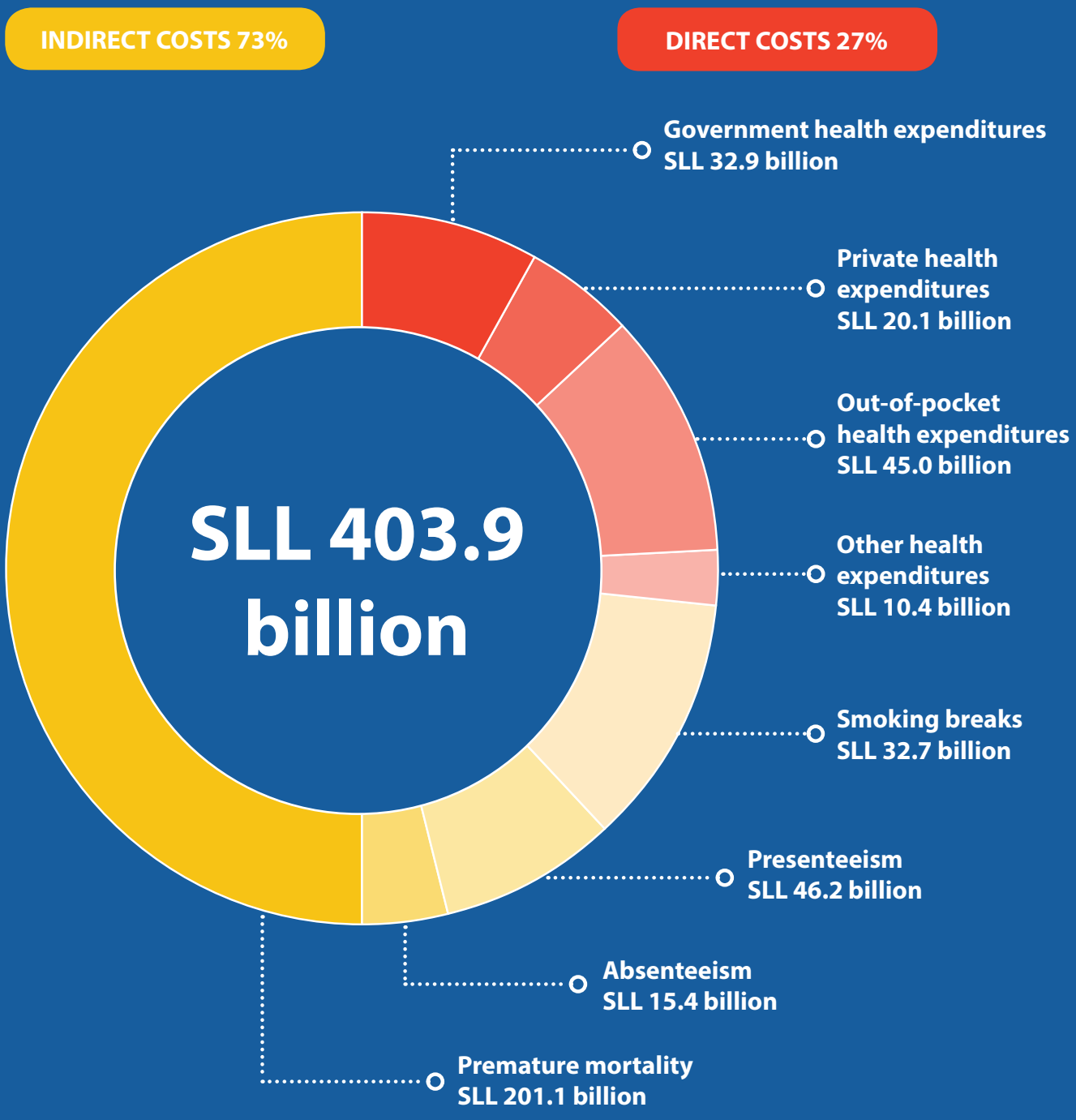


Fig. 5: Tobacco-attributable deaths by disease, 2017 *(Data source: Results are from the IHME Global Burden of Disease Results Tool. Other diseases include Alzheimer's disease and other dementias, stomach cancer, peptic ulcer disease, asthma, colon and rectum cancer, larynx cancer, subarachnoid hemorrhage, prostate cancer, bladder cancer, aortic aneurysm, leukemia, cervical cancer, breast cancer, lip and oral cavity cancer, pancreatic cancer, other pharynx cancer, gallbladder and biliary diseases, kidney cancer, atrial fibrillation and flutter, and nasopharynx cancer.)*

