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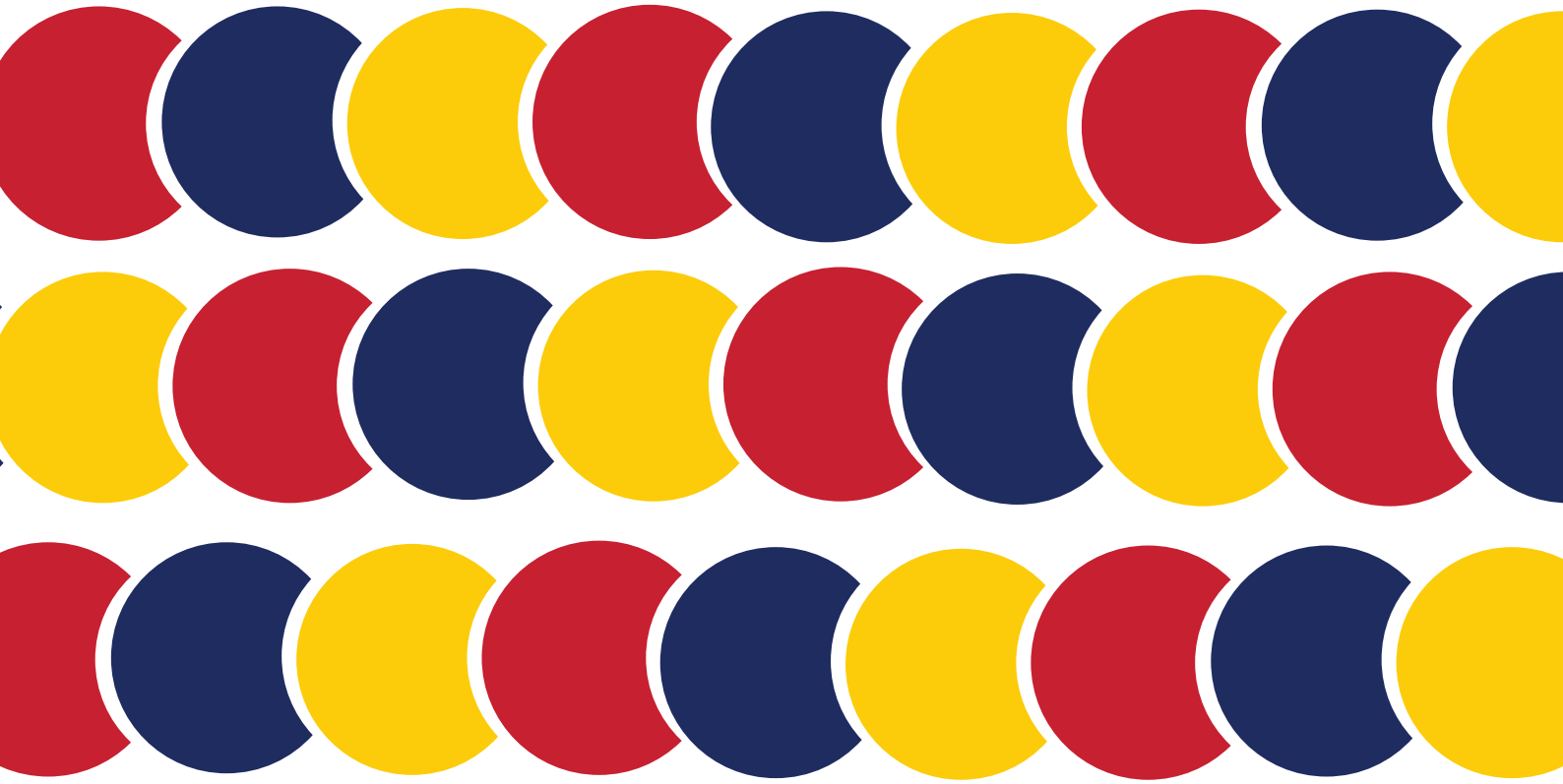
Investment Case for Tobacco Control in

Chad

The case for scaling-up WHO FCTC implementation



The report was translated from English to French with the help of Anjaramamy Ramamonjisoa.

August 2019

Disclaimer

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The Case for Investing in WHO FCTC Implementation in Chad

Prepared by
Ministry of Public Health, Chad
RTI International
United Nations Development Programme
WHO FCTC Secretariat
World Health Organization

August 2019

Funded by UK Government

Nearly **2,500** Chadians die every year due to tobacco-related illness.

37% of those deaths are among the 20% of the population with the lowest incomes.

Tobacco costs Chad

XAF 32 billion

every year, equivalent to

0.5% of its GDP

in 2017.

Investing now in four tobacco control measures will prevent

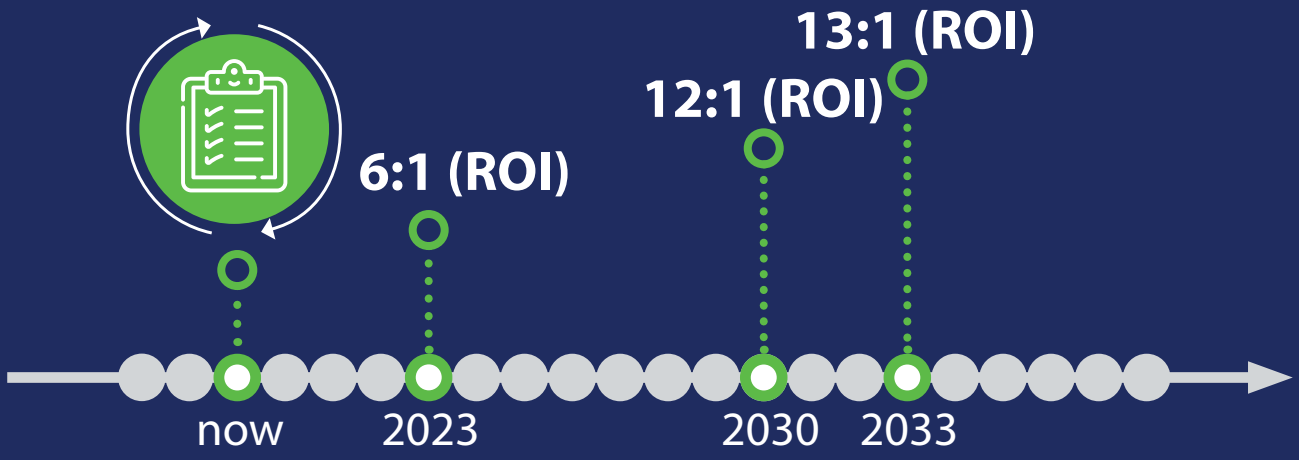
10,500 deaths

and avert

XAF 105.7 billion

in health costs and economic losses by 2033.

By investing in four tobacco control interventions, Chad will receive a return on investment of **6:1** in averted costs and economic losses by 2023, **12:1** by 2030, and **13:1** by 2033.



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The report recommends actionable steps, in addition to the modeled WHO FCTC provisions, that the Government of Chad 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 Chad to reduce the social, economic, and environmental burdens that tobacco continues to place on its country.

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1. Executive summary

Overview

Tobacco is a health and sustainable development issue. Tobacco consumption and production causes early death and disease, results in high health costs and economic losses, widens socioeconomic inequalities, and impedes progress against a range of other Sustainable Development Goals.

This report presents the findings of the case for investing in tobacco control in Chad. 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 Chad, it measures the costs and benefits—in health and economic terms—of implementing four priority tobacco control measures. The four measures are:

1. **Increase tobacco taxation to reduce the affordability of tobacco products.** (*FCTC Article 6*)
2. **Expand and enforce bans on smoking in public places to protect people from tobacco smoke.** (*FCTC Article 8*)
3. **Implement plain packaging.** (*FCTC Article 11 Guidelines*)
4. **Promote and strengthen public awareness about tobacco control issues and the harms of tobacco use through mass media information campaigns.** (*FCTC Article 12*)

Main findings

The investment case findings indicate that tobacco use in Chad is leading to enormous economic and health losses. These annual losses include a) XAF 5 billion in healthcare expenditures, and b) XAF 27 billion in lost productive capacities due to premature mortality, disability, and workplace smoking. The productivity losses from current tobacco use in Chad – 84 percent of all tobacco-related costs – indicate that tobacco use impedes development in Chad beyond health; multisectoral engagement is required for effective tobacco control, and other sectors benefit substantially from supporting tobacco control investments.

Every year, tobacco use kills nearly 2,500 Chadians every year, with 71 percent of these deaths among individuals under the age of 70. More than 800 lives lost are due to exposure to secondhand smoke, and 384 (47 percent) of secondhand smoke deaths are among children younger than age 15.

By acting now, the Government of Chad can reduce the burden of tobacco use. The investment case findings demonstrate that enacting and enforcing four FCTC tobacco-control measures would, over the next 15 years:

Avert XAF 105.7 billion in economic losses. This would include XAF 88.3 billion in economic output losses averted. The tobacco-control measures stimulate economic growth by ensuring that fewer people 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 XAF 17.3 billion in savings through avoidance of tobacco-attributable healthcare expenditures. Of this, the Government would save XAF 5.4 billion in healthcare expenditures, and Chadians would save XAF 9.4 billion in out-of-pocket healthcare costs.

Save 10,500 lives and reduce the incidence of disease. The recommended WHO FCTC tobacco control measures would contribute to Chad's efforts to achieve SDG Target 3.4 to reduce by one third premature mortality (under age 70) from NCDs by 2030. Enacting the FCTC measures would prevent over 2,500 premature deaths from the four main NCDs by 2030, the equivalent of about four percent of the needed reduction in premature mortality to fulfill SDG Target 3.4.

Provide economic benefits (XAF 105.7 billion) that significantly outweigh the costs (XAF 7.9 billion) of implementation. Each of the WHO FCTC provisions is highly cost-effective. Increasing cigarette taxes has the highest return on investment (52:1), followed by implementing a nation-wide mass media campaign (22:1), enforcing bans on smoking in public places (11:1), and implementing plain packaging of tobacco products (10:1).

Equity analysis in Chad, main findings

- Strengthening tobacco control in Chad will confer social benefits to all, but particularly to those with the lowest incomes.
- Almost half of the deaths averted from increasing cigarette taxes will be among the lowest income quintile. The lowest-earning 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 those of lower incomes 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.

Recommendations

The results of the Chad FCTC Investment Case 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, Chad can accelerate its efforts towards achieving the Sustainable Development Goals, which call for a one-third reduction in premature mortality by 2030.

