



Republic of Zambia
Ministry of Health

Prevention and Control of Non Communicable Diseases in Zambia

The Case for Investment



Prevention and control of non-communicable diseases in Zambia

The case for investment

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Foreword

The Government of the Republic of Zambia has placed priority on ensuring that Zambians are healthy and productive as a catalyst to the attainment of socioeconomic development of the country. The Vision 2030 aims to transform Zambia into a prosperous middle-income country as articulated also in the 7th National Development Plan (7NDP) and National Health Strategic Plan 2017 – 2021 (NHSP 2017-2020).

However, this aspiration is threatened by the double burden of Communicable and Non-Communicable Diseases. Zambia has been recording an increase in morbidity and mortality due to Non-Communicable Diseases (NCDs) such as cancers, diabetes, chronic respiratory and cardiovascular diseases.

According to the 2016 WHO NCD country profiles, 29% of all deaths in Zambia are attributed to NCDs. This is unacceptably high, considering that most of these diseases can be reduced by modifying four main behavioural risk factors for NCDs which are tobacco use, harmful use of alcohol, unhealthy diets and physical inactivity. NCDs have the potential to reverse the country's socioeconomic gains due to reduced productivity and increased expenditure on health care while pushing individuals and families into catastrophic expenditure.

This NCD Investment Case is a set of 'best buy' interventions in line with the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020. It builds a case for investing in NCDs programming which is an integral part of the 2030 Global Agenda for Sustainable Development. Therefore, it strengthens policy coherence in the financing and operationalisation of NCDs prevention and control strategies in Zambia.

I, therefore, urge all stakeholders to fully utilise this document to inform advocacy, planning, resource mobilization, implementation and accountability to support the prevention and control of NCDs in Zambia. I am confident that with this evidence, Zambia's response to NCDs will result in a significant reduction in the burden of NCDs, as we propel the country towards Universal Health Coverage.



Hon. Dr Chitalu Chilufya, MP
Minister of Health
MINISTRY OF HEALTH

Acknowledgement

The development of the NCDs Investment Case is a result of broad consultations and participation of stakeholders, to whom I am grateful.

I wish to express my sincere gratitude to the Department of Health Promotion, Environment and Social Determinants and the Department of Policy and Planning who spearheaded the process of developing this document. Further, I would like to thank the Departments of Clinical Care and Diagnostic Services, and Monitoring and Evaluation, for their valuable inputs in this document.

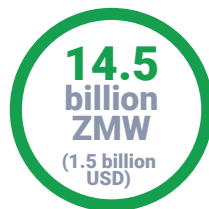
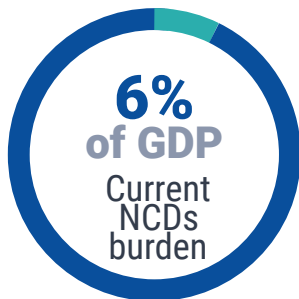
Special thanks go to the World Health Organisation, United Nations Development Programme and the Department of Economics at the University of Zambia for their financial and technical support towards the development of the NCDs Investment Case. Through the National Health in All Policies Strategic Framework and the findings of the NCDs Investment Case, we shall continue to strengthen policy coherence and effectively cost, finance and operationalise strategies and programmes for NCDs prevention and control in Zambia.



Dr. Kennedy Malama
Permanent Secretary – Technical Services
MINISTRY OF HEALTH

ZAMBIA

The case for investment in prevention and control of non-communicable diseases (NCDs)



257 million ZMW



Investment required
for selected best buys intervention packages over a 15-year period

Millions of ZMW

80



Tobacco control package

74



Alcohol control package

31



Physical activity awareness package

72



CVD and diabetes clinical interventions

992 million ZMW



Return on investment over a 15-year period

Return on investment Lives saved

Millions of ZMW in productivity benefits



5.3

5 900

421



1.3

1 400

99



4.5

1 800

141



4.6

4 300

330

Executive Summary

Non-Communicable Diseases, or NCDs, cost the Zambian economy an estimated 6 percent of its GDP every year. More than 90 percent of that economic burden stems from economic productivity losses as workers get sick and die prematurely of the four main NCDs – cardiovascular disease (CVD), cancers, diabetes and Chronic Obstructive Pulmonary Disease (COPD). This NCD Investment Case report identifies 11 key evidence-based interventions that would deliver an economic Return On Investment (ROI) of 4:1 over 15 years, leading to significant economic growth, generate additional revenue and most importantly, reduce the morbidity and premature mortalities from these illnesses.

The NCD Investment Case demonstrates the value of acting now to implement evidence-supported measures known to reduce NCD risk factors and improve health outcomes. The key findings from the Zambia NCD Investment Case are:

Investing in all recommended intervention packages would save more than 13,420 lives and help avert more than 19,360 cases of stroke and Ischemic Heart Disease (IHD) over 15 years, providing Zambians an additional 362,885 healthy life years;

A healthier workforce and reduced premature mortality would increase total GDP by 992 million Zambian Kwacha (ZMW) (USD 104 million) over 15 years;

Cost of implementing the recommended policy and clinical interventions over 15 years is less than one fifth of what the Zambian economy loses every year due to high prevalence of NCDs.

Over 15 years, the gains from implementing each of the analysed intervention packages significantly exceed its costs: for the package of tobacco interventions the ROI is ZMW 5.3 per ZMW invested, for physical inactivity - 4.5, for CVD primary care - 4.6, and for alcohol - 1.3, meaning all packages covered by the analysis are cost effective.

NCDs and the behavioural risk factors associated with them (tobacco use, harmful use of alcohol, unhealthy diet, and physical inactivity) are an increasing health and development challenge in Zambia. In 2016, NCDs are responsible for 29 percent of all deaths in the country, of these 62 percent were premature (among those under 70).

The above risk factors cannot be addressed by the health sector alone and require a holistic approach with the engagement of a broad range of actors, including all relevant government bodies and stakeholders.

In Zambia, roughly a fifth of the adult population aged 18-69 (19.1 percent) have raised blood pressure. Around 23 percent of men currently smoke tobacco, 16.8 percent of men engage in heavy episodic drinking and the population average daily salt intake (9.5g per day) is nearly twice the WHO recommendation of no more than 5g per day. Further, one third of the adults do not meet the WHO-recommended level of physical activity and around a quarter are either overweight or obese.

The increasing prevalence of most of the NCD risk factors suggests that unless action is taken rapidly, the costs of NCDs will grow even further, stunting the growth of the country's economy. At present, there are significant gaps in the implementation of the WHO-recommended cost-effective NCD preventive and clinical interventions (known as Best Buys). The forthcoming National Strategy on Prevention and Control of NCDs 2018-2022 addresses these gaps by introducing strong policy and legislative frameworks for NCDs.

The premature death, morbidity and disability associated with NCDs have a negative impact on socioeconomic development. As in other parts of the world, NCDs in Zambia are causing a surge in health care costs and social

care and welfare support needs, as well as putting an increasing burden on school and work absenteeism, with resulting reduced productivity and employee turnover.

The total direct healthcare cost of four main NCDs was estimated to be 561 million Zambian Kwacha (ZMW), or USD 59 million, in 2017. The hidden additional costs from lost productivity are of a greater magnitude, at ZMW 13.91 billion (USD 1.46 billion). Altogether, the current economic cost of these NCDs to the Zambian economy is ZMW 14.47 billion per year (USD 1.5 billion), which is equivalent to 6 percent of the country's annual gross domestic product.

The intervention costing analysis reviewed four packages of interventions for the prevention and control of NCDs in the areas of tobacco control, alcohol, physical inactivity and clinical primary care for CVD. Assessment of salt-based interventions was omitted at the time for epidemiological and data reasons.

The analysis results show that these intervention packages in Zambia are relatively cheap and cost-effective. The intervention with the highest return on investment in Zambia is the package of tobacco-reduction interventions – including implementation of a public smoking ban, package warning labels, a mass media campaign, an advertising ban and an increase in taxation – with the projected ROI of 5.3 over the 15-year period. Hypertension treatment and the physical inactivity-reduction package are also cost-effective with respective ROIs of 4.6 and 4.5. The alcohol-reduction package has a ROI of 1.3.

This report provides evidence that the four main NCDs reduce economic output and discusses several potential response options, including assessment of their relative returns on investment through incremental scale-up. Four analyses were performed:

- An economic burden analysis shows the scale of disruption of NCDs to the Zambian economy through assessment of their direct and indirect costs. Direct costs include health care costs for treating CVD, diabetes, cancer and respiratory disease. Indirect costs are based on costs of absenteeism (missing working days), costs of presenteeism (working at reduced capacity due to NCDs) and the economic losses due to premature death among people of working age.
- An intervention costing analysis provided an estimate of the funding required to implement a set of NCD interventions. Costs of policy and clinical interventions were estimated using the WHO-developed NCD Costing Tool and OneHealth Tool (OHT) respectively.
- An impact analysis provided an estimate of the potential health gains that would accrue from a set of interventions. Health gains were estimated using the One Health Tool (OHT) in terms of averted mortality and disease incidence. A monetary conversion method was applied to derive the economic value of the health gains.
- A return-on-investment (ROI) analysis compared the estimated implementation costs during the costing analysis with the economic returns of the impact analysis.