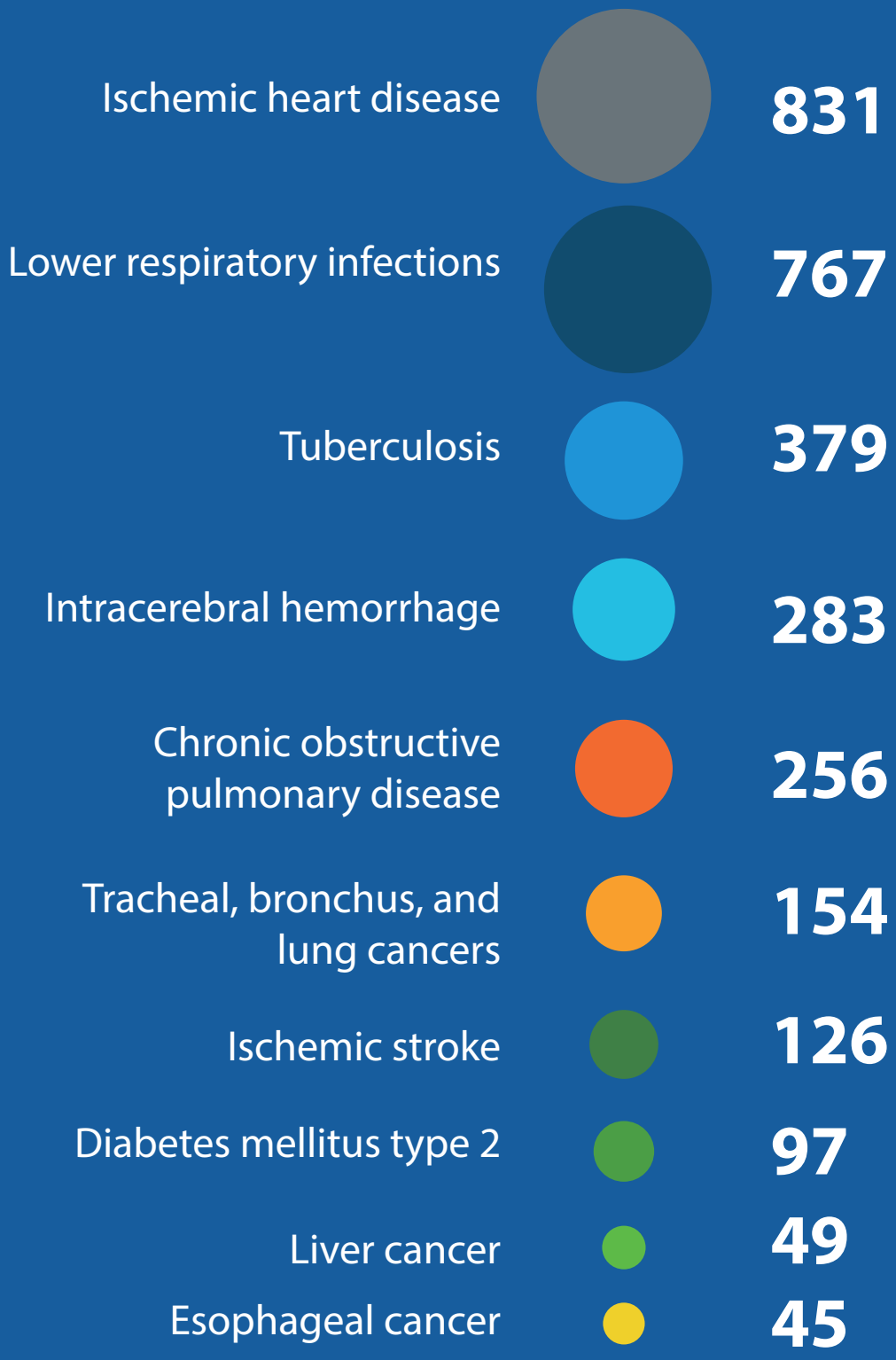
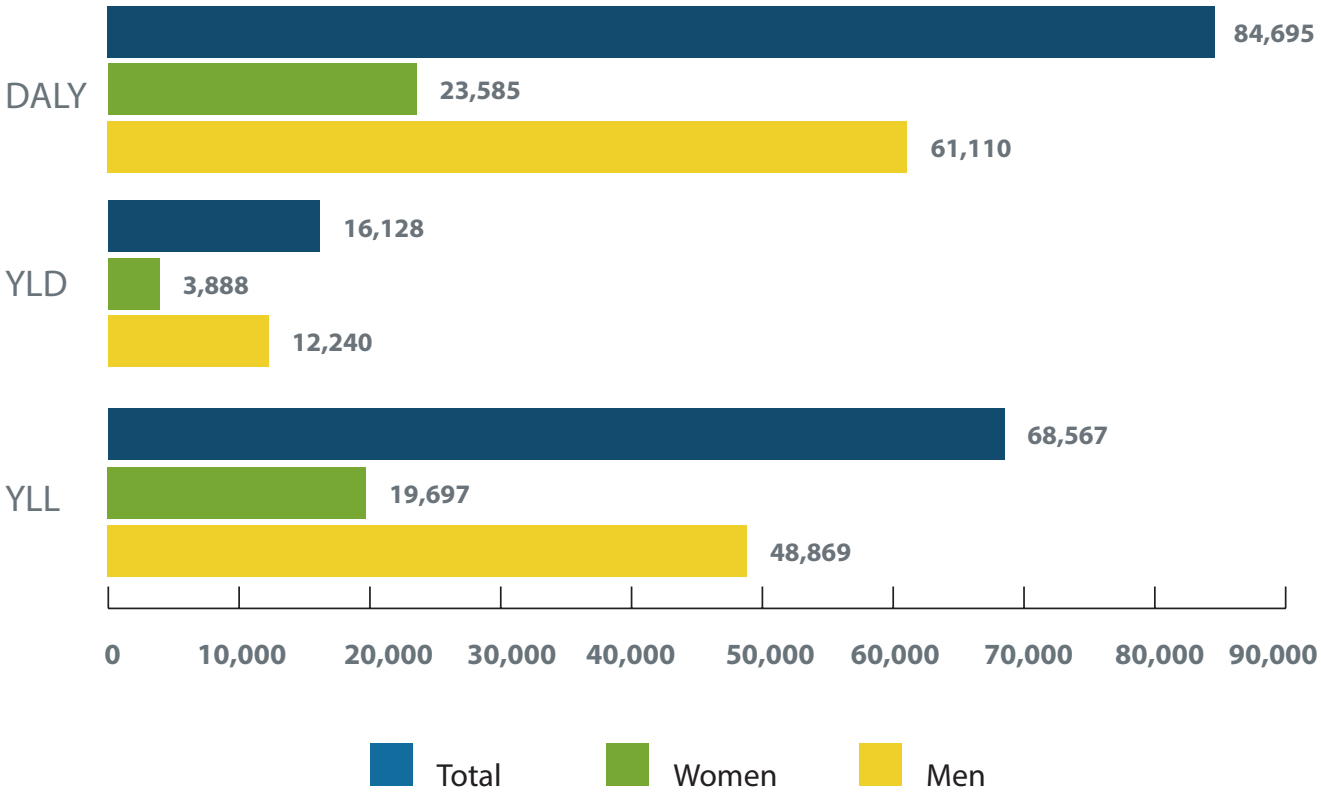


Fig. 6: Tobacco-attributable DALYs, YLDs and YLLs, 2017, by sex[4]



5.2 Implementing policy measures that reduce the burden of tobacco use

By implementing new FCTC policy measures, or intensifying existing ones, Sierra Leone can secure significant health and economic returns, and begin to reduce the SSL 403.9 billion in annual direct and indirect economic losses that occur due to tobacco use.

This section presents the health and economic benefits that result from individual policy actions to: 1) increase cigarette taxation to reduce the affordability of tobacco products; 2) implement a ban on smoking in all public places; 3) strengthen national anti-tobacco mass media campaigns to increase awareness about the harms of tobacco use; 4) enact a comprehensive ban on tobacco advertising, promotion and sponsorship; 5) require graphic warning labels that covers at least 50 percent of the tobacco product, and; 6) implement plain packaging of tobacco products.

4 YLDs are "years lived in less than ideal health…[YLDs are] measured by taking the prevalence of a [disease] condition multiplied by the disability weight for that condition. Disability weights reflect the severity of different conditions." YLLs are "calculated by subtracting the age at death from the longest possible life expectancy for a person at that age." DALYs "equal the sum of YLLs and YLDs. One DALY equals one lost year of healthy life." Source: IHME. (2018). Frequently asked questions. Retrieved from <http://www.healthdata.org/gbd/faq#What%20is%20a%20DALY?>

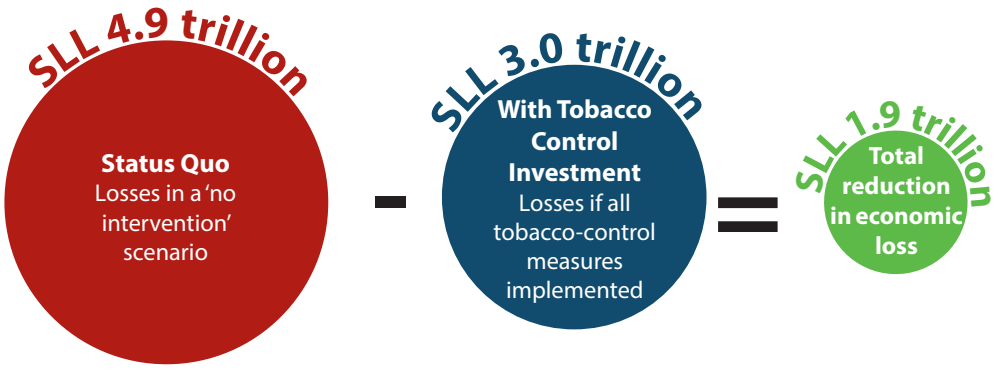
5.3 Health benefits—Lives saved

Enacting the tobacco policy package (inclusive of all six provisions listed above) would lower the prevalence of cigarette smoking, leading to substantial health gains. Specifically, enacting the package would reduce the prevalence of cigarette smoking by 68.8 percent over 15 years, saving 19,844 lives from 2019–2033, or 1,323 lives annually.

5.4 Economic benefits

Implementing the tobacco policy package would result in Sierra Leone avoiding 38 percent of the economic losses that it is expected to incur from smoking over the next 15 years. **Figure 7** illustrates the extent to which Sierra Leone can shrink the economic losses that it is expected to incur under the status quo response.

Fig. 7: Tobacco-related economic losses over 15 years: What happens if Sierra Leone does nothing, versus if the government implements tobacco control measures to reduce demand for smoking?