The report recommends actionable steps, in addition to the modeled WHO FCTC provisions, that the Government of Chad 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 Chad to reduce the social, economic, and environmental burdens that tobacco continues to place on its country.

1. **Increase tobacco taxes and reduce illicit trade.**
2. **Strengthen the tobacco control legislative framework and enforcement.**
3. **Strengthen multisectoral coordination and planning.**

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 Chad, more than 595,000 people use tobacco products, leading to an estimated 2,473 deaths every year.[1] Seventy-one percent of those deaths occur among individuals 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 that would go to fulfilling basic needs, including food and education,[7, 8, 9] contributing to pushing some 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, 14, 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 Chad 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 30 and 70) by 2030. Accelerating progress on NCDs requires strengthened implementation of the World Health Organization Framework Convention on Tobacco Control (SDG Target 3.a). 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.

Chad ratified the WHO Framework Convention on Tobacco Control (WHO FCTC) in 2006.[16] Since that time, Chad has made significant progress in tobacco control, mandating that large graphic warning labels appear on tobacco packaging; banning all forms of tobacco advertising, promotion, and sponsorship; and banning smoking in all public places.[17, 18]

By legislating and funding these important measures, Chad is helping to curb the tobacco epidemic. Intensifying existing policies and implementing new measures can draw the tobacco use prevalence curve further downward and generate additional health and economic gains. For example, opportunities exist to conduct a nationwide anti-tobacco campaign and implement plain packing laws.[19] 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.

In 2018, the WHO FCTC Convention Secretariat, UNDP, and WHO undertook a joint mission to Chad 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 Sustainable Development Goals (SDGs). Chad is one of the 15 countries worldwide receiving this dedicated 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 Chad (the return on investment; ROI). In consultation with the Government of Chad, four key 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)*

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

Institute mass media campaigns against tobacco use. *(FCTC Article 12)*

Section 3 of this report provides an overview of tobacco control in Chad, including tobacco use prevalence as well as challenges and opportunities. **Section 4** summarizes the methodology of the investment case (see *Annex* and *Technical Appendix*[1] for more detail). **Section 5** reports the main findings of the economic analysis, including the impact of cigarette tax increases on different socioeconomic groups. The report concludes under **Section 6** with a set of recommendations.

Credit: © Ken Doerr via Flickr

1 Available upon request

3. Tobacco control in Chad: status and context

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

In Chad, 13.4 percent of men and 2.7 percent of women age 15 and above use at least one form of tobacco.[20] Tobacco use varies by region, with the lowest rates found in the central regions of the country (1.1 percent in Lac and 1.9 percent in Barh El Gazal) and the highest rates found in the southern regions of Mayo Kebbi Est (20.4 percent) and Logone Oriental (13.0 percent),[21] as shown in **Figure 1**.

The type of tobacco products consumed varies by gender. **Figure 2** shows that the prevalence of cigarette smoking is approximately twice as high as other forms of tobacco use, such as snuff or chewing tobacco, among men.[22] However, among women, the rate of the use of other tobacco products is four times greater than cigarette smoking prevalence. Chewing tobacco, known as tambook in Chad, is fermented, grounded and mixed with sodium bicarbonate and kept in the mouth, while snuff is dried and finely ground tobacco that is mixed with potassium nitrate and other salts and inhaled as a pinch.

Tobacco use is highly correlated with income. The poorest 20 percent of people in Chad have a cigarette smoking prevalence of 9.8 percent, while the wealthiest 20 percent of the population smoke cigarettes at a rate of 4.2 percent.[23] This results in lower income Chadians suffering from a disproportionate share of the health and economic burden resulting from tobacco-attributable disease and mortality. Because the health and economic benefits of tobacco control accrue disproportionately to these lower-income groups, tobacco control is regarded as a pro-poor policy approach that accelerates progress towards SDG 10 on reducing inequalities.

Fig. 1: Tobacco use prevalence, by region

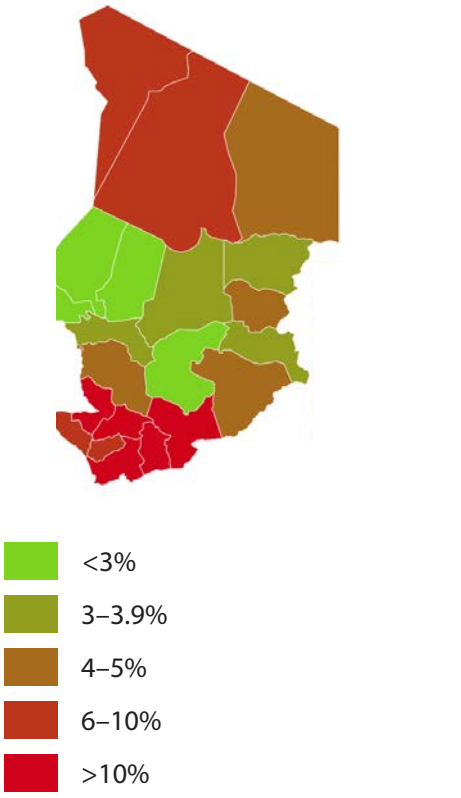
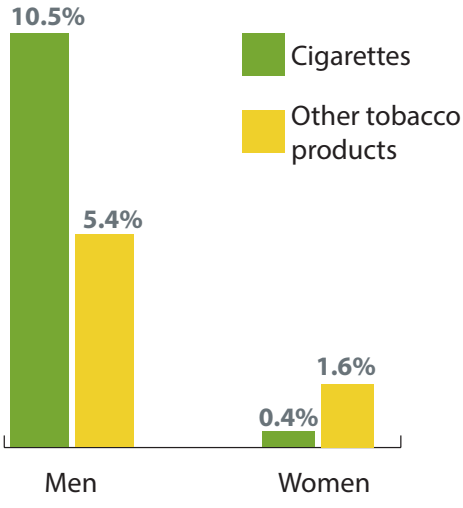


Fig. 2: Forms of tobacco use among adult tobacco consumers, by sex



3.2 Tobacco control regulatory measures

Strong fiscal and regulatory measures can powerfully influence norms by signaling to the population that tobacco use is harmful. Four years after accession to the WHO FCTC in 2006, Chad passed Tobacco Control Law No. 10 / PR / 2010. This law and several bylaws ban smoking from public places, mandate graphic warning labels on tobacco packaging, and ban all forms of direct and indirect forms of tobacco advertising, promotion, and sponsorship.[24] In June 2018, Chad ratified the protocol on illicit trade in tobacco.

However, several FCTC provisions are not covered under the current legal framework (e.g. testing of tobacco products, preventing tobacco industry interference, regulation of duty-free sales, provision of accessible tobacco cessation services, banning sales of single stick cigarettes). Similarly, some measures covered by current legislation remain incomplete, including bans on smoking in public places. The Ministry of Health is currently working on regulation to define 'public places' and to lend enforcement authority to different entities, including the new sanitary health inspectors under the national police force. To further protect the health of its population, Chad can honor its obligations as a member of the FCTC by strengthening existing policies and implementing additional measures proved to reduce demand for tobacco. The following summarizes the state of implementation for the interventions.

Taxation and Pricing

Chad currently has a total **tax rate on cigarettes** that accounts for 34.5 percent of the retail price of the most sold brand of cigarettes. This falls short of the WHO FCTC recommendation that taxes represent *at least* 75 percent of the retail price of tobacco products with *at least* 70 percent of taxes composed of excise taxes.[25] Chad has made progress in raising taxes, with the implementation of a specific excise tax of XAF 100 on all cigarette packs which came into effect 01 January 2019 with the 2019 Finance Law. Furthermore, it was announced that the additional tax revenue will be earmarked for the promotion of public health.

However, Chad can further increase taxes with a focus on increasing specific excise taxes to achieve additional health and revenue gains for the Government. Chad should also put in place a regular adjustment mechanism or periodic procedures for reassessing the level of the tobacco tax, and tax all tobacco products equally to ensure that tobacco consumers do not switch to cheaper products (e.g. tambook). The investment case examines the impact of doubling the cost of a pack of cigarettes over the first seven years, with additional incremental increases through 2033.

Smoking Ban in Public Places

Chad has enacted a ban on smoking in all public places. However, there are significant issues with compliance with the bans. For example, a 2016 study of 105 bars, restaurants, cafes, and hotels in Chad observed customers smoking in 72 percent of the venues and staff smoking in 15 percent of the venues.[26]

Warning Labels and Packaging

In order to inform consumers about the harmful effects of tobacco, Chad mandates that cigarette and smokeless tobacco packaging carry four rotating graphic warning labels and text messages that cover 70 percent of the packaging.[27] This meets the FCTC obligations for graphic warning labels, which require graphic warning labels to cover at least 50 percent of tobacco packaging. This intervention is therefore not modeled in the investment case for Chad.

Plain Packaging

Plain packaging—neutral colors, without branding and logos—is currently not mandated.[28] Plain packaging of tobacco products would enhance the impact of health warnings and eliminate the possibility of using the package as a vehicle for advertising.

Anti-tobacco Awareness Campaigns

The Government of Chad, in partnership with the Association for the Defense of Consumer Rights of Chad (ADC) and the Blue Cross, have sponsored several anti-smoking media campaigns over the past five years.[29] As part of the "STOP TabaChad" initiative, several awareness campaigns across the country have been carried out. National mass media campaigns were broadcast on two televisions and two radio stations with national reach. Between 2018 and 2019, the Government of Chad broadcast on the national radio and certain private radio stations awareness messaging each lasting four consecutive weeks and conducted two to three times a year.

Tobacco Advertising, Promotion, and Sponsorship (TAPS)

Chad has enacted a comprehensive ban all forms of tobacco advertising, promotion, and sponsorship (TAPS), including direct advertising on major forms of media (e.g., TV, radio, print media, billboards, internet) and indirect forms of promotion and sponsorship (e.g., free distribution of tobacco products, point of sale product displays). Compliance with the bans is reported to be high and this intervention is not modeled in the investment case.[30]

Table 1 summarizes the existing state of FCTC demand-reduction measures and compares them against the FCTC target goals for each measure. Reaching target goals can further reduce tobacco consumption.