Raising tobacco and alcohol taxation would provide an important additional revenue stream for the government. There is a significant gap between the current tax rate on tobacco (37.3 percent of retail price) and the WHO recommendation (70 percent). A further step would be allocation of appropriate funds to public health programmes for NCD prevention and control activities in Zambia. Those funds generated through taxation should be earmarked for achieving Universal Health Coverage (UHC) and social spending.

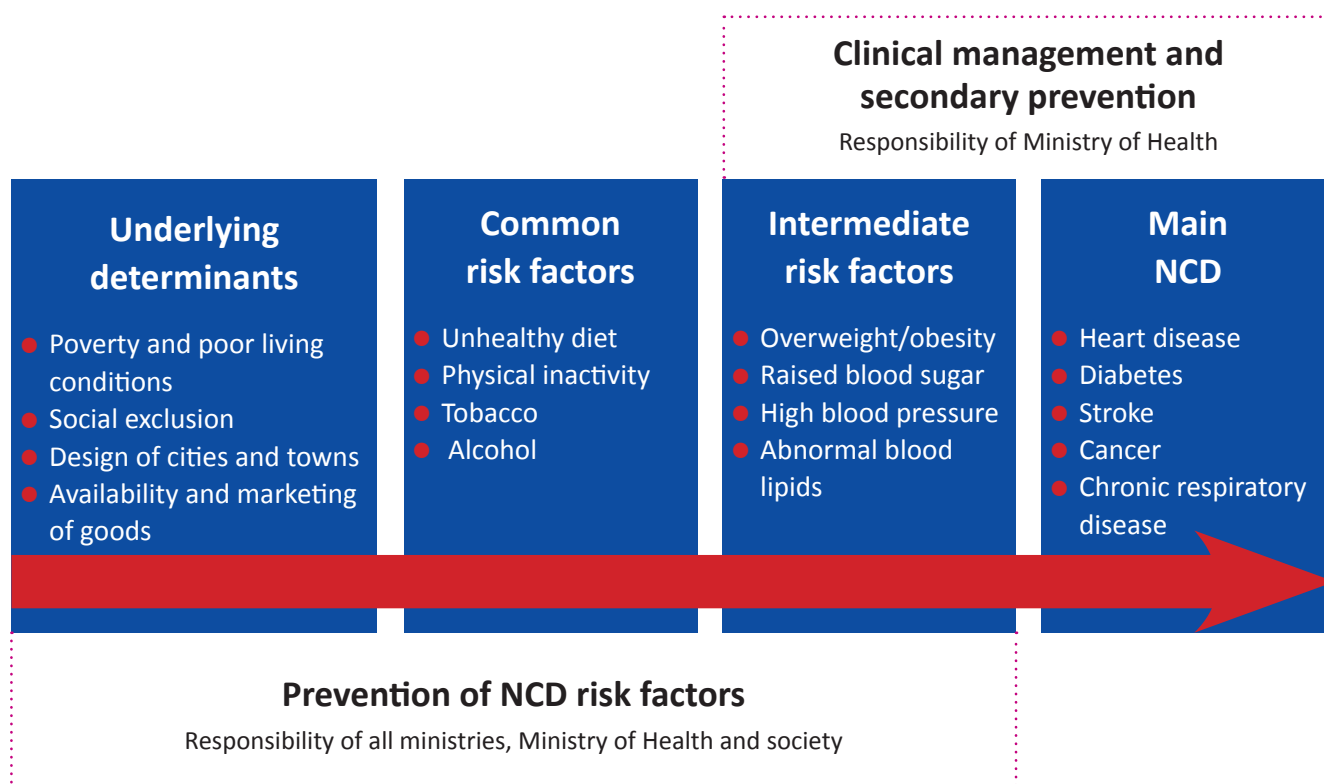
1. Introduction

Non-Communicable diseases (NCDs) are diseases of long duration and generally slow in progression. The four main types of non-communicable diseases are cardiovascular diseases (CVDs) (heart attacks and stroke), cancer, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. According to the WHO, NCDs are by far the leading cause of death in the world, representing 63 percent of all annual deaths. Non-communicable diseases kill more than 36 million people each year. The most affected are low and middle-income countries where approximately 80 percent of all NCD deaths occur.

At a macro-economic level, NCDs reduce productivity through interruption of full participation in the labour force and the subsequent impacts on individuals, their careers and the state. When individuals die prematurely, the labour output they would have produced in their remaining working years is lost. In addition, individuals who suffer from an NCD are more likely to miss days of work (absenteeism) or to work at a reduced capacity while at work (presenteeism). In low and middle-income countries, it is estimated that between 2011 and 2030 NCDs will cause more than US\$ 21 trillion in lost economic output, with nearly one third of that figure attributable to CVD alone (1). For individuals and governments, expenditure on health can mean significant opportunity costs, including decreased investment in education, transportation projects or other forms of human or physical capital that can produce long-term returns.

The risk of NCDs can be reduced by modifying the four main behavioural risk factors (tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity) and metabolic risk factors such as high blood pressure or high cholesterol (2). Fig. 1 illustrates the determinants and risk factors that drive the development of NCDs, many of which are beyond the control of the health sector alone (48).

Figure 1: Determinants of NCDs and responsibilities for response



Source: Bonilla-Chacín, María Eugenia. 2014, modified to include responsibilities factors

The burden of NCDs in Zambia is increasing, with significant consequences for morbidity and mortality levels. The most common NCDs in the country include chronic respiratory diseases, CVDs, diabetes mellitus (Type II),

cancers, epilepsy, mental illnesses, oral diseases, eye diseases, trauma (mostly due to road traffic accidents and burns), and sickle cell anaemia. In 2016, it was estimated that NCDs caused 29 percent of all deaths in the country, and the risk of dying prematurely (between the ages of 30 and 70) from one of the NCDs was 18 percent (43). Most of these NCDs are associated with lifestyles, such as unhealthy diets, physical inactivity, alcohol and substance abuse, and tobacco use.

High human and economic costs highlight the need to reduce the burden of NCDs in Zambia.

In 2017, the World Health Assembly endorsed a set of affordable, evidence-based interventions for the prevention and control of NCDs in all Member States (NCD 'best buy' interventions). These were first published in the 'WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020' and updated in 2017. Among these best buys is the need to build a case for investing in NCD prevention and control.

The need to address NCDs is an integral part to the 2030 Global Agenda for Sustainable Development. Sustainable Development Goal (SDG) target 3.4 calls for a one-third reduction in premature mortality from NCDs by 2030. Zambia has set itself an ambitious target of reducing premature deaths arising from NCDs from 23 percent to 15 percent by 2021. This calls for accelerated multisectoral efforts to attain the desired target.

A key recommendation of the United Nations Interagency Task Force on the Prevention and Control of Non-Communicable Diseases (UNIATF) visit to Zambia in December 2016 was to investigate the economic case for investing in NCD responses (4).

2. Purpose of Case for Investment in NCD Prevention and Control

The economic aspects of NCDs are too often unrecognised in the budgetary allocation processes. Quantifying the costs of NCD management and interventions to prevent and control NCDs, as well as their returns relative to the costs of inaction, has been a high-priority request from Member States. Investment cases are designed to help countries make their own economic rationales for action to prevent and control NCDs.

The purpose of developing the case for investment is to:

1. Support policy formulation and implementation
2. Provide an advocacy tool for resource mobilisation
3. Quantify the costs and benefits of prioritised interventions

In March 2018, a series of meetings were held with contact persons across the Ministry of Health, WHO, World Bank and other organisations over a period of a month to identify data sources and subsequently collect data, in order to later perform an economic analysis to help the country make informed decisions about ways to reduce the NCD burden. To support the overarching economic analysis, the team carried out an epidemiological review (used in Section 3). Together with other reports on the NCD situation, these helped identify policy strengths and areas for further development.

Section 3 provides an analysis of NCD behavioural risk factors in Zambia, including current levels of tobacco, alcohol and salt consumption and physical inactivity, as well as the existing prevalence of metabolic risk factors such as raised total cholesterol and raised blood pressure within the population. Section 4 outlines evidence-based policies and a clinical intervention that can contribute to reducing the burden of disease and details the current implementation level of policies and interventions in Zambia. Section 5 describes the meth-

ods and tools used in the analysis. Section 6 presents the results, including total costs, and the expected health and economic benefits (such as healthy life-years gained, mortality averted and productivity gains) of implementing the three policy packages described, as well as the clinical intervention. Section 7 outlines the conclusions.

3. Situation Analysis: Risk Factors Relevant to NCDs

This section sets out background information used in preparation of the investment case analysis. It addresses NCDs as a whole and the extent to which risky behaviours – such as tobacco, alcohol and salt consumption and physical inactivity – are present in Zambia, as well as the prevalence of metabolic risk factors such as raised blood pressure, cholesterol and raised blood sugar. The selection of behavioural and metabolic risk factors has been narrowed to focus on those which are most common and are targeted by the set of interventions analysed in this study.