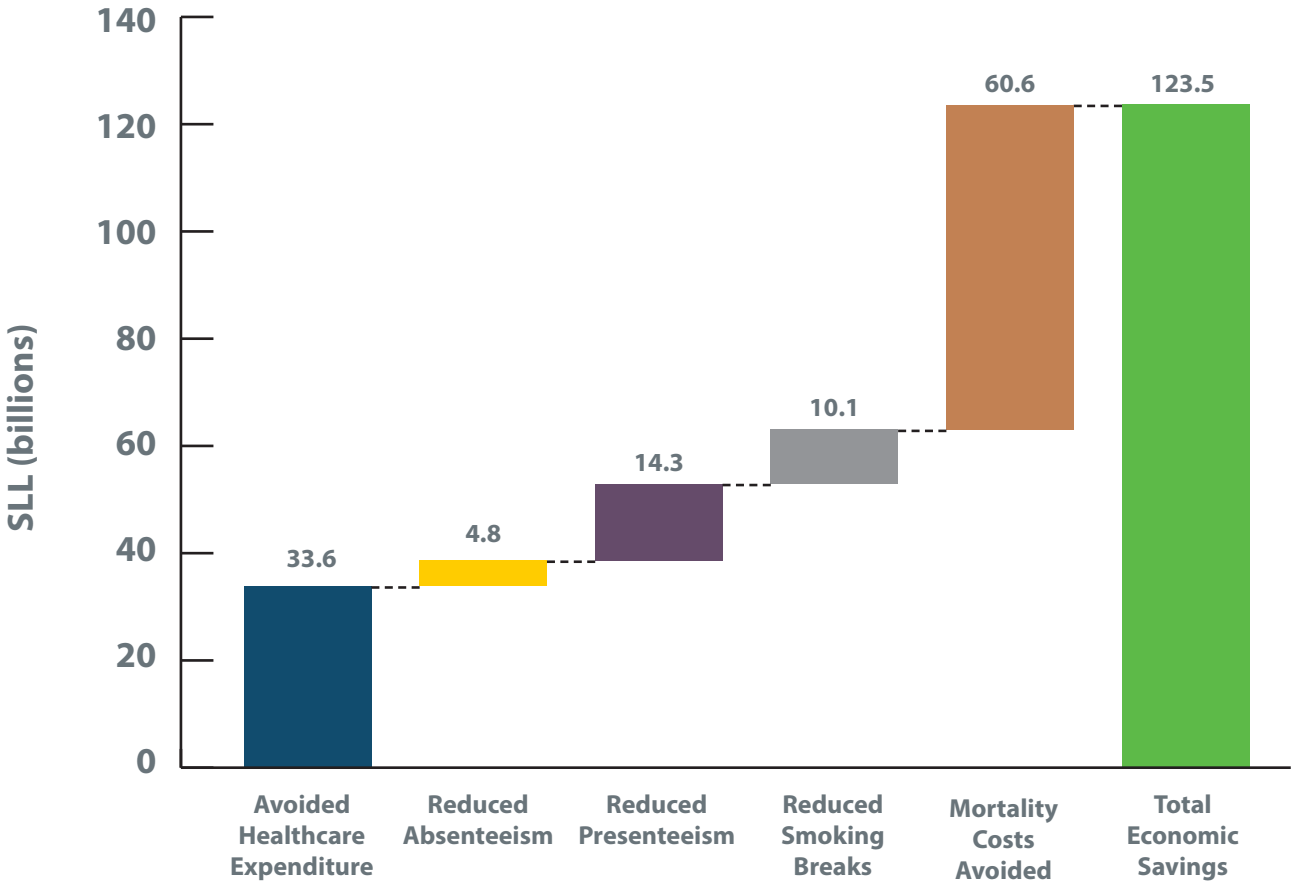


In total, over 15 years Sierra Leone would save about SLL 1.9 trillion that would otherwise be lost if it does not implement the package of tobacco control measures. That is equivalent to about SLL 123.5 billion in annual avoided economic losses.

The avoided economic losses derive from lowering direct and indirect costs of tobacco use. With better health, fewer individuals need to be treated for complications from disease, resulting in direct cost savings to the Government. In addition, better health leads to increased worker productivity. Fewer working-age individuals leave the workforce prematurely due to death. Laborers miss fewer days of work (absenteeism) and are less hindered by health complications while at work (presenteeism). Finally, because the prevalence of smoking declines, fewer individuals take smoking breaks in the workplace.

Figure 8 breaks down the sources from which annual savings accrue. The largest annual savings result from avoiding premature mortality (SLL 60.6 billion). The next highest source of annual savings is avoided healthcare expenditures (SLL 33.6 billion), followed by reduced presenteeism (SLL 14.3 billion), reduced smoking breaks (SLL 10.1 billion), and reduced absenteeism (SLL 4.8 billion).

Fig. 8: Sources of annual economic savings as a result of implementing the tobacco policy package

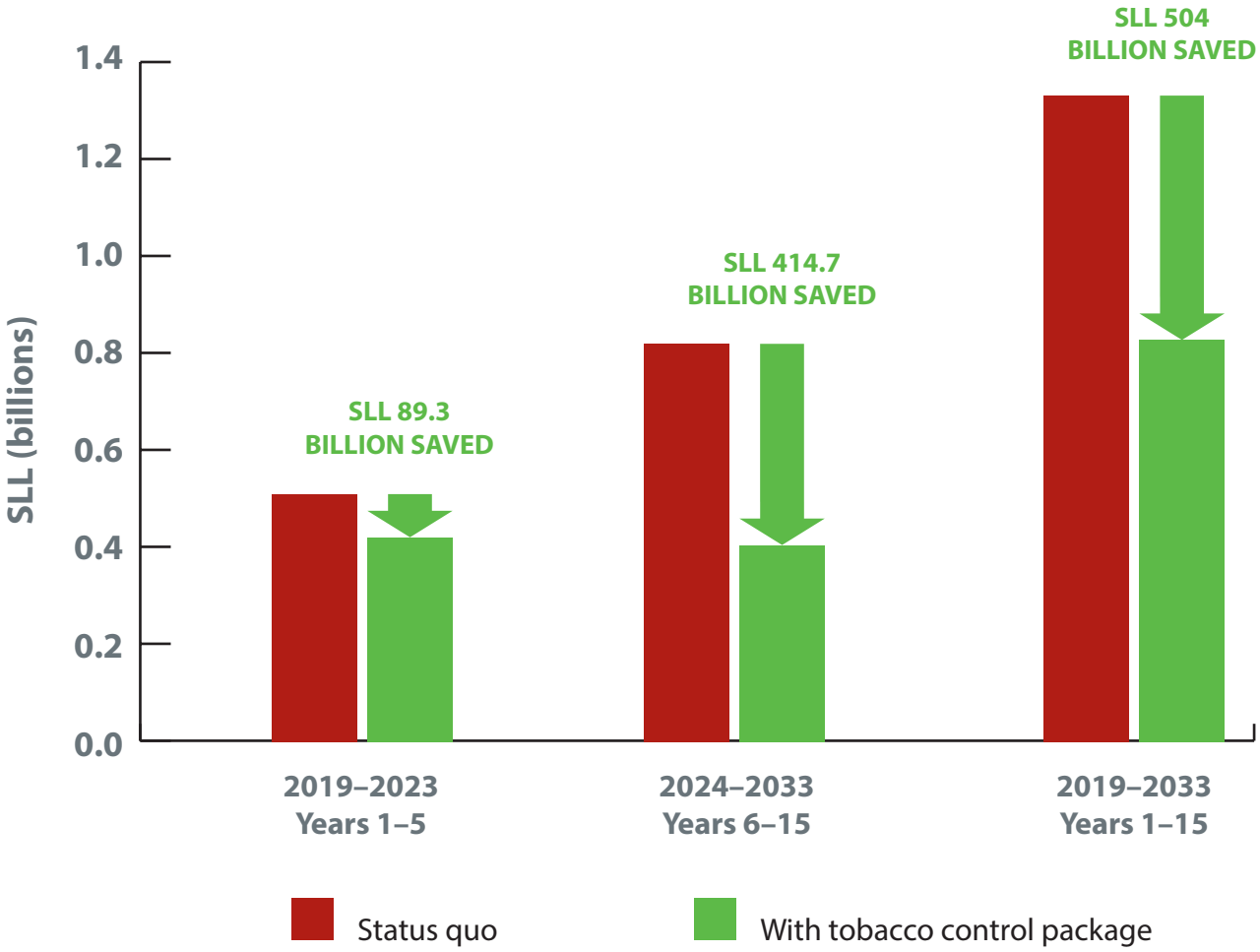


Implementing the package of tobacco control measures reduces healthcare expenditures for citizens and the Government. Presently, total private and public annual healthcare expenditures in Sierra Leone are about SLL 4.0 trillion [23], of which an estimated 2.7 percent [3] is directly related to treating disease and illness due to tobacco use (≈ SLL 108.4 billion).