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

Tobacco Control Policy	Baseline	Target
Increase tobacco taxation to reduce the affordability of tobacco products. *(Article 6)*	Tax share equivalent to 34.5 percent of the retail price of the most sold brand of cigarettes.	Further reduce affordability of tobacco by increasing taxes on cigarettes and smokeless tobacco. Harmonize taxes across tobacco products and increase the specific excise tax component to reduce the possibility of consumers switching to cheaper brands and products. Implement regular tax increases to outpace inflation and income growth.
Implement and enforce bans on smoking in all public places to protect people from tobacco smoke. *(Article 8)*	Smoking is banned in all public places, but compliance with and enforcement of the law is low.[31]	Currently meeting the FCTC guidelines for banning smoking in all indoor workplaces and public places. However, increasing enforcement and compliance with the ban would result in additional gains.
Mandate that tobacco products and packaging carry large graphic health warnings describing the harmful effects of tobacco use. *(Article 11)*	Four graphic warning labels are required to cover 70 percent of tobacco packaging and to be rotated.	**Currently meeting the FCTC size and rotation obligations.**
Mandate plain packaging of all tobacco products. *(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. *(Article 12)*	Chad has not held a nationwide anti-tobacco campaign within the past five years.	Implement a nationwide anti-tobacco mass media campaign that is researched and tested with a targeted audience; airs on TV and radio, and; is evaluated for impact.
Enact and enforce a comprehensive ban on all forms of tobacco advertising sponsorship and promotion. *(Article 13)*	Advertising is banned on major forms of media (e.g., TV, radio, internet, billboards, print) as are indirect forms of promotion and sponsorship.	**Currently meeting most of the FCTC obligations on banning tobacco advertisements, promotions, and sponsorships.**

* Unless otherwise noted, information in this table is derived from the WHO Report on the Global Tobacco Epidemic: Country profile – Chad.[32]

3.3 National multisectoral tobacco control strategy and coordination

Chad has made good progress in strengthening national multisectoral coordination, planning and strategy for tobacco control. In 2014, Chad established the National Program for the Fight against Tobacco, Alcohol and Drugs (PNLTAD). There are two levels of organization of the PNLTAD: the central and regional level of coordination, though the regional level remains to be operationalized. PNLTAD's capacity was reportedly limited due to lack of resources, but Chad successfully enacted a specific tax increase on tobacco in January 2019, earmarking the resulting revenue to the improvement of public health, including tobacco control.

In 2007, Chad established the National Committee for the Fight against Smoking (CNLT), Chad's multisectoral national coordination mechanism specific to tobacco control. The CNLT is subdivided into three entities: the National Council for Tobacco Control, chaired by the Prime Minister of Chad; the Technical Committee for Tobacco Control housed in the PNLTAD; and regional committees under the supervision of the Minister of Health. The regional committees are not operational. The CNLT brings together key ministries, civil society, religious denominations and development partners, but represented sectors do not have defined roles.

Since the PNLTAD and CNLT were created through a Ministerial decree and do not have a dedicated structure endowed with financial autonomy, they cannot receive dedicated funding from specific taxes allocated by the Ministry of Finance and approved by the National Assembly. Several stakeholders recommended that the PNLTAD and CNLT be elevated in status and re-established in the same form through legislation. This would allow the PNLTAD to design an annual budget, and the Ministry of Finance to levy a specific tobacco tax and earmark tobacco tax revenue to finance PNLTAD activities.

In September 2018, the Ministry of Health launched Chad's multi-sectoral national strategy for tobacco control. The general objective is to reduce by 1/3 the prevalence of smoking among adults aged 15 and over by 2022. The specific objectives consist of strengthening the legal and institutional framework for tobacco control; reducing the demand for and supply of tobacco products; conducting tobacco research; and implementing a system of epidemiological surveillance, monitoring and evaluation of smoking. Specific objectives include reinforcing judicial and institutional capacities to implement and enforce tobacco control, reducing demand and supply of tobacco products, enhancing research and surveillance, and strengthening partnerships and cooperation. The strategy aligns with Chad's 2016–2030 National Health Policy and 2017–2021 National Development Plan and was launched with the buy-in and support of multiple sectors of Government. Developed under the aegis of the PNLTAD, its implementation is to be coordinated by the CNLT. The strategy is only partially funded through donor and Ministry of Health contributions, however, and no cost-sharing agreements have been arranged with other sectors involved in the strategy.

3.4 Enforcement and compliance with tobacco control laws

Stakeholders in Chad cite lack of enforcement and awareness as two primary issues hindering FCTC implementation in the country. This relates particularly to bans on smoking in public places; bans on sales to and by minors; bans on tobacco advertising, sponsorship and promotion; and bans on public shisha bars. The municipal police (*gendarmerie*) can enforce the law but requires clear directives on the law and its requirements. The Ministry of Health and others conducted an enforcement training for N'Djamena politicians and law enforcement in October 2018, funded in part by the FCTC 2030 project. Enforcement will be assisted at both the communal and national levels by the new sanitary police force under the national police, as stipulated under the national tobacco control law. In 2017, two circular notes were issued banning smoking on the premises of all Ministries. Enforcement of this smoking ban remains a challenge, however.

3.5. Tobacco industry interference and illicit trade

Chad has one tobacco product manufacturer, la Manufacture des Cigarettes du Tchad (MCT) which is a subsidiary of the Imperial Tobacco group. Its headquarters is based in N'Djamena and the manufacturing plant is located in Moundou, a city south of the capital. MCT reportedly produced 48.3 million packs of cigarettes in 2016, compared to 36.6 million packs in 2003. The tobacco industry in Chad actively attempts to shape regulation in its favor. The industry lobbied for delays in the rotation of graphic health messages required under Order 039 and lobbied for the Government to adopt the tobacco industry's track and trace system for tobacco products, 'Codentify'.

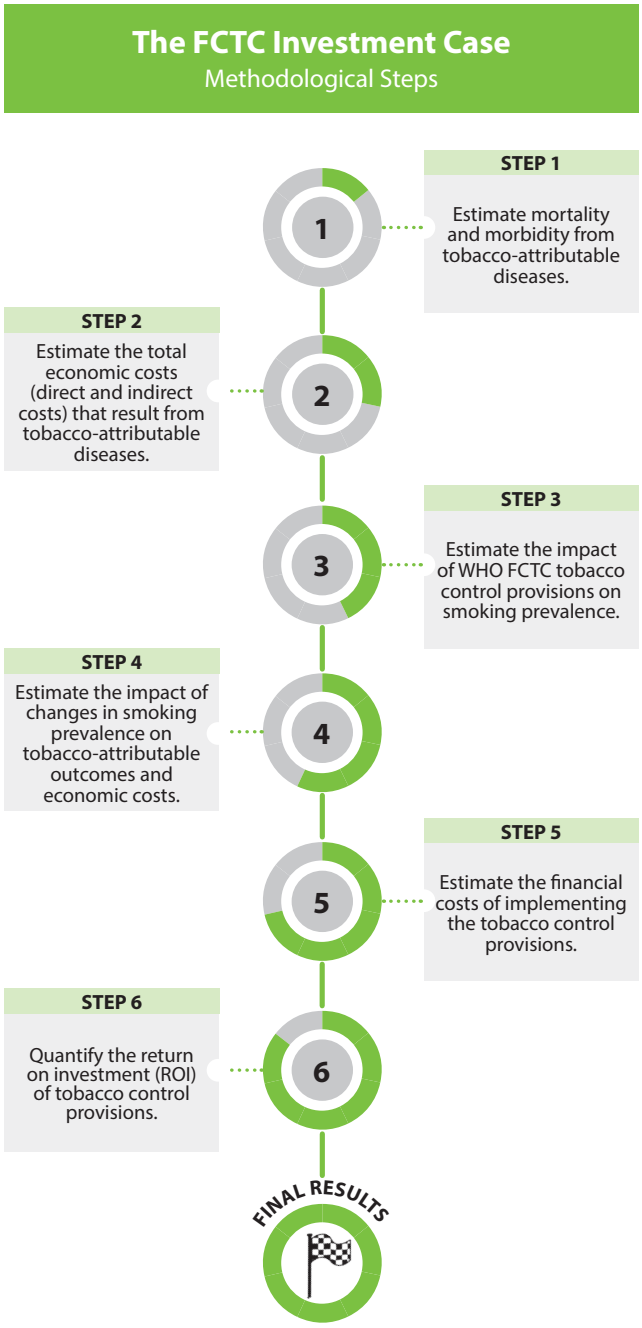
There is currently no code-of-conduct or other provisions in Chad to prevent tobacco industry interference. However, Chad is receiving financial and technical assistance from the International Union Against Tuberculosis and Lung Disease under project Chad 21, "Protecting Chad's National Health Policy as recommended by WHO's MPOWER policies and the provisions of FCTC Article 5.3 against interference of the tobacco industry." The Ministry of Health heads a tobacco industry surveillance committee under the national coordination mechanism, the CNLT.

According to stakeholder reports, illicit tobacco in Chad stems primarily from Nigeria, and is routed to Chad through Cameroon. Some illicit tobacco also stems from Libya and Sudan. Exacerbating the issue is that the Ministry of Commerce lacks adequate mechanisms to ensure declaration of tobacco imports. The Government created a mobile customs unit to seize illicit tobacco and other products, but the unit did not receive necessary funding. According to stakeholders in Chad, illegal tobacco imports are easily accessed and purchased.

4. Methodology

The purpose of the investment case is to quantify the current health and economic burden of tobacco use in Chad (in the context of tobacco control measures that are currently in place); estimate the impact that implementing new tobacco control measures—or intensifying existing ones—would have on reducing this burden; and provide analysis of other impacts that may factor into government decisions to implement tobacco control measures.

Fig. 3: Building the FCTC investment case



An RTI International-developed static model incorporating a population attributable fraction approach was created to conduct the investment case and to 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.[2]

The investment case team worked with partners in Chad 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), the World Bank database, the Institute for Health Metrics and Evaluation's (IHME) Global Burden of Disease (GBD) study, and academic literature. Within the investment case, costs and monetized benefits are reported in constant 2017 Central African Francs (XAF) and discounted at an annual rate of three percent.

2 Available upon request.

5. Results

5.1 The burden of tobacco use: health and economic costs[3]

Tobacco use undermines economic growth. In 2017, tobacco use caused an estimated 2,473 deaths in Chad, 71 percent occurring among those under the age of 70. Chad lost productive years in which those individuals would have contributed to the workforce. The economic losses in 2017 due to tobacco-related mortality are estimated at XAF 20.5 billion.