3.1 Tobacco Use

The WHO Stepwise approach to Surveillance (STEPS) survey of 2017 investigated prevalence of tobacco use for people aged 18-69 (5). A marked gender disparity exists: only 3.3 percent of women use tobacco compared to 23.3 percent of men¹. The preferred form of tobacco use is smoking manufactured cigarettes and hand rolled cigarettes, used by 59 percent and 39 percent of current smokers respectively (44).

The Global Youth Tobacco Survey (GYTS) for Zambia conducted in 2002 and 2011 revealed a marked increase in tobacco use among youths: 25.6 percent of youths (24.9 percent of boys; 25.8 percent of girls) aged 13–15 years currently use some form of tobacco (6), in some settings almost 3 in 10 youths use tobacco (44).

The International Tobacco Control policy evaluation project Survey addressing FCTC implementation in Zambia (Wave 1 in 2012, Wave 2 in 2014) revealed that an increasing majority of smokers (93 percent wave 2, 85 percent wave 1) were aware of the harmful effects of smoking and an increasing proportion of smokers regret starting (82 percent wave 2, 67 percent wave 1) (44). Zambians are also subject to misleading marketing; 51 percent of adults were not aware of the fact that the brands with the package descriptions of 'light' or 'mild' are no less harmful than regular brands. Twenty-six percent of Zambian men choose these misleading brands. In the 12 months leading up to the STEPS 2017 survey 49.3 percent of smokers had tried quitting (5).

Key facts summarised in Box 1.

3.2 Harmful use of Alcohol

The STEPS 2017 survey findings show that about a third (32.0 percent) of males and over one-tenth (11.8 percent) of females are considered current alcohol users, and half of this population engaged in heavy episodic drinking (6 or more drinks on any occasion in the past 30 days).

Box 1. Tobacco snapshot

Tobacco use: 23.3 percent of Zambian men smoke. Tobacco use prevalence increases with age; only 10.1 percent of people aged 18-29 smoke, whilst for ages 60-69 17.5 percent smoke. Around one quarter-a third of youths aged 13-15 use tobacco.

Attributable NCDs: Multiple forms of cancer; IHD, stroke, and other CVD and circulatory diseases; chronic obstructive pulmonary disease and pneumoconiosis, and; peptic ulcer disease, diabetes, cataract, macular degeneration, and rheumatoid arthritis.

¹ This excludes smokeless forms of tobacco use.

Harmful use of alcohol leads to multiple forms of cancer, pancreatitis, epilepsy, diabetes, cirrhosis and IHD, stroke and other cardiovascular diseases, oral health problems and mental illnesses. The use of illicit alcohol is another problem. A study investigating unrecorded consumption describes how *kachasu*, a distilled beverage, is part of traditional Zambian culture. The study revealed that 29 percent of mostly older Zambians (aged 37-60) heavily consume *kachasu* as well as other types of illicit alcohol (7). Moreover, the STEPs 2017 survey findings showed that 26.3 percent of adults consumed unrecorded alcohol within a 7-day period.

Another highly popular form of illicit and unregulated alcohol is strong spirit sold in small bottles which are branded with lavish names and are easily accessible and affordable.

Alcohol contributes to road traffic accidents, an effect enhanced by weak enforcement of traffic regulations and round-the-clock open hours of bars. About 2,100 of the 17.5 million people in Zambia die each year as a result of road traffic accidents, making this the third leading cause of death in Zambia (30 fatalities per 100,000 residents) (4).

Key facts summarised in Box 2.

3.3 Unhealthy Diet

According to a regional study conducted in 2016 to assess NCD risk factors and hypertension in Western Province, the mean salt intake of adults (18+) is estimated at 9.3g per day, almost double the WHO recommendation of 5g per day, with women consuming more than men (10). Focus groups conducted as part of the study found that people are aware that genetically modified and westernised foods may contain greater amounts of sugar and salt. The STEPS Survey, consistent with other evidence, showed high overall consumption of salt at 9.5g per day with men consuming more salt than women (10.5g for men; 8.5g for women) (5). Approximately 78.3 percent of adults thought they were consuming the correct amount of salt, suggesting inadequate knowledge as a potential driver.

However, 62.2 percent of the population were aware of the health risks of overconsumption of salt. Approximately 21.7 percent of adults reduced consumption of processed foods, 6.6 percent checked food packaging labels, 14.5 percent avoided eating food prepared outside home and only 5.2 percent purchased low salt alternatives.

A global survey showed that Zambia has the greatest increase in mean saturated fat intake worldwide measured as a percentage of energy intake over the period 1990-2010, rising from 2.3 percent to 7.1 percent (12).

Key facts summarised in Box 3.

3.4 Physical Inactivity

Physical inactivity is a risk factor for NCDs compounded by the resultant overweight and obesity. The STEPs 2017 survey assessed the extent to which Zambians were engaging in physical activity (5). Overall 65.3 percent engaged in vigorous physical activity (75.1 percent of men; 54.5 percent of women), such as running, fast cycling, aerobics, competitive sports, etc. The national prevalence of physical inactivity was 19.8 percent (22.2 women and 17.3 percent men).

Box 2. Alcohol snapshot

Alcohol use is an issue in Zambia as people frequently drink heavily; In the last 30 days 10.9 percent of adults consumed 6+ drinks on one occasion – the maximum normally consumed on such occasions is 8.3.

Attributable NCDs: Multiple forms of cancer, pancreatitis, epilepsy, diabetes, cirrhosis, and IHD, stroke, and other cardiovascular and circulatory diseases, oral health problems and mental illnesses.

Box 3. Salt snapshot

Salt intake in Zambia is double the WHO-recommended level.

Attributable NCDs include stomach cancer and increased risk of IHD, stroke and other cardiovascular and circulatory diseases due to hypertension.

Although there is little research on the attitudes of Zambians towards physical activity, one regional study of Western Province rural areas suggests that exercise has been partially stigmatised; the study attests that exercise (running or going to the gym) is not a cultural norm and might be regarded negatively by members of the community (10).

Obesity is a proven problem in Zambia and it is a known risk factor for hypertension (13). In the STEPS 2017 survey rates of obesity are high and significantly different for men and women (5.2 percent for men and 19 percent for women). Overall, 7.5 percent of respondents were obese while 16.7 percent were overweight (16.2 percent men and 32.5 percent women). A study in Western Province showed that 21 percent were overweight and 19 percent were obese (10).

Key facts summarised in Box 4.

Box 4. Physical inactivity snapshot

Activity levels: One third of adults do not meet the WHO-recommended level of physical activity.

Attributable NCDs include coronary heart disease, type 2 diabetes and breast and colon cancers (12).

3.5 Metabolic Risk Factors

Metabolic risk factors such as raised blood pressure, high body mass index or raised blood lipid levels significantly increase the risk of having a cardiovascular event. The prevalence of high blood pressure², raised total cholesterol³ and diabetes⁴ in Zambia is reported in the STEPS 2017 survey (5) (Table 1).

Table 1. Prevalence of metabolic risk factors, by age and gender

Factor	Men				Women			
	18–29	30–44	45–59	60–69	18–29	30–44	45–59	60–69
Very high blood pressure ⁵	3.2	6.2	10.3	22.5	3.3	6.7	18.0	33.6
High blood pressure	16.3	20.8	29.4	38.6	8.4	16.7	33.5	59.4
Raised cholesterol	1.8	4.3	12.0	12.7	6.2	9.3	13.5	24.6
Diabetes	3.3	6.0	11.8	17.2	3.1	7.0	9.8	22.2

While elevated levels of any one factor can increase the risk of a cardiovascular event, the risk is compounded for individuals with multiple metabolic risk factors. WHO risk prediction charts assess the likelihood of an individual having a cardiovascular event and/or dying within 10 years by combining six factors: gender, age, blood pressure, cholesterol, smoking status and whether or not they have diabetes. Overall 4.2 percent of Zambian adults aged 40–69 years have a probability of 30 percent or higher of having a fatal or non-fatal cardiovascular event within 10 years; this rises with age (Table 2).

Table 2. Prevalence of high cardiovascular risk, by age and gender

Factor	Men		Women	
	40 to 54	55 to 69	40 to 54	55 to 69
10-year cardiovascular risk $\geq 30\%$, or with existing CVD	2.1	9.2	3.6	6.2

² Systolic blood pressure (BP) ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg or currently on medication for raised BP.

³ Raised total cholesterol ≥ 5.0 mmol/L or ≥ 190 mg/dl or currently on medication for raised cholesterol.

⁴ Raised blood glucose (defined as either plasma venous value of ≥ 7.0 mmol/L (126 mg/dl) or capillary whole blood value of ≥ 6.1 mmol/L (110 mg/dl)) or currently on medication for diabetes.

⁵ Including all those who have blood pressure measure over 160/100 mmHg.

4. Interventions to reduce NCDs burden

As highlighted in Section 1, WHO has published a menu of policy options and interventions to prevent and control NCDs (2) (3). The economic analysis for this investment case was narrowed to assess selected interventions for NCD prevention (tobacco, alcohol and physical inactivity policies) and management of cardiovascular disease.