Year-over-year, the package of interventions lowers smoking prevalence, which leads to less illness, and consequently less healthcare expenditures. Over the time horizon of the analysis, the package of interventions averts SLL 504 billion in healthcare expenditures, or about SLL 33.6 billion annually (see **Figure 9**), with 30 percent of those savings accruing to Government, and 42 percent to individual citizens who would have paid out-of-pocket for healthcare. Thus, from

the reduced healthcare costs alone, the Government stands to save about SLL 153 billion over 15 years. Successfully reducing the healthcare expenditure burden that tobacco imposes on Sierra Leone's citizens would support efforts to reduce economic hardship on individuals and families. Rather than spend on treating avoidable disease, these families would be able to invest more in nutrition, education and other inputs to secure a better future.

Fig. 9: Private and public healthcare costs and savings over the 15-year time horizon



5.5 The Return on Investment

An investment is considered worthwhile from an economic perspective if the gains from making it outweigh the costs. A return on investment (ROI) analysis measures the efficiency of the tobacco investments by dividing the economic benefits that are gained from implementing the FCTC measures by the costs of the investments. For the Sierra Leone investment case the ROI for each intervention was evaluated in the short-term (period of five years), to align with planning and political cycles, and in the medium-term (period of 15 years). Net benefits show the amount of impact that each intervention has, while the ROI shows the return on investment for each intervention.

Table 2 displays costs, benefits and ROIs by intervention, as well as for all interventions combined. All individual interventions deliver a positive ROI within the first five years, meaning that even short-term returns would be achieved. Depending on the intervention, over the first five years, the Government will recoup anywhere from 4 to 36 times its investment. The ROIs for each intervention continue to grow over time, reflective of the increasing effectiveness of policy measures as they move from planning and development stages, to full implementation.

Table 2: Return on investment, by tobacco policy/intervention (SLL billions)[5]

	First 5 years (2019–2023)			All 15 years (2019–2033)		
	Total Costs (SLL billions)	Net Benefits (SLL billions)	ROI	Total Costs (SLL billions)	Net Benefits (SLL billions)	ROI
Tobacco Package* *(all policies/interventions implemented simultaneously)*	31	328	**11**	72	1,852	**26**
Raise cigarette taxes *(FCTC Article 6)*	4	151	**36**	9	973	**107**
Protect people from tobacco smoke *(FCTC Article 8)*	7	45	**6**	15	350	**24**
Warning labels *(FCTC Article 11)*	3	60	**17**	7	461	**62**
Plain packaging *(FCTC Article11: Guidelines)*	3	15	**4**	7	121	**16**
Mass media campaign *(FCTC Article12)*	5	26	**5**	15	202	**13**
Bans on advertising *(FCTC Article 13)*	3	118	**34**	8	875	**115**

*The combined impact of all policy measures is not the sum of individual policy measures. To assess the combined impact, following Levy and colleagues' (2018), "effect sizes [are applied] as constant relative reductions; that is, for policy i and j with effect sizes PRi and PRj, (1-PR ii) x (1-PR j) [is] applied to the current smoking prevalence [24, p. 454].

5 Costs and benefits have been rounded to the nearest whole number. ROIs were calculated using non-rounded numbers, so individual ROIs may not equal the quotient of the rounded costs and benefits.

Over the 15-year period, banning advertising is expected to have the highest return on investment: for every Sierra Leonean leone invested, one can expect to see 115 leones in return. Raising cigarette taxes has the next highest ROI (107:1), followed by warning labels (62:1), smoke free public places (24:1), plain packaging (16:1), and mass media campaigns (13:1).

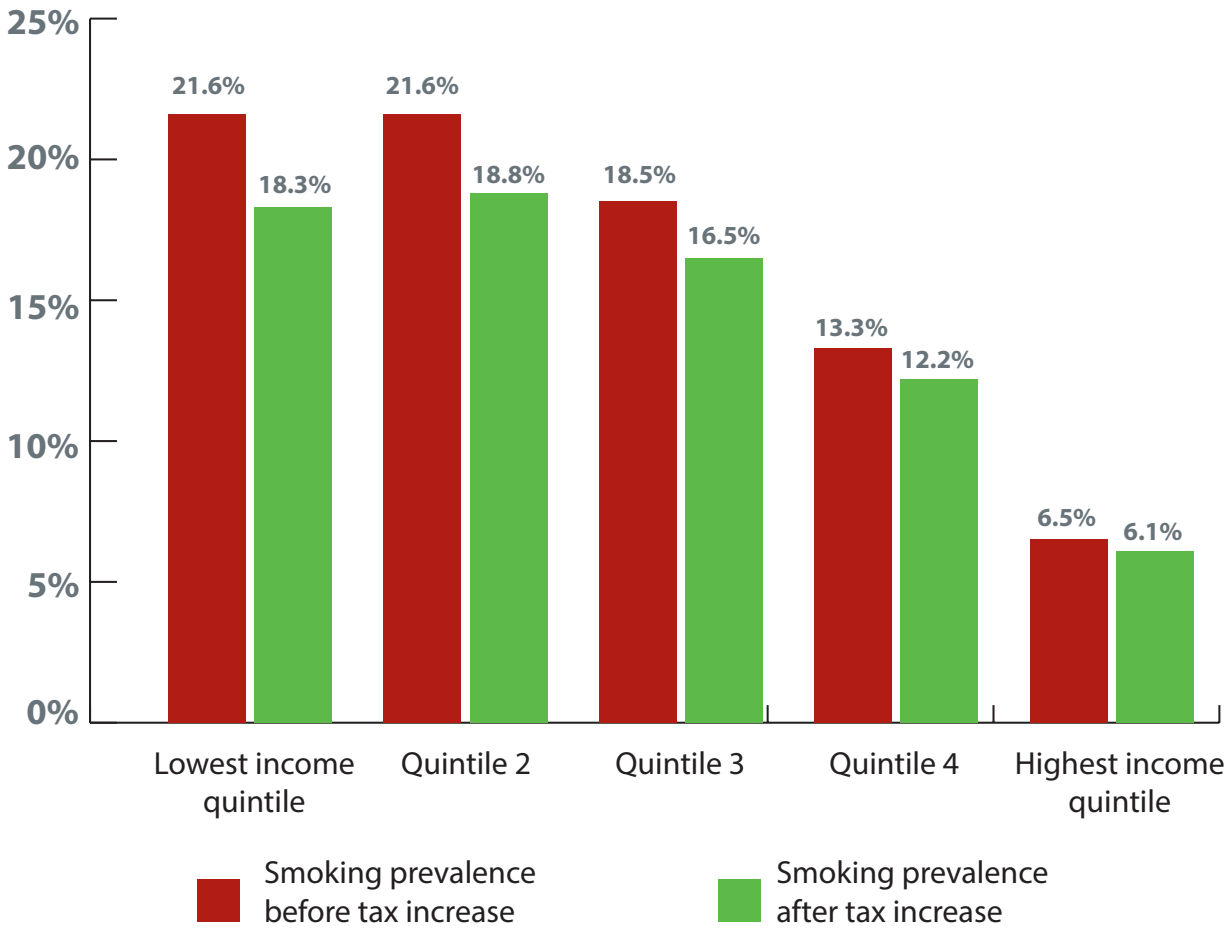
5.6 Impact on the poor

A common misperception is that taxes on tobacco products may disproportionately impact poor tobacco users, since the tax burden represents a higher proportion of their income than that of wealthier tobacco users. However, evidence shows that the poor actually stand to benefit most from raised cigarette taxes [25]. Relative to richer smokers, poorer smokers are more likely to quit smoking when taxes are increased [26], meaning they benefit from subsequent decreases in tobacco-related health problems, and resulting medical costs. In Lebanon [27], for example, a 50 percent increase in cigarette prices was projected to prevent 23,000 new cases of poverty over 50 years, and that same level of increase was found to avert 2.1 million catastrophic health expenditures in India, 440,000 in Bangladesh, and 250,000 in Vietnam [28].