While the costs of premature mortality are high, the consequences of tobacco use begin long before death. As individuals 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 XAF 1.6 billion in 2017 and caused Chadian citizens to spend XAF 2.8 billion in out-of-pocket (OOP) healthcare expenditures. Private insurance and non-profit institutions serving households spent XAF 0.7 billion on treating tobacco-attributable diseases in 2017. In total, smoking generated XAF 5.2 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 XAF 1.1 billion and the costs of presenteeism due to cigarette smoking were XAF 3.3 billion.

Finally, even in their healthy years, working smokers are less productive than non-smokers. Smokers take an estimated ten additional minutes per day more in breaks than non-smoking employees.[33] If ten minutes of time is valued at the average workers' salary, the compounding impact of 149,500 employed smokers taking ten additional minutes per day for smoke breaks is equivalent to losing XAF 2.2 billion in productive output annually.

In total, tobacco use cost Chad's economy XAF 32.3 billion[4] in 2017, or about 0.5 percent of Chad's 2017 GDP. **Figure 4** breaks down direct and indirect costs. **Figure 5** and **Figure 6** illustrate the annual health losses that occur due to tobacco use.

3 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 pinpoint those losses.

4 Component parts may not add up exactly to 32.3 billion due to rounding.

The current burden of tobacco use

Fig. 4: Breakdown of the share of direct and indirect costs in 2017 (XAF billions)

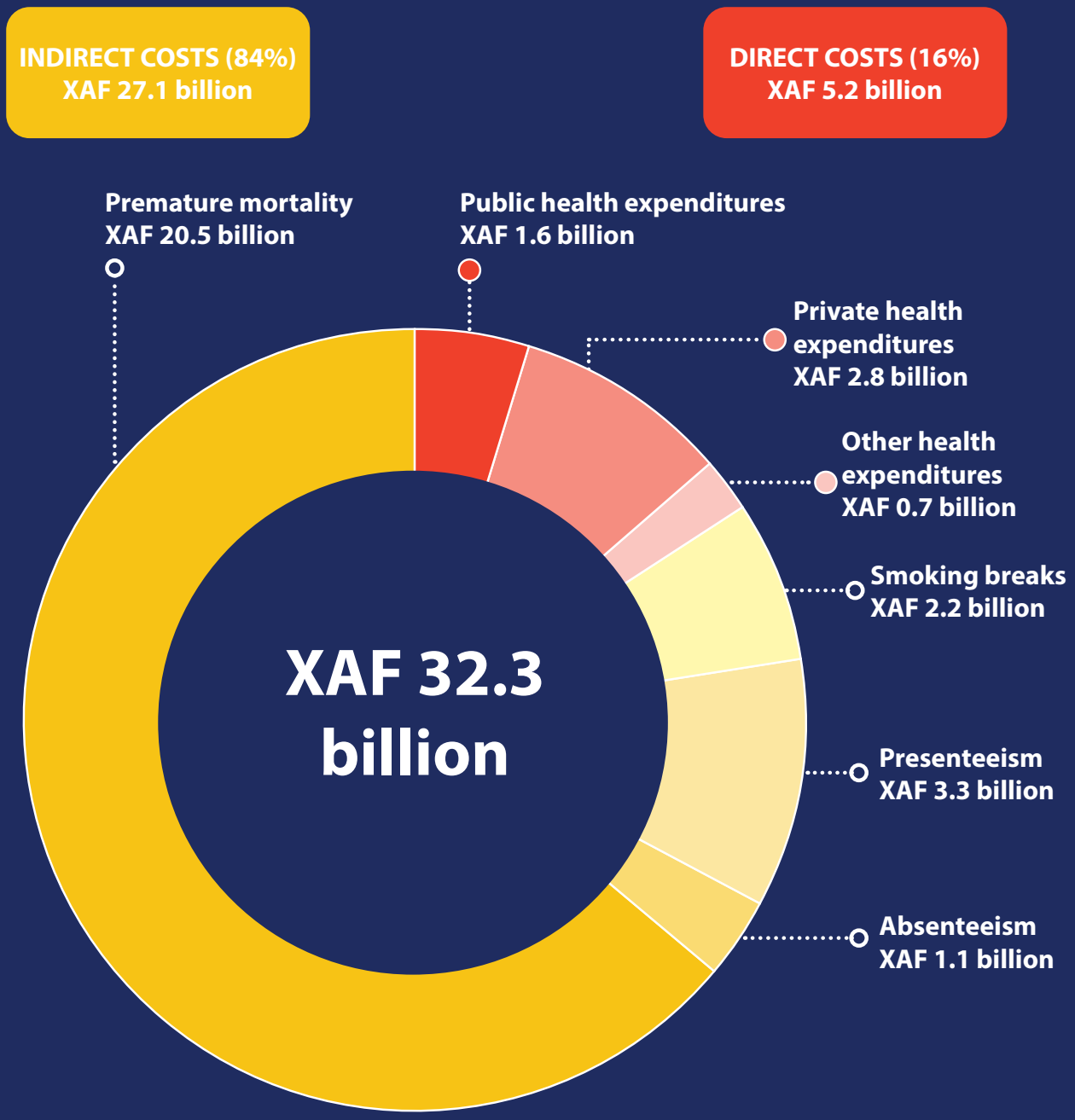


Fig. 5: Tobacco-attributable deaths by disease, 2017 *(Results are from the IHME Global Burden of Disease Results Tool. Other diseases include liver cancer, asthma, Alzheimer's disease and other dementias, stomach cancer, peptic ulcer disease, larynx cancer, lip and oral cavity cancer, bladder cancer,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

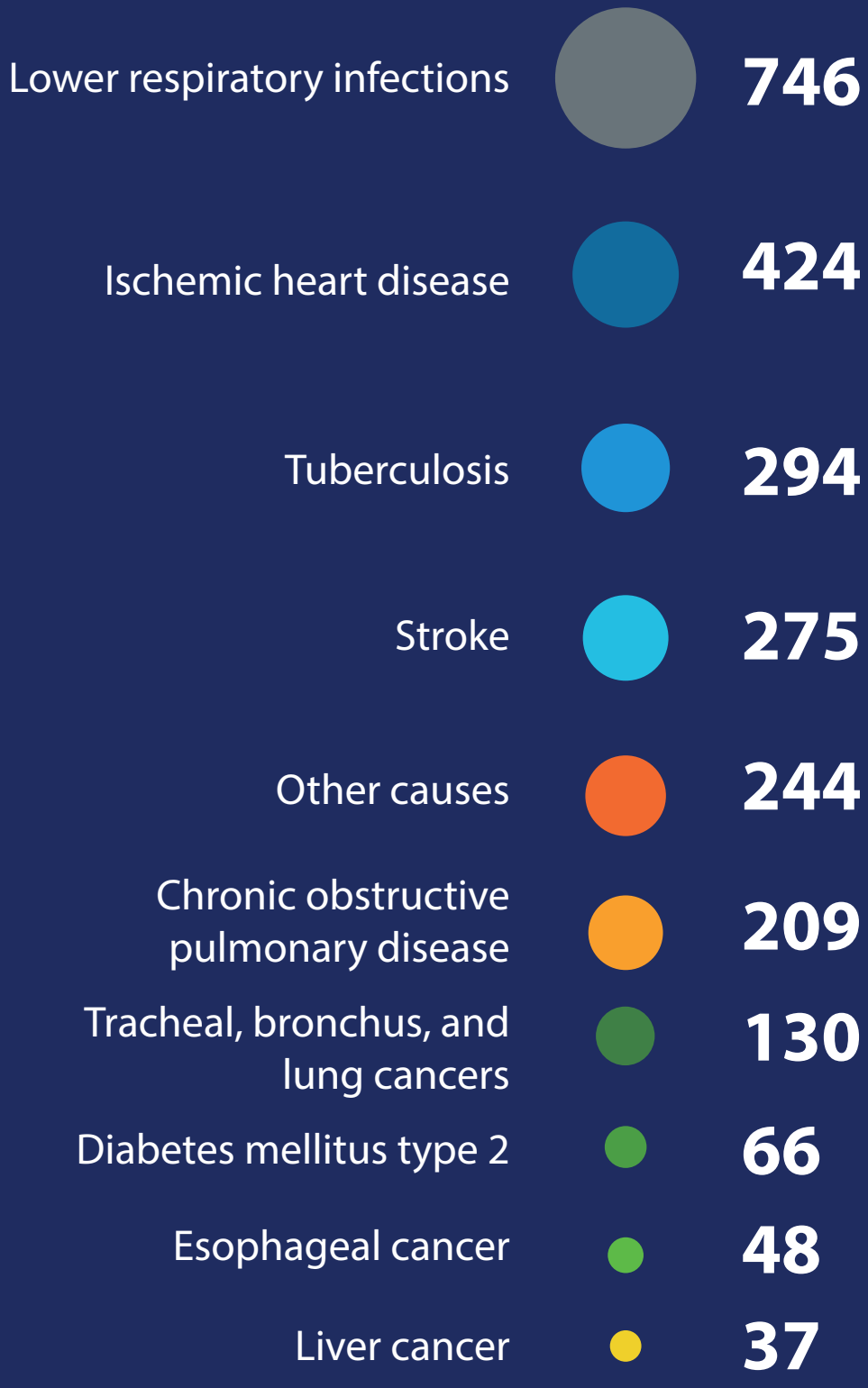
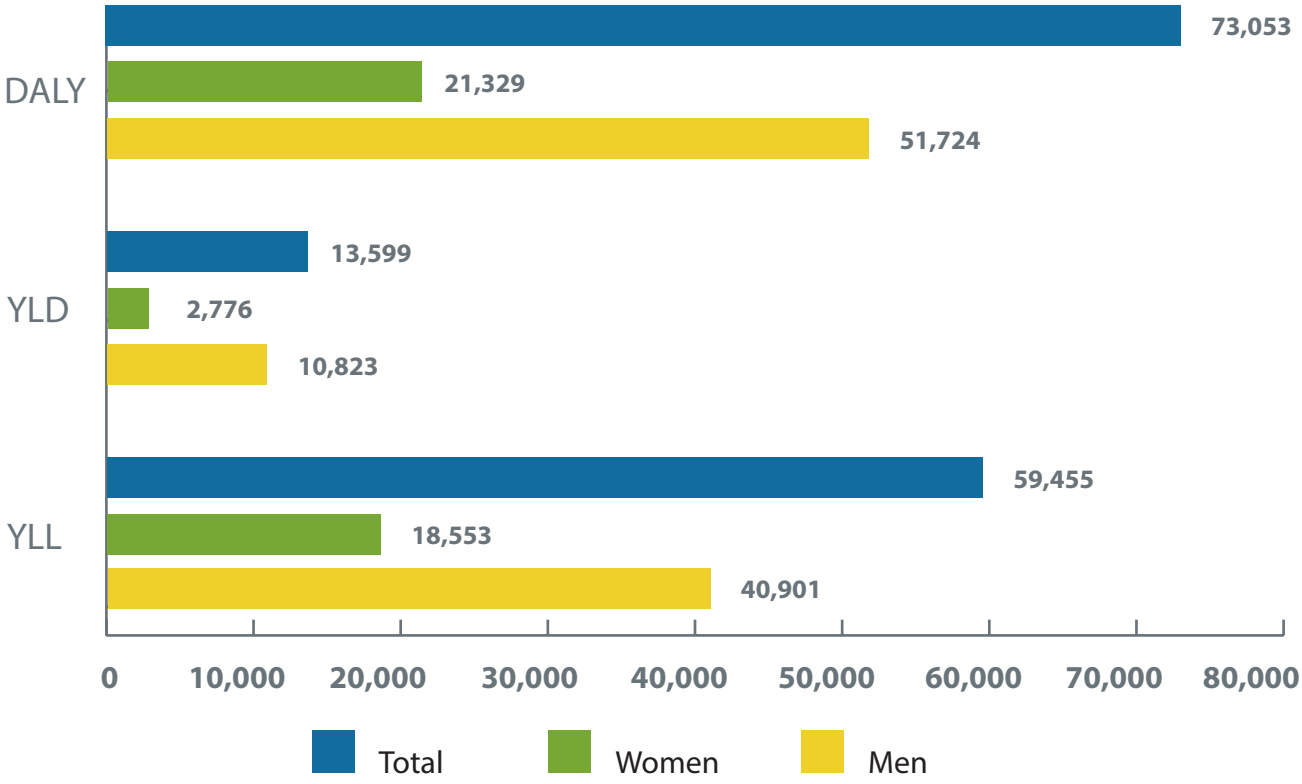