The following sections summarise national efforts for specific areas against the full menu of policy options recommended in the updated WHO NCD Global Action Plan 2013-2020, drawing on the findings of relevant published reports from WHO and other institutions (3). The discussions held with the Ministry of Health and other stakeholders determined which of these interventions would be the best options for scale-up, bearing in mind the current economic and political constraints in Zambia. These interventions were included in the ROI analysis and are listed below.

4.1 Tobacco control

In 2008, Zambia showed its commitment to fighting tobacco use by becoming a party to the WHO Framework Convention for Tobacco Control (FCTC) (16). This pivotal moment precipitated, over the course of 2009, a public smoking ban and an amendment to health warning regulations. The tobacco control movement has gained momentum with the recent drafting of the Tobacco Products and Nicotine Products Control Bill of 2019, launch of the Investment Case for Tobacco Control and draft National Tobacco Control Strategic Plan. The Tobacco Control Bill 2019 continues to undergo consultations with key stakeholders.

Tobacco industry interference poses one of the main challenges to strong tobacco control measures. The industry has attempted to weaken the new Tobacco Control Bill and change policies, including tobacco tax regulation, in its favour. Zambia produces a significant amount of tobacco leaf and the industry has a strong presence in the country. Tobacco farming spreads untaxed and cheap loose-leaf tobacco for roll-your-own (RYO) cigarettes, which decreases the effectiveness of tobacco control measures, including taxes (22). Further, tobacco cultivation yields poor returns to labour, can cause dependency and debt, is hazardous to farmers' health, and can contribute to food insecurity and environmental degradation (45). Sixty percent of tobacco farmers in Zambia are considering switching to other crops (46).

Zambia faces challenges in enforcement of bans on smoking in public places, bans on sales to minors, and restrictions on tobacco advertisement, promotion and sponsorship. The country has made some progress in enforcing indoor public smoking bans by developing and implementing a smoke free manual and training law enforcement agents on how to use the manual. However, resource constraints and a fragmented tobacco control legislative framework continue to hamper stronger enforcement.

Contributing to the tobacco epidemic particularly among youth, but also among adults, is the fact that purchase of single stick cigarettes is legal and common in Zambia. Although the per stick price is higher for single cigarettes compared to buying a whole pack, single stick sales make purchasing cigarettes accessible for youth. Further, while sales to those below 16 years of age are prohibited, 23 percent of youth aged 13-15 years currently smoke cigarettes purchased from stores (47). In addition, the tobacco industry remains free to market to youth by advertising at point of sale and on entertainment channels. Vending machines, internet sales and the sale of sweets, snacks, toys or any other objects made to look like tobacco products (these appeal to minors) are not prohibited. Menthol cigarettes encourage youth initiation of smoking by making cigarettes feel less harsh.

Zambia's share of taxes as a percent of the retail price of the most sold brand of cigarettes was 37.3 percent in 2016, and tobacco in Zambia is highly affordable compared to many other WHO FCTC Parties in Africa. Currently, there are no taxes imposed on snuff tobacco and smokeless tobacco. Readily available roll-your-own tobacco, often available at even lower cost than cigarettes, remains an issue in Zambia because tobacco users can substitute with these less expensive tobacco products. Scaling up taxes to represent 75 percent of the retail price, with

a predominant specific excise tax component, as recommended under WHO FCTC Article 6 guidelines, would generate large health and economic gains for Zambia. Further, restructuring the tax system to be uniform across tobacco products and contain a strong specific-tax component would substantially increase the benefits of tax increases.

Zambia is strengthening multisectoral planning and coordination for tobacco control. The national multisectoral committee on implementation of the WHO FCTC led by the Minister of Health, is being revitalised; key sectors are in the process of nominating focal points and terms of reference for the committee are being developed. Further, the Ministry of Health is leading the development of a multisectoral national strategy for tobacco control. The NCD Unit, which is under the Directorate of Health Promotion, Environment and Social Determinants has received minimal financial resources for NCDs activities.

Reviews of the current policy implementation with respect to the MPOWER measures have recently been undertaken and the main points are summarised as follows:

Table 3. Current status of policies for tobacco reduction in Zambia

Policy	Description	State of Implementation
Monitor tobacco use and prevention policies	Nationally representative surveys to track the prevalence of tobacco use	
	Zambia recorded rates of tobacco smoking in the STEPS 2017 survey and the Demographic and Health Survey 2013-2014 (17). Less recently conducted was the Global Youth Tobacco Survey 2011 and the STEPS 2008 survey for Lusaka (18) (14).	
Protect people from tobacco smoke	Legislation that bans smoking in public places (e.g., workplaces, restaurants, cafes/pubs/bars, public transport, and health-care, educational, and government facilities), with complaint systems and regulations in place to ensure follow-through.	In 2008, Zambia issued Statutory Instrument #39, banning smoking in all public places (19). In 2014, police were given the power to prosecute violators (20). However, compliance and enforcement of the law is reportedly low, especially in government facilities, educational facilities, cafes, pubs and bars.
Offer help to quit tobacco use	Three types of treatment should be included in any tobacco cessation effort: 1) tobacco cessation advice incorporated into primary health-care services; 2) easily accessible and free quit lines; and 3) access to low-cost pharmacological therapy.	Cessation services are generally inaccessible in Zambia. Aside from the occasional community place, most facilities such as health clinics and primary care facilities do not offer smoking cessation support. Free quit lines are yet to be introduced. Nicotine replacement therapy (NRT) is purchasable but not covered by health insurance (21).

Table 3. (continued)

Policy	Description	State of Implementation
Warn about the dangers of tobacco	1) Mandated warning labels on tobacco packaging that detail health effects. 2) Plain packaging that does not allow for the use of logos, colours, brand images, or promotion information other than the brand and product names. 3) targeted anti- tobacco mass-media campaigns to increase knowledge about smoking and its effects	The 1992 Public Health Regulations introduced the basic health package warnings present today. These are text-based – only available in English – and cover an insufficient 30% of the front and back of the package. On a positive note, the ITC project has suggested that backing exists for implementing pictorial health warnings (22). Although a national campaign hasn't yet been implemented, during 2012-2014, the Tobacco Free Association of Zambia (TOFAZA) rolled out several district-wide awareness and advocacy campaigns. In this period 31% of people reported hearing anti-tobacco messages on the radio (22).
Enforce bans on tobacco advertising, promotion and sponsorship	Banning advertising in prominent forms of media, as well as banning indirect advertising (e.g., free distribution or promotional discounts, brand product placement in TV or films, allowing brands to hold sponsored events).	The 1992 Public Health Regulations restrict advertising in only a few dimensions for which enforcement is weak. There has been no recent concerted effort to ban advertising, promotion and sponsorship of tobacco products (21) (22).
Raise taxes on tobacco	Tobacco excise taxes equal to at least 70 percent of the retail price	At 37.3% of retail price, Zambia's tobacco tax rate is well below the WHO recommendation (70%) and the lowest in the continent (21). Moreover, one of the three tax adjustments in the past decade was a decrease on a popular cigarette brand, down from 34% in 2008 to 27.6% in 2012 (22). Currently, the outlook for tobacco control seems positive; a proposal in the 2018 National Budget altering eligibility to pay VAT effectively increases costs to local tobacco suppliers (23).

The ROI analysis modelled the following changes:

- Protect people from tobacco smoke
- Offer help to quit tobacco use
- Warn about the dangers of tobacco
- Enforce bans on tobacco advertising, promotion and sponsorship
- Raise taxes on tobacco

4.2 Alcohol control

A major milestone in Zambian alcohol policy reform was the implementation of the Liquor Licensing Act 2011 establishing restrictions on alcohol sales and purchasing. A National Alcohol Policy and Implementation Frame-

work has been developed to address several key areas including coordination, prevention of harmful use of alcohol, treatment of individuals affected and training for management of alcohol related problems, including enforcement related to the Act (24). In 2012, a civil society alliance called the Network Against Harmful Use of Alcohol (ZNAHUA) was formed and has contributed significantly to the formulation of this policy. Table 4 compares Zambia's current alcohol policy to a subset of WHO recommendations to reduce the harmful use of alcohol.

Table 4. Current status of policy for alcohol reduction in Zambia

Policy	Description	Current state of implementation
Enforce restrictions on the availability of alcohol	Regulate the number and location of alcohol outlets, and the days and hours, and modes of retail sales	The Liquor Licensing Act 2011, intended to regulate alcohol use by restricting opening hours to after 10:00 am and selling to minors, is rendered ineffective due to weak enforcement. This results in minors easily acquiring and consuming alcohol (25) (26). In addition, a number of bars near schools and houses remain open 24/7 (4). In 2012, a ban was placed on the strong spirit called <i>tujilijili</i> (27).
Enforce restrictions on advertising	Advertising ban - 1) Regulating the content and volume of marketing; direct or indirect marketing in certain or all media (including social media); sponsorship activities that promote alcoholic beverages, and; restrictions or bans on promotions in connection with activities targeting young people. 2) Effective systems of surveillance of marketing. 3) Effective administrative and deterrence systems for infringements on marketing restrictions.	Not achieved
Raise taxes on alcoholic beverages	Specific domestic taxation on alcohol, which may vary by alcohol content.	Steady tax increases have not been achieved, mainly due to powerful opposition. Narratives advanced by the alcohol industry arguing that tax raises increase illicit trade and diminish both revenue and jobs succeeded in bringing about a tax reduction (4). The 2016 Budget plan included a reduction on excise tax of clear beer from 60 percent to the previous rate of 40 percent in 2014 (28). Again, attitudes have shifted, with the 2018 National Budget containing a proposal to introduce an excise duty of 125 percent on several forms of alcohol (23).