To examine the extent to which a cigarette tax increase could be considered pro-poor in Sierra Leone, the investment case undertakes an equity analysis. The analysis divides Sierra Leone's population into five equal groups, by income, where quintile 1 is composed of the poorest 20 percent of people, and quintile 5 is composed of the wealthiest 20 percent. Within each income group, the analysis examines the impact of tax increases that raise the price of the average pack of cigarettes by about 39 percent (2,100 leones, or about US$0.25). Average tobacco-income elasticities from a set of low- and middle-income countries are employed to assess how different economic groups react to changes in price.

The results from the analysis show that all income quintiles reduce smoking in response to the tax measures but, because people with lower incomes are more responsive to changes in price, and because the poor smoke at higher rates in Sierra Leone, the tax increase causes the largest drop in smoking prevalence among the poorest income quintile.

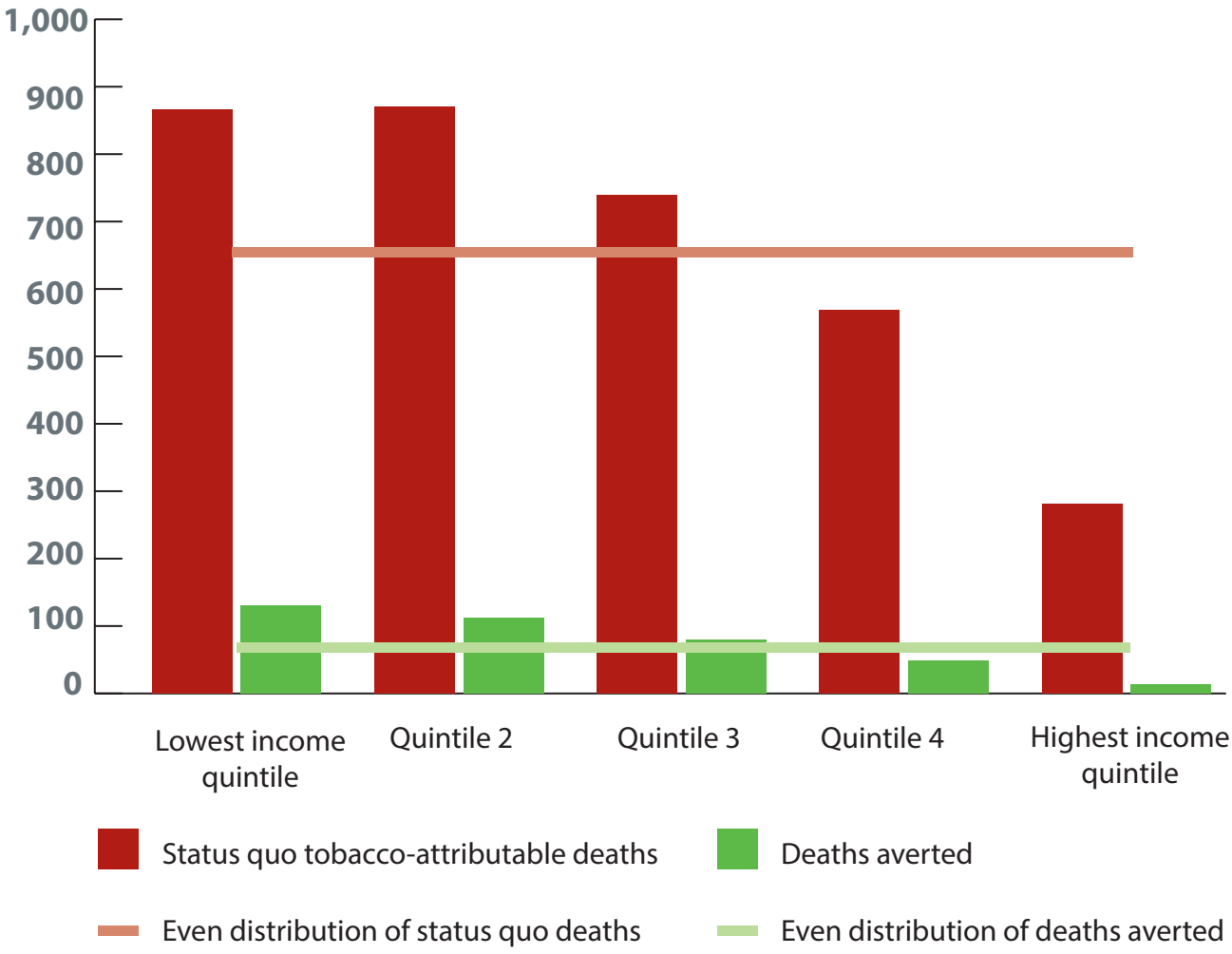
Fig. 10: Smoking prevalence before and after the cigarette tax increase, by income quintile



Lower rates of smoking translate to health gains. Prior to the cigarette tax increase, of the 3,330 tobacco-attributable deaths observed in 2017, 26 percent occurred among the poorest 20 percent of the population (quintile 1). However, because the tax increase would cause smoking prevalence to fall the most in the poorest income quintile, health benefits would disproportionately accrue to the poor.

The investment case finds that over one-third (34 percent) of the 385 deaths that will be averted due to the cigarette tax increase will be among the poorest 20 percent of the population, as shown in **Figure 11**. The second poorest quintile benefits from 28 percent of the averted deaths, followed by the middle quintile (21 percent), second richest quintile (13 percent), and richest quintile (3 percent).

Fig. 11: Status quo deaths and deaths averted by the cigarette tax increase, by income quintile[6]



5.7 The Sustainable Development Goals and the WHO FCTC

Enacting six measures[7] designed to reduce demand for tobacco will enable Sierra Leone to fulfill SDG Target 3.a to strengthen implementation of the WHO FCTC. Moreover, taking action now will contribute to Sierra Leone's efforts to meet SDG Target 3.4 to reduce by one-third premature mortality from NCDs by 2030. These health gains will support development more broadly, including reduction of poverty and inequalities (SDGs 1 and 10, respectively) and economic growth (SDG 8). In Sierra Leone in 2017, 11,000 premature deaths between the ages of 30 to 69 were caused by the four main NCDs (CVD, diabetes, cancer, and COPD). Roughly 12 percent of these premature deaths occurred due to tobacco use. Enacting the FCTC measures identified in the Investment

6 The red horizontal line shows what the number of status quo deaths would be if they were evenly distributed among the quintiles, and the green line demonstrates the number of averted deaths if they were distributed evenly among quintiles.

7 Increasing tobacco taxation to reduce the affordability of tobacco products; implementing and enforcing bans on smoking in all public places to protect people from tobacco smoke; mandating that tobacco products and packaging carry large graphic health warning describing the harmful effects of tobacco use; mandating plain packaging of all tobacco products; promoting public awareness about tobacco control issues and the harms of tobacco use through mass media; and enacting a comprehensive ban on all forms of tobacco advertising, promotion and sponsorship.

Case would reduce tobacco use prevalence—a key risk factor driving NCD incidence—preventing 5,749 premature deaths from the four main NCDs over the next 12 years (2019 to 2030). Preventing those deaths contributes the equivalent of about 13 percent of the needed reduction in premature mortality to fulfill SDG Target 3.4.

SDG Target 3.A

By 2030 the FCTC measures would...

Lower the prevalence of tobacco use by over two-thirds from present day levels.

Reduce economic costs due to tobacco use by SLL 1.4 trillion, including saving SLL 389 billion in healthcare expenditures.

Lead to savings that significantly outweigh the costs (see **Table 3**).