Fig. 6: Tobacco-attributable DALYs, YLDs and YLLs, 2017, by sex[5]



5.2 Implementing policy measures that reduce the burden of tobacco use

By implementing new FCTC policy measures, or intensifying implementation of existing ones, Chad can secure significant health and economic returns, and begin to reduce the XAF 32.3 billion in annual direct and indirect economic losses that occur due to tobacco use.

The next two sections present the health and economic benefits that result from four WHO FCTC policy actions to: 1) increase cigarette taxation to reduce the affordability of tobacco products; 2) increase enforcement of the ban on smoking in public spaces; 3) run a national anti-tobacco mass media campaign to increase awareness about the harms of tobacco use, and; 4) implement plain packaging of tobacco products.

5 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?>

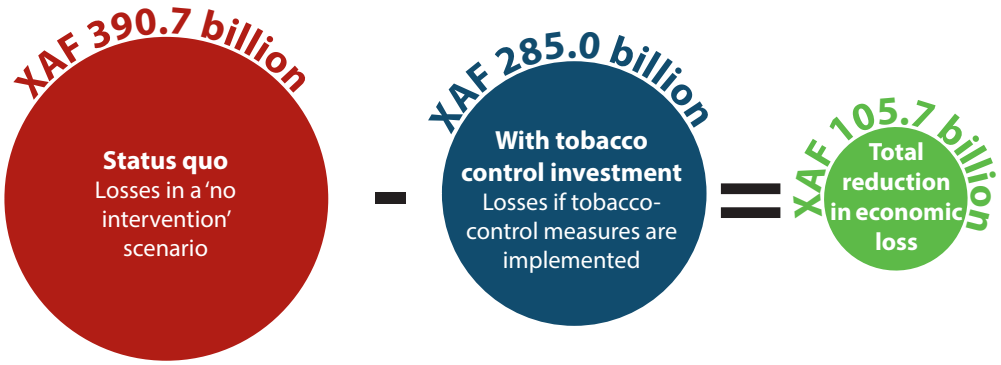
5.3 Health benefits—lives saved

Putting in place the full package of tobacco-control measures (inclusive of all four of the measures 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 46.8 percent (in relative terms) over 15 years, saving 10,531 lives from 2019–2033, or 702 lives annually.

5.4 Economic benefits—costs averted

Implementing the tobacco control policy package would result in Chad avoiding 27 percent of the economic loss that it is expected to incur from smoking over the next 15 years. **Figure 7** illustrates the extent to which Chad can shrink the economic losses that it is expected to incur under the status quo.

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



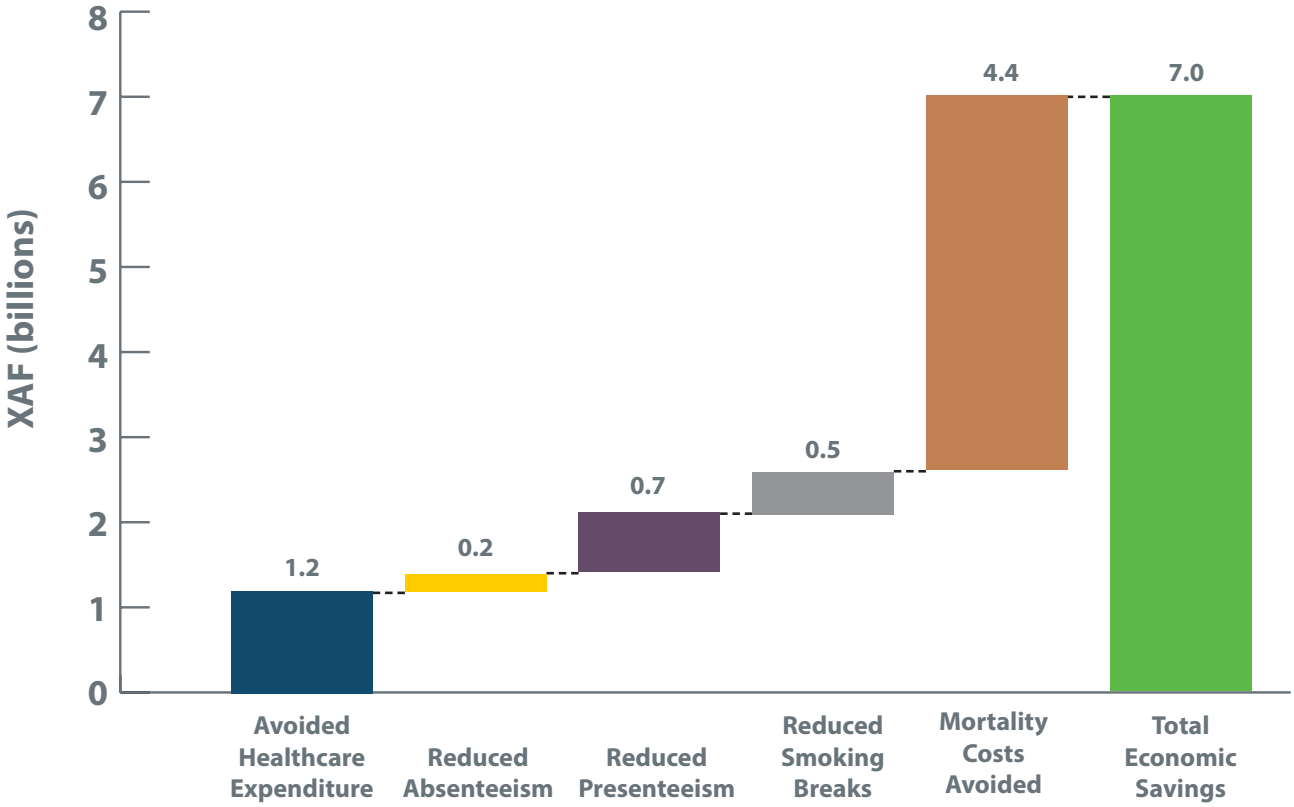
In total, over 15 years Chad would save about XAF 105.7 billion that would otherwise be lost if it does not implement the package of tobacco measures. That is equivalent to about XAF 7.0 billion in annual avoided economic losses.

With better health, fewer individuals need to be treated for complications from disease, resulting in direct cost savings to the government and to citizens. 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 smoke breaks in the workplace.

In addition to the savings from avoiding healthcare and productivity losses, equalizing the tax rates on smokeless tobacco products with the rate on cigarettes would generate significant additional revenue, that could be allocated to both the tobacco control measures recommended here, as well as broader efforts to achieve the Sustainable Development Goals. The 2015 Addis Ababa Action Agenda on financing for development, adopted by consensus weeks before the formalization of the 2030 Agenda, specified increased tobacco taxes as key means to financing the 2030 Agenda for Sustainable Development. Those gains from additional revenue are not modeled as part of the economic savings from implementing the package recommended here, but that additional revenue would be just as concrete a benefit as the savings projected in this investment case.

Figure 8 breaks down the sources from which annual savings accrue. The largest annual savings result from avoiding premature mortality (XAF 4.4). The next highest source of annual savings is avoided healthcare expenditures (XAF 1.2 billion), followed by reduced presenteeism (XAF 0.7 billion), reduced smoking breaks (XAF 0.5 billion), and reduced absenteeism (XAF 0.2 billion).