The ROI analysis modelled the following changes:

- Enforce restrictions on the availability of alcohol
- Enforce restrictions on advertising
- Raise taxes on alcoholic beverages

4.3 Unhealthy Diet (with focus on salt)

Policies to reduce salt intake in Zambia trail behind other diet-related policies in both development and implementation. The UNIATF mission report cites implementation of laws restricting marketing of breast-feeding milk substitutes and of unhealthy foodstuffs to children (4). Regarding salt, past actions have focused explicitly on iodization, with positive achievement: Iodine deficiency among school children was successfully reduced from 72 percent in the early 1990s to 14 percent in 2011 (29). However, the threat of high salt intake is yet to be recognised. Although the National Food and Nutrition Strategic Plan for Zambia 2011-2016 includes an NCDs section, Strategic Direction #7, does not mention risks of high salt intake (30).

Table 5 compares Zambia's current state against a set of WHO measures that outline steps countries can take to reduce salt intake which are: Surveillance; Harness industry; Adopt standards for labelling and marketing; Knowledge; Environment (SHAKE) (31).

Table 5. Current status of policies to reduce salt consumption in Zambia

Policy	Description ^a	Current status in Zambia
Surveillance	Measure and monitor population salt consumption patterns, and the sodium content of food.	National salt intake for Zambians aged 18-69 was recorded for the first time in the recent STEPS 2017 survey.
Harness industry for reformulation	Set target levels for the amount of salt in foods and meals and implement strategies to promote reformulation.	Not achieved
Adopt standards: Front of pack labels	Adopt front-of-pack nutrition labelling systems (e.g., colour coded for salt content level, 'high salt' warning).	Not achieved
Knowledge: Education and communication	Implement integrated education and communication strategies to raise awareness about the health risks and dietary sources of salt in order to change behaviour.	Not achieved
Environment: Salt reduction strategies in community-based eating spaces	Implement multicomponent salt reduction strategies in community settings (e.g., schools, workplaces, hospitals).	Not achieved

^a Information in the Description column is derived from the SHAKE technical package for salt reduction (31).

4.4 Physical Inactivity control

Lack of physical activity is a growing problem for Zambia, particularly in urban areas. Many leisure parks in Zambia are not free to access and roads are not safe for pedestrians and children who walk to and from work

and school respectively. This discourages walking, cycling, jogging and other elements of physical activity. At the same time there are some good examples of compulsory physical education in schools and programmes put forth by youth and sport. However, the physical activity requirement in schools is not well enforced (4). Table 6 compares Zambia's current physical inactivity policy to a subset of WHO recommendations to reduce physical inactivity.

Table 6. Current status of policies to reduce physical inactivity in Zambia

Policy	Description	Current state in Zambia
Brief advice as part of routine care	Provide physical activity counselling as part of routine primary health care services through use of a brief intervention	Not achieved
Awareness campaign	Implement community wide public education and awareness campaign for physical activity which includes a mass media campaign combined with other community-based education, motivational and environmental programmes aimed at supporting behavioural change of physical activity levels.	on-going

The ROI analysis modelled the following changes:

- Brief advice as part of routine care
- Awareness campaign

4.5 Clinical primary care interventions for CVD and diabetes

Zambia's health system is in need of strengthening, particularly in the area of primary health care (Service Availability and Readiness Assessment [SARA] Survey 2015). Inadequate human resources and funding sets back the health care system. Although health facilities deliver primary health care services at the community level, there is little focus on the prevention and management of CVD and diabetes (4).

Information on diabetes care was collected in the SARA survey conducted by the Ministry of Health in 2015. Its results, as relayed in the UNIATF mission report, show that only 25 percent of health facilities offer services for diabetes despite a readiness score of 58 percent (4). Availability of guidelines for diabetes diagnosis and treatment is at a lower level (33 percent), with training of at least one staff for diabetes diagnosis and treatment even lower (13 percent). In terms of equipment, adult scales were found in all the facilities (100 percent), while measuring tapes had the lowest score of 88 percent. Diagnosis was lowest for blood glucose (52 percent) and highest for urine-dipstick (83 percent).

A study estimated that only 64 percent of diabetic adults (18+) were aware that they had diabetes from having been previously diagnosed. Of those previously confirmed as diabetic only 34 percent had been receiving treatment (15). A study of diabetic outpatients attending a clinic in Lusaka showed poor glycaemic control (32). The STEPS 2017 survey estimated diabetes prevalence at 6.2 percent and found that only 36.8 percent of those adults who had been previously diagnosed with diabetes were currently on medication (5).

The Better Health Outcomes through Mentoring and Assessment (BHOMA) project (33) showed that there is capacity to improve hypertension management in the phases of screening, monitoring and treatment in rural Zambia. Interviews with clinicians revealed setbacks to hypertension management. It was suggested that the low levels of screening were in part a result of the need for repeat visits before confirmation of diagnosis. Additional factors were a lack of equipment (BP machines and urinalysis sticks), trained personnel and workload. These factors influenced staff to reduce time spent monitoring hypertension; only what was deemed high priority

components of a physical examination were undertaken. Furthermore, drug stock-outs frequently resulted in prescriptions of second-choice antihypertensive drugs. Lastly, caregivers speculated the asymptomatic nature of hypertension led people to neglect follow-up visits. This was also confirmed by the STEPS Survey that revealed that over 80% of the respondents with raised blood pressure did not know that they were hypertensive and were thus not on medication.

The 2017 STEPS survey reviewed treatment coverage for CVDs and found that eligible adults receiving drug therapy and counselling to prevent heart attacks and strokes was only 13.0 percent.

5. Methods

The investment case allows scaled-up action – and the costs of not doing so – to be modelled in short-term (5 years) and long-term (15 years) time frames. The baseline scenario is a continuation of the status quo, in which no new policies are implemented, and current coverage levels remain in place – i.e. the costs of inaction. The other scenario is one in which selected policies and clinical interventions are scaled-up over the next 15 years.

The analysis used the WHO OneHealth Tool, an epidemiology-based population model developed by United Nations partners to enable strategic planning and costing of interventions and projection of the health benefits expected from their implementation. Health benefits are generated in terms of natural units (cases or deaths averted) but also monetized using the human capital approach to enable benefit–cost ratios (the primary return on investment metric) to be evaluated and reported for each package of interventions.

This section outlines the different methods and economic models applied at different stages in the economic analysis:

- the economic burden of NCDs in terms of direct costs (government spending) and indirect costs (absenteeism, presenteeism and premature deaths);
- costing of interventions (clinical and policy interventions);
- assessment of the health and economic benefits of interventions;
- ROI analysis

The investment case was completed by analysing four intervention packages related to tobacco, alcohol, physical inactivity and clinical management. However, a salt package was not included as data was not available. These interventions were analysed in terms of implementation costs, health impacts, economic benefits and ROIs. In summary, the interventions assessed were as follows (Table 7).

Table 7. Summary list of interventions analysed

Tobacco interventions	Alcohol interventions	Physical inactivity interventions	Clinical interventions
● Protect people from tobacco smoke ● Warn about danger: warning labels ● Warn about danger: mass media campaign ● Enforce bans on tobacco advertising ● Raise taxes on tobacco	● Enforce restrictions on availability of retailed alcohol ● Enforce restrictions on alcohol advertising ● Raise taxes on alcoholic beverages	● Brief advice as part of routine primary care ● Awareness campaigns	● Drug therapy for patients with very high blood pressure (SBP>160) but low risk of CVD/diabetes (<20%)

5.1 Economic Burden

5.1.1 Absenteeism and Presenteeism

In this section, we estimate the productivity losses of absenteeism (missing working days) and presenteeism (working at reduced capacity due to NCDs) using the Human Capital Approach.

The fraction of the Zambian workforce that have NCDs is first worked out by applying prevalence rates of diseases to population figures and relevant economic indicators such as unemployment rates and labour force participation rates⁶. Then, the amount of unproductive days worked is determined by applying rates of productivity loss taken from the academic literature (table 8). Finally, a monetary value is placed on the amount of unproductive days.

An individual's earnings (annual wages plus benefits) reflect their productivity in a year. In our analysis, we use data on labour force share size and wages to estimate the Zambian average wage, 37,210 ZMW (3,876 USD) per year⁷. A dearth of available data pertaining to the present on earnings by age, industry, gender, and health-status prevents us from improving this estimate further.