Table 3: Return on Investment through the SDG era (2030), by tobacco policy/intervention (SLL billions)[8]

	Total Costs (SLL billions)	**Net Benefits** (SLL billions)	**ROI**
Tobacco Package* *(all policies/interventions implemented simultaneously)*	**61**	**1,428**	**23**
Raise cigarette taxes *(FCTC Article 6)*	8	727	**93**
Protect people from tobacco smoke *(FCTC Article 8)*	13	265	**21**
Warning labels *(FCTC Article 11)*	6	349	**54**
Plain packaging *(FCTC Article 11, in accordance with COP Guidelines for Implementation)*	6	91	**14**
Mass media campaigns *(FCTC Article 12)*	13	152	**12**
Bans on advertising *(FCTC Article 13)*	7	664	**101**

8 Costs and benefits have been rounded to the nearest whole number. ROIs were calculated using non-rounded numbers, so individual ROIs may not equal the quotient of the rounded costs and benefits.

6. Conclusion and recommendations

Each year, tobacco use costs Sierra Leone SLL 403.9 trillion in economic losses and causes substantial human development losses. Fortunately, the investment case shows that there is an opportunity to reduce the social and economic burden of tobacco in Sierra Leone. Enacting the recommended multisectoral tobacco control provisions would save over 1,300 lives each year and reduce the incidence of disease, leading to savings from averted medical costs and averted productivity losses. In economic terms, these benefits are substantial, adding to SLL 1.9 trillion over the next fifteen years. Further, the economic benefits of strengthening tobacco control in Sierra Leone greatly outweigh costs of implementation (SLL 1.9 trillion in benefits versus just SLL 0.07 trillion in costs).

By investing now in six proven tobacco control measures, Sierra Leone would not only reduce tobacco consumption, improve health, reduce government health expenditures and grow the economy, it would also reduce hardships among Sierra Leoneans, particularly among those with low incomes. As the investment case shows, contrary to common misperception, tobacco control would benefit people in lower-income categories the most. For example, higher cigarette taxes would not only help those with lower incomes (and others) avoid out-of-pocket health expenditures, it would also raise revenue for the Government of Sierra Leone that can advance its sustainable development efforts, a priority identified by the Ministry of Trade and Industry. Many countries reinvest savings from healthcare expenditures and revenue from increased tobacco taxes into national development priorities such as universal health coverage, which is another proven pro-poor and inclusive policy measure.

The investment case has identified strong tobacco control investments that Sierra Leone can make. It offers compelling economic and social arguments to implement core WHO FCTC measures. The full benefits of the investment case are more likely to be realized if the following actions are pursued:

Draft and pass a comprehensive tobacco control bill.

In March 2017, the Sierra Leone Cabinet gave directives for the Minister of Justice to draft tobacco legislation with the aim of protecting the health of the public from the effect of exposure to tobacco smoke. Sierra Leone's tobacco control law was at draft stage and not comprehensive. Recently, with technical support from the Campaign for Tobacco Free Kids (CTFK), the Government revisited the draft bill and fully aligned it with the Convention. It is recommended that the Ministry of Health and Sanitation work closely with the relevant ministries to ensure that the new comprehensive tobacco control bill gets the approval of the Cabinet and to advocate for its passage through engaging Parliamentarians. Sierra Leone should also initiate the legal process for joining the Protocol to Eliminate Illicit Trade in Tobacco Products. International partners and experts can assist Sierra Leone's efforts with legal expertise.

Strengthen multi-sectoral engagement in tobacco control.

The Government can leverage the investment case findings to demonstrate that tobacco control is an important development strategy for Sierra Leone with implications for not just health but also ministries of finance, economy, education, social welfare, labour and others, as well as Parliamentarians. Effective tobacco control requires a 'whole-of-government' and 'whole-of-society' approach.

The investment case findings should be used to advocate stronger collaboration and coordination among different sectors, particularly by reinvigorating the multi-sectoral tobacco control task force. The Ministry of Health and Sanitation, Ministry of Finance and other stakeholders could champion integration of tobacco control into relevant national and sectoral planning and policy documents. Given the development impacts of tobacco use, many ministries in Sierra Leone see tobacco control as beneficial to their sector. Many UN and development partners in Sierra Leone can likewise advance tobacco control in line with their core accountabilities, commitments and partnerships.

Advocate for comprehensive increases in tobacco taxes.

Taxes on tobacco products are one of the world's most proven and impactful health and development tools. However, tobacco tax levels remain notably low in Sierra Leone. Taxes equal only 30 percent of the retail price of the most sold brand of cigarettes. This is far below the WHO-recommended level modelled in the FCTC investment case (at least 75 percent of the retail price inclusive of at least a 70 percent excise tax). It is recommended that Sierra Leone not only implement the cigarette tax advancement modelled in the FCTC investment case but also explore expanding effective tobacco taxation to all tobacco products. In doing so, increased taxes on tobacco products can be framed as a means to improve health, reduce healthcare costs, and raise important revenue to finance development. These triple benefits of tobacco taxation were stated clearly in the Addis Ababa Action Agenda on Financing for Development. Using part of tobacco tax revenue to strengthen tobacco control efforts and related measures such as universal health coverage, as many countries are doing, is a viable option. Given the economic benefits of tobacco control demonstrated through this investment case, it is recommended that the Ministry of Health and Sanitation work with the Ministry of Finance on a sustainable financing mechanism for tobacco control. Establishing a national tobacco control programme with a multisectoral coordination mechanism and costed strategy will assist in allocating resources towards national tobacco control efforts.

It is further recommended that the Ministry of Health and Sanitation work with the Ministry of Finance to create an enabling political, policy and social environment for tax increases on tobacco products including by restructuring (simplifying) the tax system and increasing tobacco tax rates on a regular basis to decrease affordability of tobacco products. Policymakers who advocate for additional tobacco-tax increases can now cite robust, Sierra Leone-specific evidence from this report that tobacco tax increases are pro-economy and pro-development, benefiting the lowest-income segments of society the most. Equally important is the development of a robust strategy and systems to combat illicit tobacco trade, to prevent the loss of tax revenue for the government and the loss of lives. Sierra Leone is urged to sign and ratify the Protocol to Eliminate Illicit Trade in Tobacco Products.

7. Methodology annex

7.1 Building the FCTC investment case

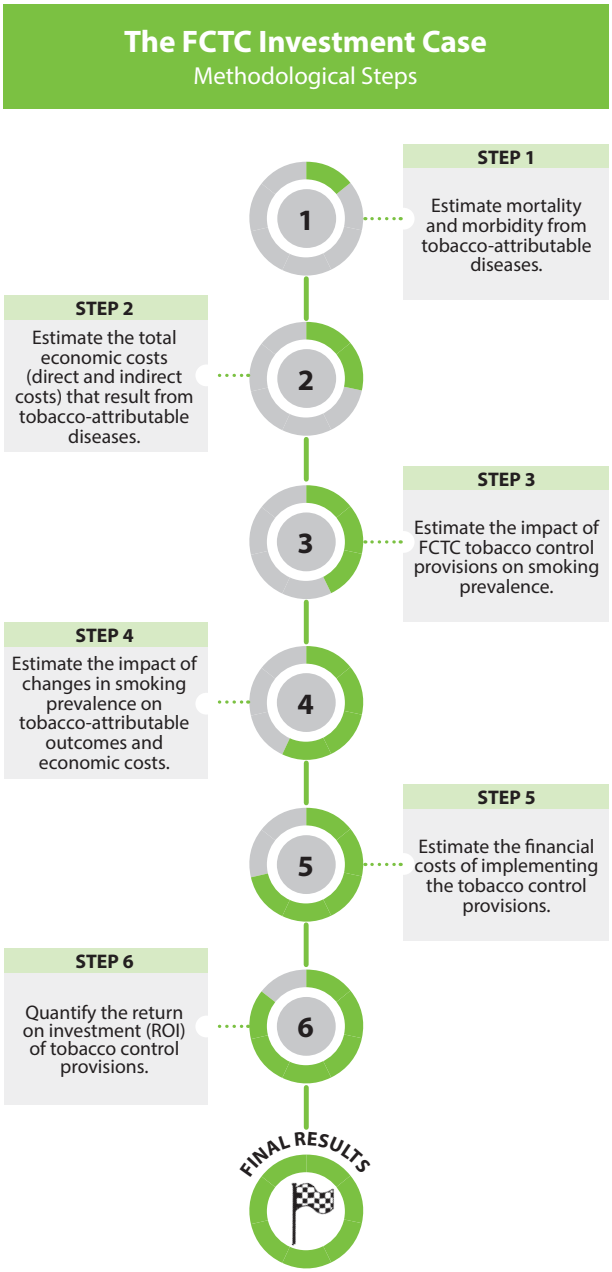
The purpose of the FCTC Investment Case is to quantify the current health and economic burden of tobacco use in Sierra Leone; estimate the impact that implementing tobacco measures would have on reducing the burden; and provide analysis of other impacts—i.e., equity—that may factor into government decisions to implement tobacco control measures.