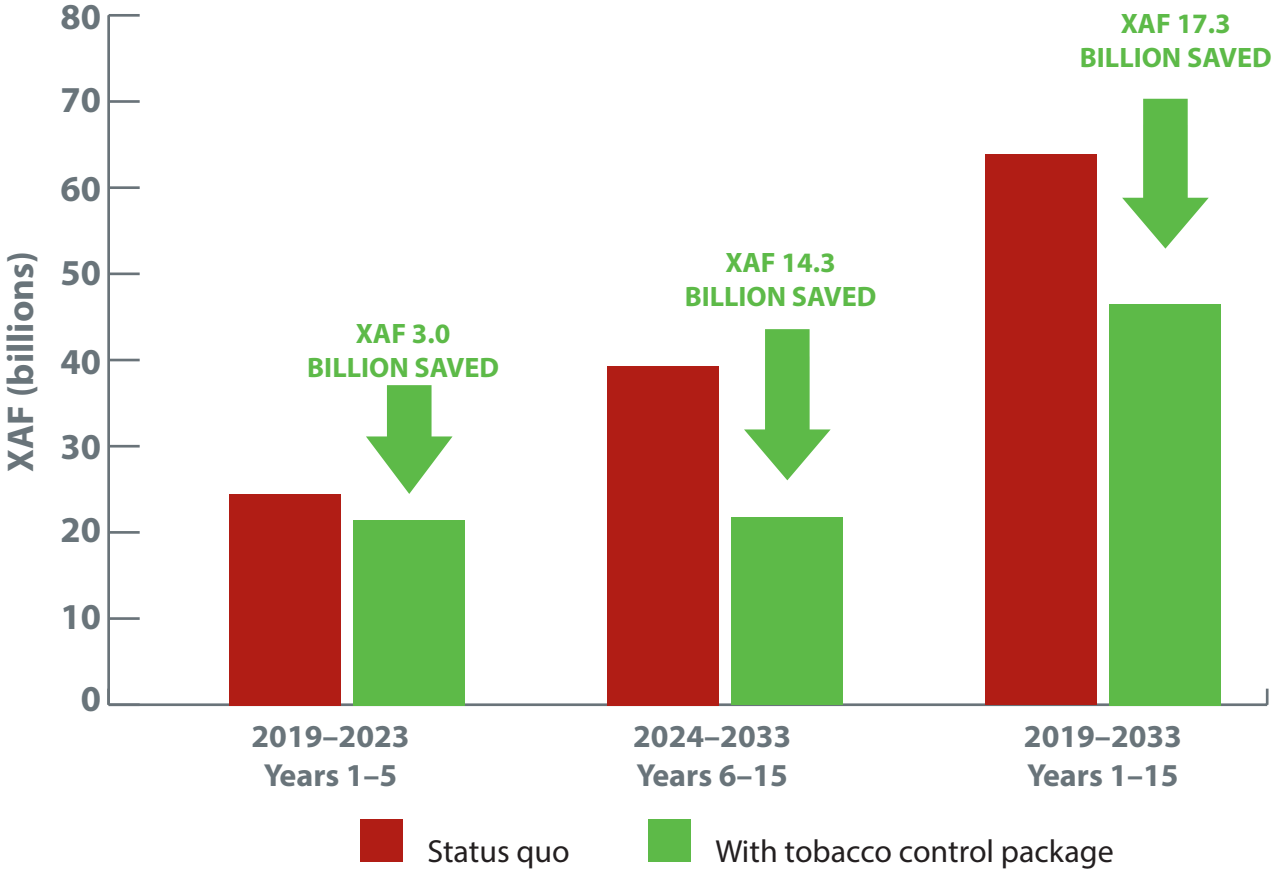
Fig. 8: Sources of annual direct and indirect economic savings as a result of implementing the tobacco control policy package



Implementing the package of tobacco control measures reduces medical expenditure for citizens and the Government. Presently, total private and public annual health care expenditures in Chad is about XAF 306 billion, 1.7 percent of which is directly related to treating disease and illness due to tobacco use[34] (≈ XAF 5.2 billion).

Year-over-year, the package of interventions lowers smoking prevalence, which leads to less illness, and consequently less healthcare expenditure (see **Figure 9**). Over the 15- year time horizon of the analysis, the package of interventions averts XAF 17.3 billion in healthcare expenditures, or XAF 1.2 billion annually. Of this, 31 percent of savings accrue to the Government, and 54 percent accrue to individual citizens who would have purchased out-of-pocket healthcare. The remainder of savings goes to private insurance. Thus, from reduced healthcare costs alone, the Government stands to save about XAF 5.5 billion over 15 years. Simultaneously, the Government would successfully reduce the health expenditure burden tobacco imposes on Chad's citizens, supporting efforts to reduce economic hardship on 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: Public and private healthcare savings over the 15-year time horizon



5.5 The return on investment (ROI)

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 WHO FCTC tobacco control investments by the costs of the investments. For the Chad 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) to align with the SDGs. The ROI shows the return on investment for each intervention, and for the full package of measures. Total benefits are a measure of which interventions are expected to have the largest impact.

Table 2 displays costs, benefits and ROIs by intervention, as well as for all interventions combined. All individual interventions deliver a ROI greater than one within the first five years, meaning that even in the short-term the benefits of implementing the interventions outweigh the costs. Depending on the intervention, over the first five years, the Government will recoup anywhere from three to 22 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 control measure (XAF billions)

Return on investment, by tobacco control measure (XAF billions)	First 5 years (2019–2023)			All 15 years (2019–2033)		
	Total Costs (billions)	Net Benefits (billions)	ROI	Total Costs (billions)	Net Benefits (billions)	ROI
Tobacco control package* *(combined interventions)*	3.32	18.45	**6**	7.94	105.66	**13**
Raise cigarette taxes *(FCTC Article 6)*	0.51	11.13	**22**	1.17	61.36	**52**
Mass media campaign *(FCTC Article12)*	1.05	3.27	**3**	2.28	25.31	**11**
Plain packaging *(FCTC Article 11 Guidelines)*	0.51	1.37	**3**	1.10	10.76	**10**
Protect people from tobacco smoke *(FCTC Article 8)*	0.61	5.13	**8**	1.75	39.26	**22**

*The combined impact of all interventions is not the sum of individual interventions. To assess the combined impact of interventions, 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 [[35], p. 454]. The costs of the tobacco package include the costs of the examined policies, as well as programmatic costs to implement and oversee a comprehensive tobacco-control program.

Over the 15-year period, raising cigarette taxes is expected to have the highest return on investment (52:1). Implementing a mass media campaign has the next highest ROI (22:1), followed by enforcing bans on smoking in public places (11:1), and implementing plain packaging (10:1).

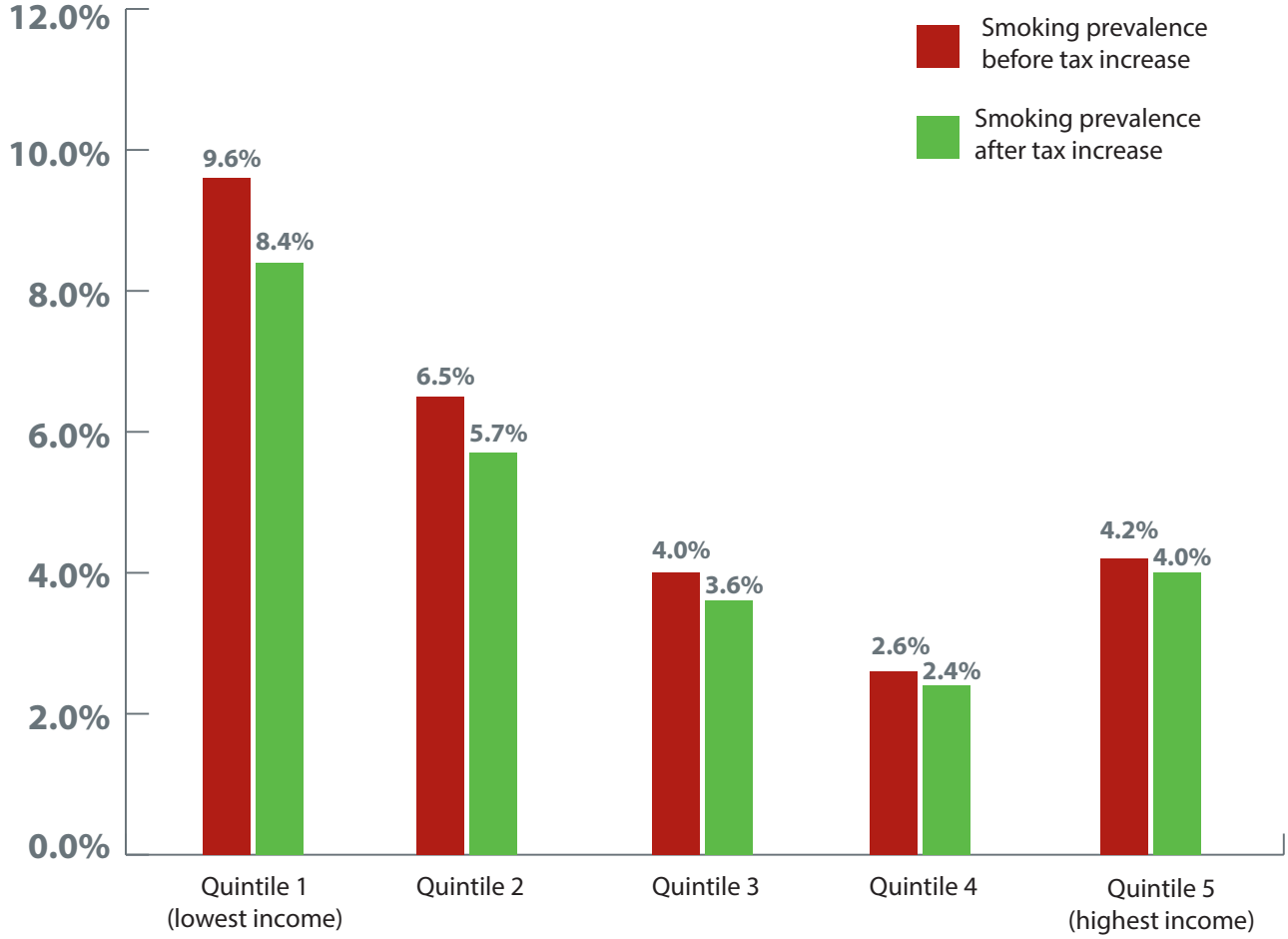
5.6 Impact on lower-income Chadians

Raising cigarette taxes has the highest return on investment of the five policies included in this analysis. However, a common misperception is that taxes on tobacco products may disproportionately impact lower-income tobacco users, since the tax burden represents a higher proportion of their income than that of wealthier tobacco users. To the contrary, evidence shows that the those with lower incomes actually stand to benefit most from raised cigarette taxes.[36] Relative to richer smokers, smokers with lower incomes are more likely to quit smoking when taxes are increased,[37] meaning they benefit more from subsequent decreases in tobacco-related health problems, and resulting medical costs. In Lebanon,[38] 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.[39]

To examine the extent to which a cigarette tax increase could be considered pro-poor in Chad, the investment case undertakes an equity analysis. The analysis divides Chad's population into five equal groups, by income, where quintile 1 is composed of the lowest-earning 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 34 percent (250 francs, or about US$0.44). Average tobacco prevalence 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 they smoke at higher rates in Chad, the tax increases cause the largest drop in smoking prevalence among the lowest income quintile (see **Figure 10**).