The lost economic output from costs to the Zambian economy as a consequence of absenteeism and presenteeism was estimated in the following steps:

- The first step is to estimate the number of people of working age that suffered from NCDs. The Global Burden of Disease database provided figures for the prevalence and mortality of working age people with NCDs in Zambia in 2016. This data was used to approximate NCDs for 2017 (34). The formal working age of 15-60 was used.
- The next step is to estimate the number of workers with NCDs. For this, economic indicators were taken from the World Bank and CSO Zambia Labour Force Survey (17) (35). The size of the working age population with NCDs was multiplied by the labour force participation rate (LFPR) and employment to determine the NCD prevalent workers. Similarly, deaths were multiplied by LFPR and employment to provide an estimate for the number of workers that died in 2017. Deaths were subtracted from NCD prevalent workers to estimate the number of workers who survived despite their illness in 2017.

⁶ Economic indicators for the Zambian workforce are World Bank estimates which do not account for unpaid workers, family workers, and students: <https://data.worldbank.org/country/zambia>.

⁷ The average wage was calculated as 37,210 ZMW by dividing total GDP (243,284,000,000) by the current size of the employed labour force (6,538,123).

- The figures associating productivity losses with specific disease types (table 8) were multiplied by the number of surviving workers to work out the total number of unproductive days that resulted from NCDs in 2017.
- In the final step, GDP per worker was multiplied by the total number of unproductive working days.

Table 8: Rates of absenteeism and presenteeism for the four main NCDs

	Reduction in working days	Unproductive days per year
Absenteeism		
Cardiovascular disease	3.3%	8.0
Diabetes	0.3%	0.8
Cancers	2.3%	5.4
Respiratory diseases	0.5%	1.2
Presenteeism		
Cardiovascular disease	3.7%	8.9
Diabetes	3.0%	7.3
Cancers	5.1%	12.3
Respiratory diseases	11.5%	27.5

5.1.2 Premature deaths

The loss of GDP due to premature death of workers is estimated using a common method, the Human Capital Approach recommended by Neumann (36). This method counts all future potential income lost from a worker who dies during their working lifetime. The annual loss of income resulting from the death of a worker was estimated based on the number of working years lost from the age of death to the age when the deceased employee would have reached the average retirement age. Lost working years by disease group, age and gender were extracted from the GBD database (34).

The productivity losses due to premature deaths were calculated as the product of the total working years lost across all age brackets multiplied by the LFPR, employment and GDP per worker.

The human capital approach considers the patient's hours of productivity that are lost and calculates productivity costs as the product of those total lost hours up to the patient's retirement age with the hourly wage. Consequently, the productivity loss calculation based on this approach is inevitably large. Under this method, replacement of workers is not considered to reduce productivity, as full employment is assumed. The loss based on this approach in the total NCD cost calculations in this report should be regarded as a maximum.

5.1.3 Intervention Costs

Interventions allow for the recovery of benefits (e.g., health, labour productivity) that are lost to NCDs, but they come at a cost.

In this section, we estimate the costs of a clinically-based CVD primary prevention intervention, and policy interventions. For the clinical interventions, we limit our costing to healthcare expenditures, including direct medical (e.g. human resources, drugs, devices) and direct non-healthcare costs (e.g. administrative costs, overhead, equipment.). For policy interventions, we use the assumptions embedded in the WHO NCD Costing

Tool, which take into account human resources, meetings, training, mass media time, supplies and equipment, and other miscellaneous items needed to implement and enforce policies.

The updated Appendix 3 of WHO's global action plan for the prevention and control of NCDs 2013–2020 lists multiple clinical interventions (3). In this study, we model the clinical intervention termed drug therapy for people with hypertension (SBP $\geq$ 160) but low risk of CVD/diabetes (<20%). We estimate the number of additional people that could be treated in this way for hypertension by projecting a scale up in the rate of coverage – the share of people receiving treatment out of all those who need it. The rate of coverage for raised blood pressure (26%) was assumed to be similar enough to that for hypertension so that it can act as a proxy for the latter. Furthermore, since this rate of coverage represents the share of patients receiving treatment out of only those previously diagnosed, the results should be interpreted as an underestimation. We scale up the rate of hypertension treatment in line with Zambia's NCD strategy going forward; accordingly, coverage is set to reach 80% by the end of the study period.

Clinical interventions are costed using an ingredients-based, bottom-up approach. For clinical interventions, the OneHealth Tool (OHT) contains default regimens that are based on standard WHO protocols and expert opinion (37). The intervention regimens include: 1) required drugs and supplies, and 2) number/length of outpatient and inpatient visits. Table 9 shows the regime for the clinical intervention for hypertension treatment.

Table 9: Drugs and outpatient visits prescribed for patients with hypertension

Drugs and supplies required per patient	% of patients receiving this aspect of the treatment	# of units	Times the medication is taken per day	Days taken per year
Hydrochlorothiazide, tablet 25mg	95	1.0	1	365
Enalapril, tablet, 20mg	40	1.0	1	365
Atenolol, tablet 10mg	25	1.5	1	365
Amlodipine, tablet, 10mg	25	0.5	1	365
Blood glucose level test	20	1.0	1	1
Cholesterol test	30	1.0	1	1
Urine analysis	30	1.0	1	1
Urine sugar analysis	100	1.0	1	1
Assumption is three visits to primary care clinics				

The ROI analysis modelled the following changes:

Table 10. Projected number of people reached by clinical intervention for hypertension

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Coverage (%)	26	30	34	38	41	45	49	53	57	61	65	68	72	76	80

Similar ingredients-based assumptions underlie calculations for the policy interventions in the WHO Costing Tool. Each resource that is required for the intervention is identified, quantified, and valued. The Tool has been discussed in detail elsewhere (38), but in brief the Tool operates as follows:

Identification of resources: For each policy, the Tool costs 1) human resources, 2) trainings, 3) external meetings, 4) mass media (e.g., television and radio time, newspaper ads), and 5) other miscellaneous equipment that are needed to enact policies and programmes.

Quantity: Each policy contains assumptions, set by WHO experts, about the *quantity* of inputs that are required to implement and enforce the policies. The quantity of resources needed is estimated at the national, regional, and district levels. The cost of resource needs is adjusted to reflect a country's population size and the administrative composition of the evaluated country.

Human resource costs are estimated based on the percent of full-time employment (FTE) a health provider will devote to supporting a given policy, multiplied by the annual salary of his/her position. The cost of trainings and meetings is based on the frequency of meetings and workshops within a year, their average duration, the number of national and sub-national participants (plus associated support staff), and the size of the meeting venue. For mass media, TV and radio advertising, newspaper advertisements, wall posters and information leaflets were included. Estimates were based on the number and intensity of media slots, for example four, two-week series per year, each consisting of 10 one-minute TV and radio slots per week.

Valuation: Unit costs for resource items were taken from the WHO-CHOICE database.

Additional information, and examples of how clinical and policy interventions were costed, can be found in the RTI Technical Appendix (39).

5.1.4 Health Impacts

In terms of impact calculations, the OHT takes a range of input data points, such as intervention effect sizes and transition rates between states of epidemiological transition-state models. Sources for the data points include the GBD database (NCD prevalence and mortality) and the STEPS 2017 survey (NCD risk factor prevalence) (5) (34). More detail on use of the tool and its impact formulas is available in the OneHealth Tool Manual (40). It is discussed in detail in the technical appendix to the forthcoming RTI International report, *The Investment Case for Non-Communicable Disease Prevention and Control* (39) (40). It is discussed in detail in the technical appendix to the forthcoming RTI International report, *The Investment Case for Non-Communicable Disease Prevention and Control*. (39)

The OHT looks at a baseline scenario and assesses how many CVD events would occur among the population and how many deaths would result, while also assessing deaths resulting from other NCDs. It then looks at a scale-up scenario with intervention implementation increased and assesses how many CVD events and deaths would be averted.

5.2 Economic Benefits

The economic value that an individual imparts to society is a function of the amount of time that the individual spends engaged in productive activities—whether within formal markets or informal markets. Health interventions give individuals “more productive time”, by decreasing the chance that they will die prematurely, or by allowing them to work more frequently (absenteeism) or capably (presenteeism) because of reduced disease.

In our analysis, NCD interventions change individuals' health-status-specific-likelihood of participating in labour markets. For example, an individual who suffers a stroke will miss days of work. An intervention that prevents that individual from ever having the stroke event saves him/her from missing those work days, ensuring that they continue to participate fully in the labour market.

In estimating the economic benefits of interventions, we apply the accounting framework that was described in section 5, for calculating productivity losses. We use the rates in table 8 to account for gains from reduced absenteeism and presenteeism and the HCA to account for gains from averted mortality. We also continue to use GDP per worker (37,210 ZMW or 3,876 USD) to account for productivity benefits.