A RTI International-developed model was developed to conduct the investment case, and perform the methodological steps in **Figure 12**. The tools and methods used to perform these steps are described below. Interested readers are also referred to this report's separate Technical Appendix for a more thorough account of the methodology.[9]

The FCTC Investment Case team worked with partners in Sierra Leone to collect national data inputs for the model. Where data was unavailable from government or other in-country sources, the team utilized publicly available national, regional, and global data from sources such as the World Health Organization (WHO), World Bank database, Global Burden of Disease (GBD) study, and academic literature.

Within the investment case, costs and monetized benefits are reported in constant 2017 Sierra Leonean leones, and discounted at a rate of three percent.

Fig. 12: Building the FCTC Investment Case



9 Available upon request

7.1.1 Overview

The economic analysis consists of two components: 1) assessing the current burden of tobacco use and 2) examining the extent to which FCTC provisions can reduce the burden. The first two methodological steps depicted in **Figure 12** are employed to assess the current burden of tobacco use, while methodological steps 3–6 assess the costs and benefits of implementing or intensifying FCTC measures that reduce demand for tobacco. The tools and methods used to perform these methodological steps are described in detail below.

7.1.2 COMPONENT ONE: CURRENT BURDEN	The current burden model component provides a snapshot of the current health and economic burden of tobacco use in Sierra Leone.

STEP 1

Estimate mortality and morbidity from tobacco-related diseases.

The investment case model is populated with country-specific data on tobacco attributable mortality and morbidity from the 2017 Global Burden of Disease Study (GBD) [29]. The study estimates the extent to which smoking and exposure to second-hand smoke contribute to the incidence of 37 diseases, healthy life years lost, and deaths, across 195 countries.

STEP 2

Estimate the total economic costs (direct and indirect costs) associated with tobacco-related diseases.

Next, the model[10] estimates the total economic costs of disease and death caused by tobacco use, including both *direct* and *indirect* costs. Direct refers to tobacco-attributable healthcare expenditures. Indirect refers to the value of lives lost due to tobacco-attributable premature mortality, and labour-force productivity costs: absenteeism, presenteeism, and excess smoking breaks.

10 In assessing the current burden of tobacco use, the economic costs of premature mortality include the cost of premature deaths due to any form of exposure to tobacco (including of smoking, second-hand smoke, and the use of other types of tobacco products). Only smoking-attributable (not tobacco-attributable) costs are calculated for healthcare expenditures, absenteeism, presenteeism, and smoking breaks. While other forms of tobacco may also cause losses in these categories, no data is available to precisely calculate those losses.

Direct costs – Direct costs include both tobacco-attributable public (government-paid), private (insurance, individual out-of-pocket), and other healthcare expenditures. The proportion of healthcare costs attributable to smoking was obtained from Goodchild and colleagues (2018), who estimated tobacco to account for 2.7 percent of all healthcare expenditures in Sierra Leone [30].

Indirect costs – Indirect costs represent the monetized value of lost time, productive capacity, or quality of life as a result of tobacco-related diseases. Indirect costs accrue when tobacco use causes **death**, eliminating the unique economic and social contributions that an individual would have contributed in their remaining years of life. In addition, tobacco use results in productivity losses. Compared to non-tobacco users, individuals who use tobacco are more likely to miss days of work (*absenteeism*); to be less productive at work due tobacco-related illnesses (*presenteeism*); and to take additional breaks during working hours in order to smoke.

- *The economic cost of premature mortality due to tobacco use* – Mortality is valued using the human capital approach, which places an economic value on each year of life lost. Using GBD data on the age at which tobacco-attributable deaths occur, the model calculates the total number of years of life lost due to tobacco, across the population. Each year of life is valued at 1.4 times GDP per Capita, following the "full income approach" employed by Jamison et al (2013) [31].

- *Productivity costs* – Productivity costs consist of costs due to absenteeism, presenteeism, and excess work breaks due to smoking. The model incorporates estimates from academic literature on the number of extra working days missed due to active smoking (2.6 days per year) [22]. Presenteeism losses are obtained similarly, under research that shows that smokers in China, the US, and five European countries experience about 22 percent more impairment at work because of health problems compared to never-smokers [32]. Lost productivity due to smoking breaks is valued under the conservative assumption that working smokers take ten minutes of extra breaks per day [22].

7.1.3 COMPONENT TWO: POLICY/INTERVENTION SCENARIOS

This component estimates the effects of FCTC tobacco control measures on mortality and morbidity, as well as on total economic costs (direct and indirect) associated with tobacco use.

Policy measures to model were selected in consultation with Sierra Leone's Ministry of Health and Sanitation, and in accordance with the Global Strategy to Accelerate Tobacco Control [19] developed following a decision of the Parties at the Seventh session of the Conference of the Parties (COP7) to the WHO FCTC. Under Objective 1.1 of the Strategy, Parties seek to accelerate WHO FCTC implementation by setting clear priorities where they will be likely to have the greatest impact in reducing tobacco use.

This includes priority implementation of price and tax measures (*Article 6*) and time-bound measures of the Convention, including bans on smoking in all public places (*Article 8*), health warnings and plain tobacco packaging (*Article 11*), and comprehensive bans on tobacco advertising, promotion and sponsorship (*Article 13*). In addition, given the importance of awareness in behavior change and shaping cultural norms, the investment cases include instituting mass media campaigns against tobacco use (*Article 12*) as a measure modeled.

STEP 3

Estimate the impact of FCTC tobacco control provisions on smoking prevalence.

The impacts of implementing the FCTC provisions are obtained from the literature. The impact of enforcing smoke-free air laws, implementing plain packaging, intensifying advertising bans, and conducting mass media campaigns are derived from Levy et al. (2018) [24] and Chipty (2016) [33], as adapted within the Tobacco Use Brief of Appendix 3 of the WHO Global NCD Action Plan 2013–2020 [34].

The impact of raising taxes on the prevalence of tobacco use is determined by the change in price resulting from tax increases, and the "prevalence elasticity", or the extent to which individuals stop—or reduce—smoking as a result of price changes. Modelled changes in price included an average annual increase in price of 15 percent from 2019–2024, following by average annual increases of 5.5 percent from 2025–2034. Under these changes, the share of taxes as a percent of the retail price would increase to 75 percent by 2027, and 80 percent by 2033.

Following evidence that price elasticity ranges between -0.4 to -0.8 in developing countries [35], it is assumed that the price elasticity of demand in Sierra Leone is -0.5, and that prevalence elasticity is approximately one-half of price elasticity (-0.25) [36].

Within the analysis, it is assumed that implementation or intensification of new tobacco control measures does not take place until year three. With the exception of cigarette taxes—the impact of which is dependent on the timing of increases in tax rates—the full impact of the measures is phased in over a five-year period. The phase-in period follows WHO assumptions [37] that two years of planning and development are required before policies are up and running, followed by three years of partial implementation that are reflective of the time that is needed to roll out policies, and work up to full implementation and enforcement.