Figure 10: Smoking prevalence before and after tax increase, by income quintile

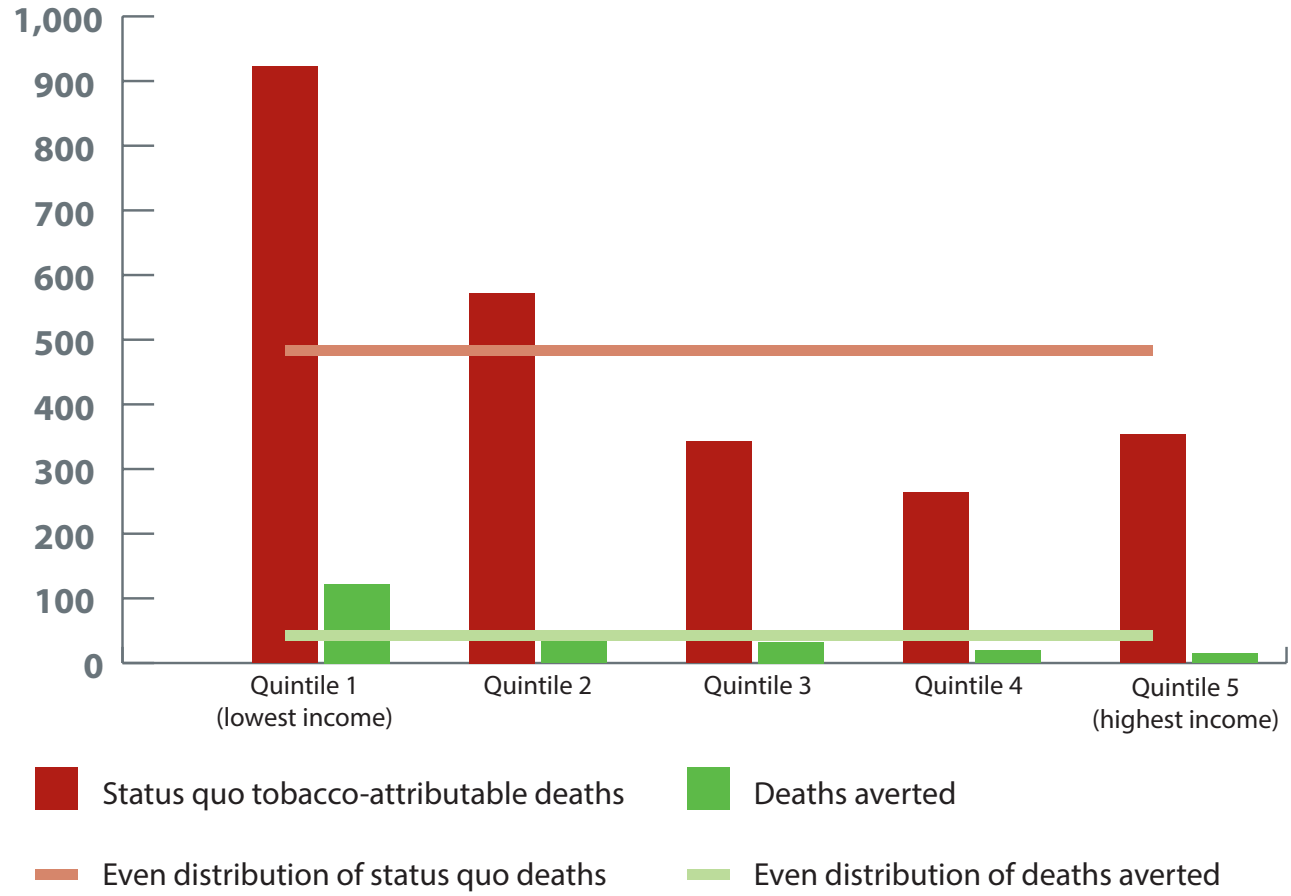


Lower rates of smoking translate to health gains. Prior to the tax increase, of the 2,473 tobacco-attributable deaths observed in 2017, 37 percent occurred among the lowest-earning 20 percent of the population (quintile 1). However, because the tax increase would cause smoking prevalence to fall the most in the lowest-income quintile, health benefits would disproportionately accrue to them.

The investment case finds that almost half (48 percent) of the 254 deaths that would be averted due to the tax increase would be among the lowest-earning 20 percent of the population, as shown in **Figure 11**.[6] The second lowest-income quintile would benefit from 25 percent of the averted deaths, followed by the three wealthier quintiles.

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.

Figure 11: Status quo deaths and deaths averted by tax increase, by income quintile



Credit: © Anmede via Flickr

5.7 The Sustainable Development Goals and the WHO FCTC

Enacting and strengthening four measures designed to reduce demand for tobacco will enable Chad to fulfill SDG Target 3.A to strengthen implementation of the WHO FCTC. Moreover, acting now will contribute to Chad'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 Chad in 2017, more than 16,600 premature deaths between the ages of 30 to 70 were caused by the four main NCDs (CVD, diabetes, cancer, and COPD). Roughly 5 percent of these premature deaths occurred due to tobacco use. Enacting the FCTC measures identified in the Investment Case would reduce tobacco use prevalence—a key risk factor driving NCD incidence—preventing over 2,500 premature deaths from the four main NCDs over the next 12 years (2019 to 2030). Preventing those deaths contributes the equivalent of about 4 percent of the needed reduction in premature mortality to fulfill SDG Target 3.4.

SDG Target 3.4

By 2030 the FCTC measures would...

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

Reduce economic costs due to tobacco use by XAF 80.8 billion, including saving XAF 13.3 billion in healthcare expenditures.

Lead to savings (XAF 80.8 billion) that significantly outweigh the costs (XAF 6.7 billion), with an overall return on investment of 12:1.

6. Conclusion and recommendations

Each year, tobacco use costs Chad XAF 32.3 billion 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 Chad. Enacting the recommended multisectoral tobacco control provisions would save over 700 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 XAF 106 billion over the next fifteen years. Further, the economic benefits of strengthening tobacco control in Chad greatly outweigh costs of implementation (XAF 105.7 billion in benefits versus just XAF 7.9 billion in costs).

By investing now to intensify implementation of the four proven tobacco control measures modeled under this investment case, Chad would not only reduce tobacco consumption, improve health, reduce government health expenditures and grow the economy, it would also reduce hardships among Chadians, particularly among those with low incomes. Many countries reinvest savings from healthcare expenditures and revenue from increased tobacco taxes into national development priorities such as universal health coverage.

The investment case offers compelling economic and social arguments to implement core WHO FCTC measures. Policymakers across sectors are encouraged to share the investment case findings broadly among all sectors of government, parliament, civil society, the public, development partners and academic institutions. Doing so will strengthen public and political support for tobacco control. An advocacy strategy with key messages, for example on how tobacco control can support economic growth and reduce hardships on those living on low incomes, can assist policymakers in disseminating the message. The full benefits of the investment case are more likely to be realized if the following actions are pursued:

Increase tobacco taxes and reduce illicit trade.

The Government of Chad has acknowledged the importance of financial and fiscal measures to reduce tobacco consumption, raising taxes on tobacco products, most recently in January 2019. However, taxes remain below the WHO recommended level (at least 75 percent of retail price inclusive of at least a 70 percent excise tax). Further increasing taxes on tobacco products to reduce their affordability would achieve the mutually reinforcing objectives of reducing tobacco consumption, reducing healthcare costs, and providing the public sector with additional revenue needed to invest in other sustainable development efforts.

It is also recommended that the Chadian Government continue to work in close collaboration with the Convention Secretariat, the University of Cape Town Knowledge Center and the WHO for the increase of tobacco taxes on a regular basis via a specific or mixed taxation system and act as a strong advocate for promoting policy change at the CEMAC level. Extending tax increases to all tobacco products (not just cigarettes) should be pursued to prevent tobacco users from switching to the cheapest brands or products (e.g. tambook).

Policymakers who advocate for additional tobacco-tax increases can now cite robust, Chad-specific evidence from this report that tobacco tax increases are pro-economy and pro-development, benefiting the lowest-income segments of society the most. This is especially true if—as many countries do—Chad reinvests savings from healthcare spending and revenue from increased tobacco taxes into poverty alleviation measures including universal health coverage. Doing so would also bring Chad closer to meeting its commitments under the Abuja declaration under which Chad pledged to reach the target of allocating 15 percent of its national budget to improve the health sector.

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. Chad signed the Protocol to Eliminate Illicit Trade in Tobacco Products in 2018 but has not yet adopted any law to implement the Protocol. It is therefore recommended that Chad accelerate the adoption of a tracking and tracing system to help eliminate illicit trade in tobacco products.

2 Strengthen the tobacco control legislative framework and enforcement.

Though Chad has a strong tobacco control legal framework, there are several WHO FCTC tobacco control measures that are not covered under current laws. These include testing of tobacco products, preventing tobacco industry interference, provision of accessible tobacco cessation services, regulation of duty-free sales, and banning sales of single stick cigarettes. It is therefore recommended that the PNLTAD and CNLT meet to decide on a review of existing laws and the regulatory framework and to strengthen the framework for implementation and enforcement.

Enforcement of tobacco control laws in Chad remains a challenge. This relates particularly to bans on smoking in public places; bans on sales to and by minors; bans on tobacco advertising, sponsorship and promotion; and bans on public shisha bars. Institutional mechanisms to enforce the law remain weak. It is recommended that PNLTAD and CNLT meet to develop a plan to fully enforce these provisions. Enforcement trainings for public officials and government agencies such as the one conducted in N'Djamena in 2018 should be replicated in other regions and cities. Further, as the largest employer in Chad and role-model for Chadians, the Government should ensure that smoking bans are fully implemented on government premises, as required by law.