5.3 Limitations

While the economic analysis was based largely on accurate local data and information from local experts, there are a number of limitations to note. First, the strategic plan for NCDs in Zambia is still under development and yet to be finalised. This is a key source of information on selection of key interventions and targets for those interventions. Nonetheless, the interventions and targets adopted were gathered from interviews with programme stakeholders and documents. Second, a few key programme staff were unavailable for interviews during the period of data collection. For example, information on implementation status for some programmes was based solely on past reports which were somewhat old. Third, data on some parameters such as tax on specific alcoholic beverages, elasticities of demand, etc., were unavailable. Fourth, as stated above, to monetize health benefits, we used Gross Domestic Product per employed worker (37,210 ZMW or 3,876 USD) as a proxy for average earnings, given the lack of data on earnings by age, sector, gender, and health-status, in Zambia. Similarly, some of the unit costs for interventions were based on international costs. Finally, using international rather than country-specific data on the quantification of direct health care costs attributable to NCDs (section 6) is a limitation of this study, considering the wide variability of the share of health care expenditure per disease group.

6. Results

This section provides an assessment of the economic burden of NCDs before summarising the component parts of the ROI analysis – including health benefits, economic benefits and total costs – and discussing the ROI for each package of interventions. The exchange rate applied throughout the analysis is 9.53 ZMW/USD, corresponding to the average 2017 mid-market rate⁸.

6.1 Economic burden assessment

6.1.1 Direct Costs

The direct costs of the economic burden were measured roughly; only healthcare expenditure was considered and not non-healthcare related costs.

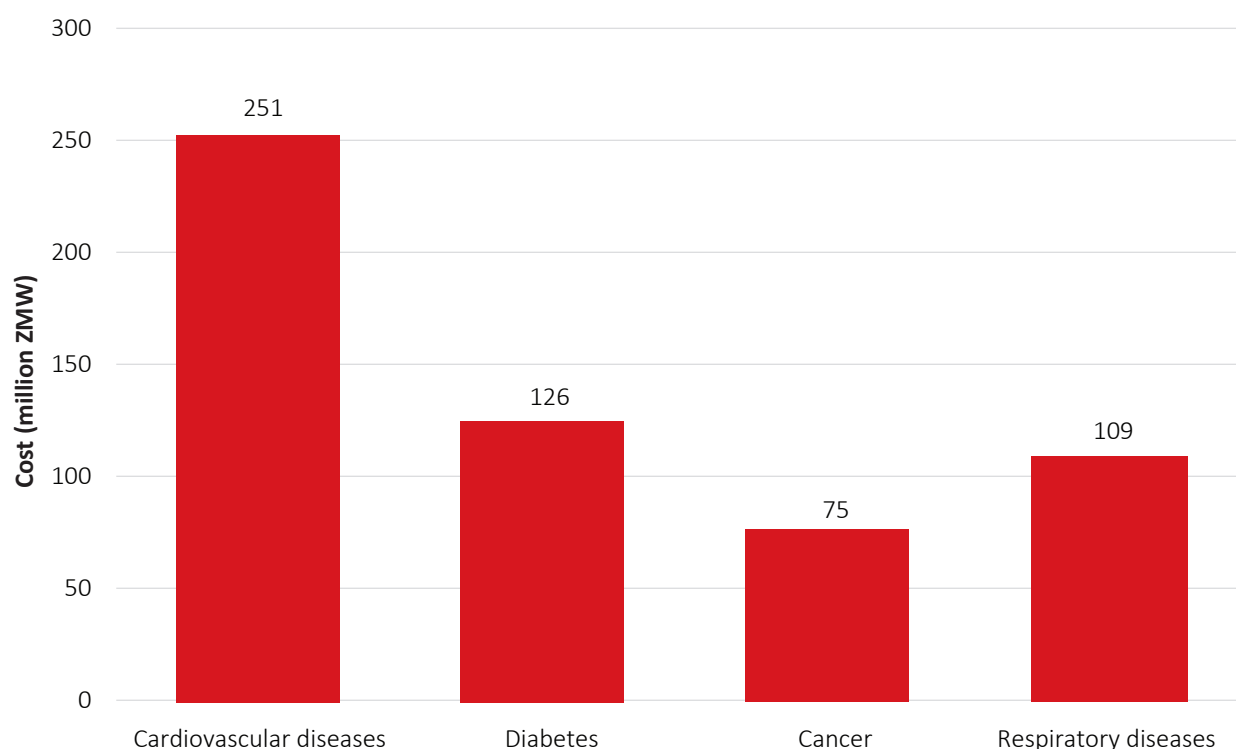
Total healthcare expenditure for Zambia in 2017 was 14.6 billion ZMW (1.5 billion USD). Roughly one-third (37%) of this was public spending (government and social health insurance), 39% was private spending and the remainder (24%) was external spending from international and other organisations.

As noted above, health care cost attributable to NCDs in Zambia was estimated based on National Health Account data on NCD spending in a basket of 13 countries (41). Assuming consistency with these countries (all have a similarly high NCD disease burden, although some are high-income countries), 30% of expenditure on health would be attributable to NCDs (13.4% on CVD; 7% on cancer; 6% on chronic respiratory disease; 4% on diabetes). Total health care expenditure on the four main NCDs is estimated to be 561 million ZMW (59 million USD)⁹ (Fig. 2).

⁸ Source: <https://www.boz.zm/average-exchange-rates.htm> accessed 21st June 2019

⁹ Source: Zambia 2016 National Health Accounts (<http://apps.who.int/nha/database/ViewData/Indicators/en>)

Figure 2: Total healthcare expenditures, 2017

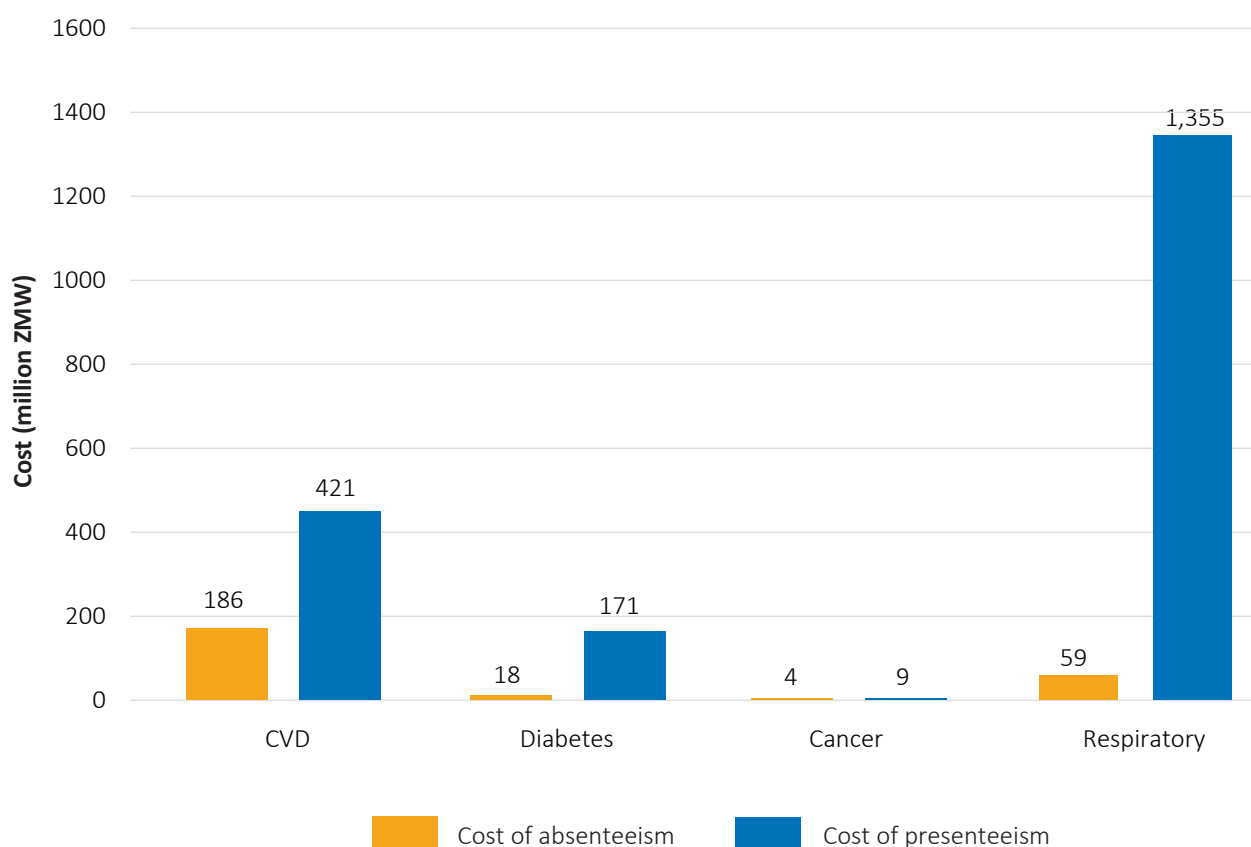


6.1.2 Indirect costs

For Zambia, indirect economic losses due to NCDs were modelled from increased absenteeism and presenteeism and losses due to premature death.

The calculation of absenteeism and presenteeism is based on the surviving workforce. Results are shown in Fig. 3. The number of absent work days was estimated at 50,058 for CVD, 4,924 for diabetes, 1,027 cancers and 15,890 for respiratory diseases, which resulted in a total of 0.3 billion ZMW (31 million USD) in absenteeism-related costs. For presenteeism, the corresponding calculation found the number of unproductive working days at 113,109 for CVD, 46,087 for diabetes, 2,340 for cancer and 364,140 for respiratory. This caused the burden of presenteeism to reach 2.0 billion ZMW (208 million USD). Note that this is only including the patients, not caregivers in the family who must take time off work to take their ill family members for care or take care of them at home.