Table 4 displays the impact sizes used within the investment case analysis.

Table 4: Impact size: Relative reduction in the prevalence of current smoking by tobacco control policy/intervention

Intervention	First 5 Years (2019–2024)	Over 15 Years (2019–2034)
Tobacco Package *(all policies/interventions implemented simultaneously)*	**55.5%**	**68.8%**
Raise cigarette taxes *(FCTC Article 6)*	23.5%	35.4%
Protect people from tobacco smoke *(FCTC Article 8)*	8.5%	11.0%
Warning labels *(FCTC Article 11)*	11.3%	14.7%
Plain packaging *(FCTC Article 11: Guidelines)*	2.8%	3.7%
Mass media campaign *(FCTC Article 12)*	4.8%	6.2%
Bans on advertising *(FCTC Article 13)*	22.6%	29.4%

*The combined impact of all policy measures is not the sum of individual policy measures. To assess the combined impact, following Levy and colleagues' (2018), "effect sizes [are applied] as constant relative reductions; that is, for policy i and j with effect sizes PRi and PRj, (1-PR ii) x (1-PR j) [is] applied to the current smoking prevalence [24, p. 454].

STEP 4

Estimate the impact of changes in smoking prevalence on tobacco-attributable health outcomes and economic costs.

To analyze the impact of policy measures on reducing the health and economic burden of smoking, the investment case calculates and compares two scenarios. In the status quo scenario, current efforts are 'frozen', meaning that, through the year 2033 (end of the analysis), no change occurs from the tobacco control provisions that are currently in place. In the intervention scenario, Sierra Leone implements new tobacco measures or intensifies existing ones, to reduce the prevalence of smoking. The difference in health and economic outcomes between the status quo and intervention scenarios represents the gains that Sierra Leone can achieve by taking targeted actions to reduce tobacco use.

The marginal effects of the policies are calculated using the status quo scenario as the comparison group. To calculate marginal effects, the model subtracts the outcome (risk factor attributable deaths, healthcare expenditures, etc.) under the intervention scenario from the same outcome under the status quo scenario. The difference between the two outcomes is the amount of change in the outcome associated with the policy.

Marginal Effects = Outcome Base Scenario — Outcome Intervention Scenario

Marginal effects are calculated as follows for each outcome:

- **Health outcomes:** To calculate the reductions in mortality and morbidity due to implementation of the policy measures, forecasted changes in smoking prevalence are applied directly to the GBD risk factor attributable outcomes from the status quo scenario. This means that the model adjusts the risk factor attributable outcomes for mortality and morbidity as reported by GBD based on year-over-year relative changes in smoking prevalence for each outcome.
- **For healthcare expenditures,** the model applies forecasted annual relative changes in smoking prevalence for each intervention scenario to the SAFs. SAFs are adjusted in proportions equal to the relative change in smoking prevalence for each intervention scenario.
- **Workplace smoking outcomes** are recalculated substituting actual (status quo) smoking prevalence for estimated annual smoking prevalence for each of the intervention scenarios that are modeled.

STEP 5

Estimate the financial costs of implementing the tobacco control measures.

The financial costs to the government of implementing new measures—or of intensifying or enforcing existing ones—is estimated using the WHO NCD Costing Tool. Full explanations of the costs and assumptions embedded in the WHO NCD Costing tool are available [37].

The Tool uses a 'bottom up' or 'ingredients-based' approach. In this method, each resource that is required to implement the tobacco control measure is identified, quantified, and valued. The Tool estimates the cost of surveillance, human resources—for program management, transportation, advocacy, and enacting and enforcing legislation—trainings and meetings, mass media, supplies and equipment, and other components. Within the Tool, costs accrue differently during five distinct implementation phases: planning (year 1), development (year 2), partial implementation (years 3–5), and full implementation (years 6 onward).

Across these categories, the Tool contains default costs from 2011, which are sourced from the WHO CHOICE costing study. Following Shang and colleagues, the Tool is updated to reflect 2017 costs by updating several parameters: the US$ to local currency unit exchange rate (2017), purchasing power parity (PPP) exchange rate (2017), GDP per capita (US$, 2017), GDP per capital (PPP, 2017), population (total, and share of the population age 15+, 2017), labor force participation rate (2017), and government spending on health as a percent of total health spending (2015) [38, p. 5]. Unless government or other in-country parameters are received, data is from the World Bank database, with the exception of data on the share of government health spending, population figures, and the price of gas per liter. The share of government spending on health as a percent of total health spending is derived from the WHO Health Expenditures database, and population figures are from the UN Population Prospects.

STEP 6

Quantify the return on investment (ROI) for the various tobacco control policies and interventions modeled, both individually and collectively.

The return on investment (ROI) analysis measures the efficiency of tobacco control investments by dividing the monetary value of health gains from investments by their respective costs. The ROI answers the following question: for every currency unit that the government invests in tobacco control measures, how much can it expect to receive in return?

ROIs were calculated for (i) each of the six tobacco control policies and interventions modeled, (ii) total economic losses and (iii) specific outcomes, such as lives saved or healthcare expenditures. Estimates from Step 3 and 4, were used to calculate ROIs for at 5- and 15-year intervals.

$$\textbf{Return on Investment (ROI)} = \frac{\text{Benefits of Intervention/Policy}}{\text{Costs of Implementing Intervention/Policy}}$$

7.2 Equity analysis

To assess how increased cigarette taxation affects different income groups, different income groups responses to changes in price were estimated, i.e. their elasticity of smoking participation. No studies were identified that examine the elasticity of smoking participation in Sierra Leone. Instead, an average from low- and middle-income countries identified by the International Agency for Research on Cancer's *Handbook of Cancer Prevention Volume 14: Effectiveness of Tax and Price Policies for Tobacco Control* [39].

Some of the studies in **Table 5** did not report elasticity by income quintile, instead reporting by income tertile, for example. In order to construct this table, adjustments to the data were made as needed. In the case of tertiles, tertile 1 was assigned to quintile 1, tertile 2 to quintile 3, and tertile 3 to quintile 5. Then, quintile 2 was given as the average of tertiles 1 and 2, and quintile 4 was given as the average of tertiles 2 and 3.

Table 5: Elasticity of smoking participation studies

Country	Author	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Myanmar	Kyaing [40]	-1.09	-1.25	-1.41	-1.38	-1.24
Nepal	Karki [41]	-0.31	-0.26	-0.35	-0.35	-0.31
Vietnam	Kinh [42]	-0.65	-0.65	-0.54	-0.42	-0.42
Bangladesh	Nargis [43]	-0.33	-0.47	-0.27	-0.21	-0.14
Sri Lanka	Arunatilake [44]	-0.37	-0.35	-0.31	0.02	0.06
Sri Lanka	Arunatilake [45]	-0.17	0.17	0.21	0.01	0.34
Ukraine	Krasovsky [46]	-0.19	-0.20	-0.21	-0.17	-0.12
Ukraine	Krasovsky [46]	-0.14	-0.15	-0.17	-0.12	-0.08
China	Mao [47]	-0.95	-0.67	-0.39	-0.07	0.26
China	Mao [48]	-0.08	-0.04	-0.01	0.06	0.13
Egypt	Nassar [49]	-0.30	-0.33	-0.33	-0.33	-0.32
Thailand	Isra [50]	-0.50	-0.18	-0.07	-0.05	-0.02
Thailand	Isra [50]	-0.25	-0.03	-0.02	-0.08	-0.04
Indonesia	Adioetomo [51]	-0.03	0.03	0.09	0.15	0.20
South Africa	van Walbeek [52]	-0.70	-0.57	-0.55	-0.54	-0.41
Turkey	Onder [53]	-0.12	-0.32	-0.11	-0.02	0.15
Average		**-0.38**	**-0.33**	**-0.28**	**-0.22**	**-0.12**

Credit: © Dominic Chavez / World Bank via Flickr

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