3 Strengthen multisectoral coordination and planning.

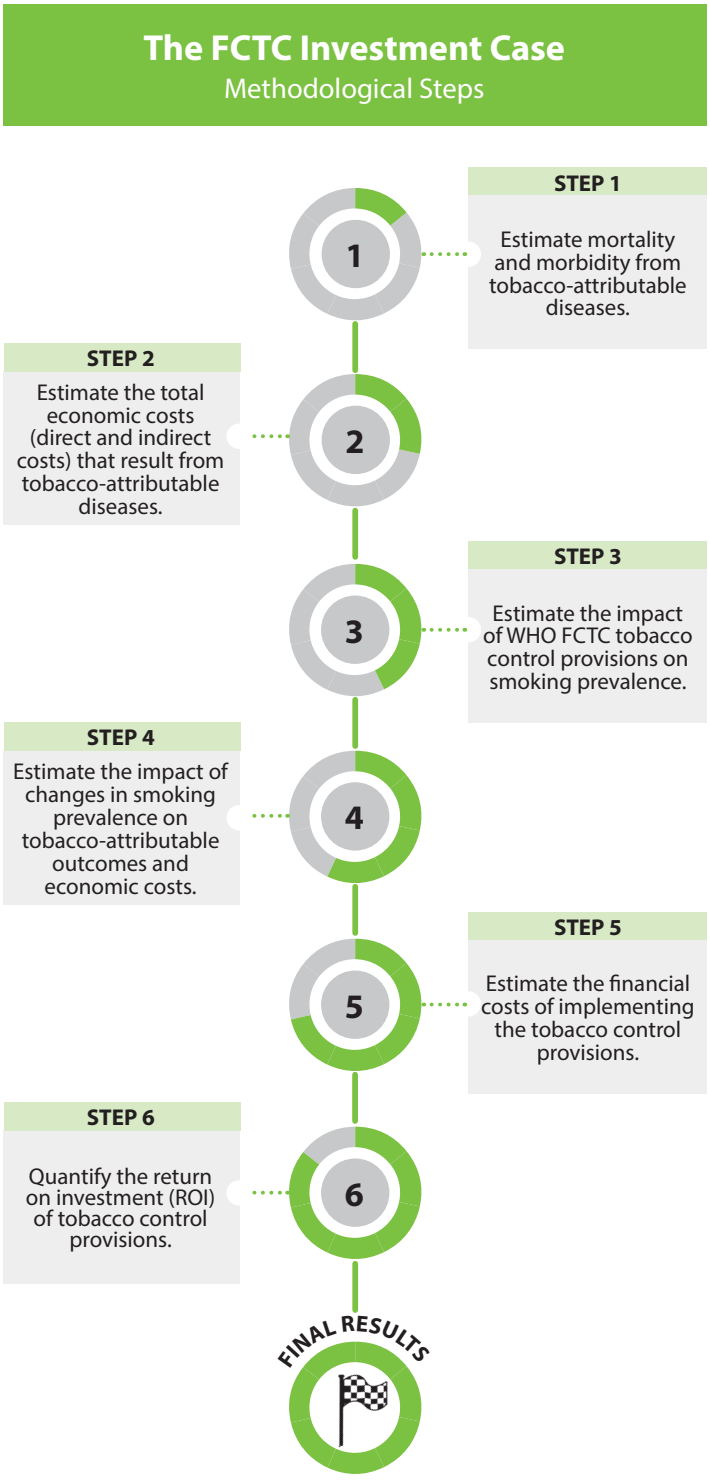
By establishing the CNLT headed by PNLTAD, Chad has taken concrete steps to establish effective multisectoral coordination for tobacco control. However, CNLT and PNLTAD are hampered by a lack of resources, and the decentralized levels of both have not been operationalized. Given the economic benefits of tobacco control demonstrated through this investment case, it is recommended that the Ministry of Health work with the Ministry of Finance to allocate a portion of increased tobacco tax revenue to PNLTAD and CNLT, and towards full implementation of the new multisectoral national tobacco control strategy.

7. Methodology annex

7.1 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 provisions to reduce the demand for tobacco. The tools and methods used to perform these methodological steps are described in detail below.

Fig. 12: Steps in the FCTC investment case



7.2 COMPONENT ONE: CURRENT BURDEN

The current burden model component provides a snapshot of the current health and economic burden of tobacco use in Chad.

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).[40] The study estimates the extent to which smoking and environmental tobacco smoke exposure 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) that result from tobacco-attributable diseases.

Next, the model estimates the total economic costs[7] 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 labor-force productivity losses: absenteeism, presenteeism, and excess smoking breaks.

Direct costs — Direct costs include 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 et al. (2018), who estimate the smoking attributable fraction (SAF) of healthcare expenditures for most countries.[41] The SAF provided in the paper for Chad is 1.7 percent, which was used in the model. To calculate the share of smoking-attributable healthcare expenditures borne by public, non-profit, and private entities, it was assumed that each entity incurred smoking-attributable healthcare costs in equal proportion to its contribution to total health expenditure, as obtained from the WHO health expenditures database—from which government is shown to cover 14 percent of total health expenditures,

7 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, secondhand smoke exposure, 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.

private and nonprofit sources cover 24 percent, and households cover 54 percent through out-of-pocket expenses.[42]

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 premature death, eliminating the unique economic and social contributions that an individual would have provided 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* — Premature 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).[43]

- *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).[44] 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.[45] Lost productivity due to smoking breaks is valued under the conservative assumption that working smokers take ten minutes of extra breaks per day.[46]

7.3 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.

The investment case employs a static model to estimate the total impact of the tobacco control measures, meaning that aside from smoking prevalence, variables do not change throughout the time horizon of the analysis. The model follows a population that does not vary in size or makeup (age/gender) over time in two scenarios: a status quo scenario in which smoking prevalence remains at present day rates, and an intervention scenario in which smoking prevalence is reduced according to the impact of tobacco control measures that are implemented or intensified.

Published studies have used similarly static models to estimate the impact of tobacco control measures on mortality and other outcomes.[47, 48]

Within the investment case, the mortality and morbidity, as well as economic costs that are computed in the intervention scenario are compared to the status quo scenario to find the extent to which tobacco control measures can reduce health and economic costs.

STEP 3

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

Selection of priority FCTC measures modeled within the investment case align with the Global Strategy to Accelerate Tobacco Control developed following a decision 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.

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)[49] and Chipty (2016),[50] as adapted within the Tobacco Use Brief of Appendix 3 of the WHO Global NCD Action Plan 2013–2020,[51] and adjusted based on assessments of Chad's baseline rates of implementation.

The impact of raising taxes on the prevalence of tobacco use is determined by the 'prevalence elasticity', or the extent to which individuals stop smoking as a result of price changes. Following evidence that the price elasticity of demand for cigarettes in low income countries in Africa is 0.56,[52] the investment case assumes that the price elasticity of demand in Chad is -0.56, and that prevalence elasticity is approximately one-half of price elasticity (-0.281).[53] **Table 3** displays the impact sizes used within the investment case analysis. Additional information on their derivation can be found in the Technical Appendix.

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 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[54] 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. The investment case examines the impact of doubling the cost of a pack of cigarettes over the first seven years, with additional incremental increases through 2033 that raise the price to 2.87 times its 2019 baseline.

Table 3: Impact size: Relative reduction in the prevalence of current smoking by tobacco control policy/intervention, over a period of 15 years

WHO FCTC Measure	Relative reduction in the prevalence of current smoking	
	First 5 Years (2019–2023)	Over 15 Years (2019–2033)
Tobacco Control Package (all policies)	**30.2%**	**46.8%**
Increase taxes on cigarettes (FCTC Art.6)	16.5%	26.7%
Strengthen enforcement of and compliance with the ban on smoking in public places and work places (FCTC Art.8)	5.8%	10.0%
Mandate that tobacco product packages carry large health warnings (FCTC Art. 11)	**Already fully implemented**	
Plain packaging of tobacco products (FCTC Art. 11: Guidelines)	2.4%	4.2%
Run a mass media campaign to promote awareness about tobacco control (FCTC Art.12)	9.12%	15.8%
Enact comprehensive bans on advertising, promotion, & sponsorship (FCTC Art.13)	**Already fully implemented**	

* The combined impact of all interventions is not the sum of individual interventions. 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" [[55], 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*, Madagascar implements new tobacco measures or intensifies existing ones, to reduce the prevalence of smoking. The difference in health and economic outcomes in between the *status quo* and intervention scenarios represents the gains that Chad 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 policies and interventions modeled, both individually and collectively.

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.[56]

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 four 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 capita (PPP, 2017), population (total, and share of the population age 15+, 2017), labor force participation rate (2017), gas per liter, and government spending on health as a percent of total health spending (2015) [[57], 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 and population figures. 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 discounted monetary value of health gains from investments by their discounted respective costs.

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

ROIs were calculated for each of the four tobacco control policies modeled, and for the four interventions together as a package. Estimates from steps 3, 4, and 5 were used to calculate ROIs at 5- and 15-year intervals.

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7.4. Equity analysis

To assess how increased taxation affects different income groups, the model estimated the responses of different income groups to changes in price, i.e. their elasticity of smoking participation. No studies were identified that examine the elasticity of smoking participation in Chad. 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.[58] Some of the studies in **Table 4** below 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 4: Elasticity of smoking participation studies

Country	Author	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Myanmar	Kyaing[59]	-1.09	-1.25	-1.41	-1.38	-1.24
Nepal	Karki[60]	-0.31	-0.26	-0.35	-0.35	-0.31
Vietnam	Kinh[61]	-0.65	-0.65	-0.54	-0.42	-0.42
Bangladesh	Nargis[62]	-0.33	-0.47	-0.27	-0.21	-0.14
Sri Lanka	Arunatilake[63]	-0.37	-0.35	-0.31	0.02	0.06
Sri Lanka	Arunatilake[64]	-0.17	0.17	0.21	0.01	0.34
Ukraine	Krasovsky[65]	-0.19	-0.20	-0.21	-0.17	-0.12
Ukraine	Krasovsky[66]	-0.14	-0.15	-0.17	-0.12	-0.08
China	Mao[67]	-0.95	-0.67	-0.39	-0.07	0.26
China	Mao[68]	-0.08	-0.04	-0.01	0.06	0.13
Egypt	Nassar[69]	-0.30	-0.33	-0.33	-0.33	-0.32
Thailand	Isra[70]	-0.50	-0.18	-0.07	-0.05	-0.02
Thailand	Isra[71]	-0.25	-0.03	-0.02	-0.08	-0.04
Indonesia	Adioetomo[72]	-0.03	0.03	0.09	0.15	0.20
South Africa	van Walbeek[73]	-0.70	-0.57	-0.55	-0.54	-0.41
Turkey	Onder[74]	-0.12	-0.32	-0.11	-0.02	0.15
Average		**-0.38**	**-0.33**	**-0.28**	**-0.22**	**-0.12**

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