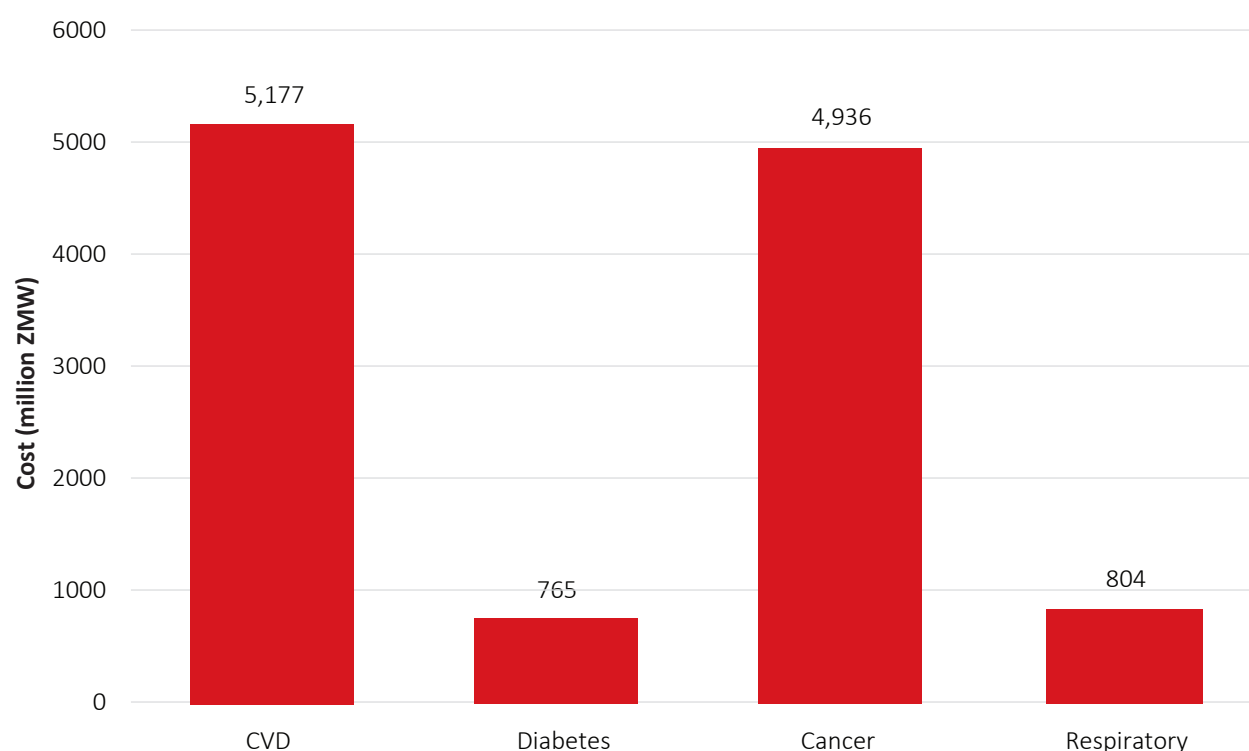
Figure 3: Costs of absenteeism and presenteeism, 2017



The level of premature death in Zambia was estimated using the human capital approach which assumes that forgone economic output is equivalent to the total output that would have been generated by workers through the course of their life until reaching the age of retirement. The cost of premature death was calculated by multiplying GDP per worker by the labour force participation and employment rates and by the 313,936 years of life lost in 2017 from the four main NCDs. The total cost of premature deaths was estimated at 11.7 billion ZMW (1.2 billion USD).

CVD, closely followed by cancer, is the costliest of the four NCDs in terms of economic losses resulting from mortality, as seen in the Figure 4. Respiratory disease does not appear to be a leading cause of premature death, despite its significant productivity losses in presenteeism. Diabetes also results in few deaths: nevertheless, many people with diabetes may die of a cardiovascular event.

Figure 4: Costs of premature deaths, 2017



6.1.3 Total Economic Costs

Table 11 summarises the total direct and indirect costs of NCDs in Zambia. Economic losses due to indirect costs are over three times greater than those due to direct costs. The direct health care cost on the four main NCDs is just 561 million ZMW (60 million USD), but the additional indirect losses to the economy (absenteeism, presenteeism and premature death) amount to 13.9 billion ZMW (1.49 billion USD).

Table 11: Economic burden of NCDs in Zambia comparing health care cost to the indirect costs of productivity losses, 2017 (million ZMW)

Costing category	CVD	Diabetes	Cancer	Respiratory diseases	Total for all NCDs
Direct costs					
Health care costs	251	126	75	109	561
Total direct costs	251	126	75	109	561
Indirect costs					
Cost of absenteeism	186	18	4	59	268
Cost of working at reduced capacity	421	171	9	1355	1 956
Cost of premature deaths	5 177	765	4 936	804	11 682
Total indirect costs	5 784	955	4 949	2 218	13 905
Total costs	6 035	1 081	5 024	2327	14 466

6.2 Intervention Costs Assessment

Incremental intervention costs were estimated for the 15-year period, 2018-2032. Table 12 shows costs for each of the first five years of this period, plus the five-year total (both undiscounted and discounted at 3% annually¹⁰) and the fifteen-year total.

The CVD clinical package produced the largest cost estimate. Treating those with hypertension costs 2.4 million ZMW in the baseline year and increases to 11.3 million ZMW in 2022. Implementing this intervention over the five-year scale-up period would cost 41.3 million ZMW.

Table 12: Costs overview of clinical and policy packages (million ZMW) 2018–2032

Intervention type	2018	2019	2020	2021	2022	5-year total	5-year total (net present value)	15-year total
Clinical package								
Drug therapy for people with hypertension	2.4	6.2	10.4	10.9	11.3	41.3	27.9	72.1
Total cost of clinical package	2.4	6.2	10.4	10.9	11.3	41.3	27.9	72.1
Tobacco policy package								
Protect people from tobacco smoke	3.7	4.6	3.5	3.6	3.5	18.9	13.7	21.3
Warn about danger: Warning labels	1.3	2.9	1.7	1.7	1.7	9.4	6.8	10.4
Warn about danger: Mass media campaign	0.8	4.2	4.2	4.2	4.2	17.5	12.1	25.5
Enforce bans on tobacco advertising	1.5	2.9	1.8	1.8	1.8	9.8	7.1	11.2
Raise taxes on tobacco	2.8	1.8	1.5	1.5	1.5	9.1	6.8	11.6
Total cost of tobacco package	10.2	16.4	12.6	12.9	12.6	64.7	46.5	80.0
Alcohol policy package								
Enforce restrictions on availability of retailed alcohol	7.5	9.7	7.6	7.6	7.6	39.9	29.0	54.3
Enforce restrictions on alcohol advertising	1.5	2.0	1.3	1.3	1.3	7.3	5.3	9.3
Raise taxes on alcoholic beverages	1.9	1.8	1.5	1.5	1.5	8.2	6.0	10.7
Total cost of alcohol package	10.9	13.5	10.3	10.3	10.3	55.4	40.3	74.3

¹⁰ 3% is the usual discount rate applied to economic models.

¹¹ 3% is the usual discount rate applied to economic models.

Table 12. (continued)

Intervention type	2018	2019	2020	2021	2022	5-year total	5-year total (net present value)	15-year total
Physical inactivity policy package								
Awareness campaigns	0.8	4.3	3.6	3.6	3.6	16.0	11.1	22.9
Brief advice as part of routine care	0.4	0.5	0.6	0.7	0.9	3.2	2.2	8.5
Total cost of physical inactivity package	1.2	4.9	4.3	4.4	4.5	19.2	13.3	31.4

The tobacco, alcohol and physical inactivity packages were costed using the NCD Costing Tool. The physical inactivity and alcohol packages were the cheapest policy options, in total costing 19.2 million ZMW and 55.4 million ZMW, respectively. The tobacco package based on MPOWER guidelines consisted of five distinct policies; Over a five-year period, the total cost was 18.9 million ZMW for the public smoking ban, 9.4 million ZMW for package warning labels, 17.5 million ZMW for the mass media campaign, 9.8 million ZMW for the advertising ban and 9.1 million ZMW for the tax increase. In total the tobacco package costed 64.7 million ZMW, making it the most expensive option.

6.3 Health Impact Assessment

All interventions provide significant reductions in the number of lives lost due to the four main NCDs, in particular CVD. The tobacco package had the greatest impact (5,870 lives saved); followed by the clinical package that targets CVD (4,296). The number of lives saved by the physical inactivity and alcohol packages is smaller in magnitude than the tobacco and clinical packages (Table 13).

Each set of interventions also restores healthy life-years (HLY) to the population. The clinical, tobacco and physical inactivity packages prevent strokes and cardiovascular events, and thus individuals avoid disabling states (such as partial paralysis from stroke) that can increase pain and suffering, reduce mobility and impaired speech and thought.

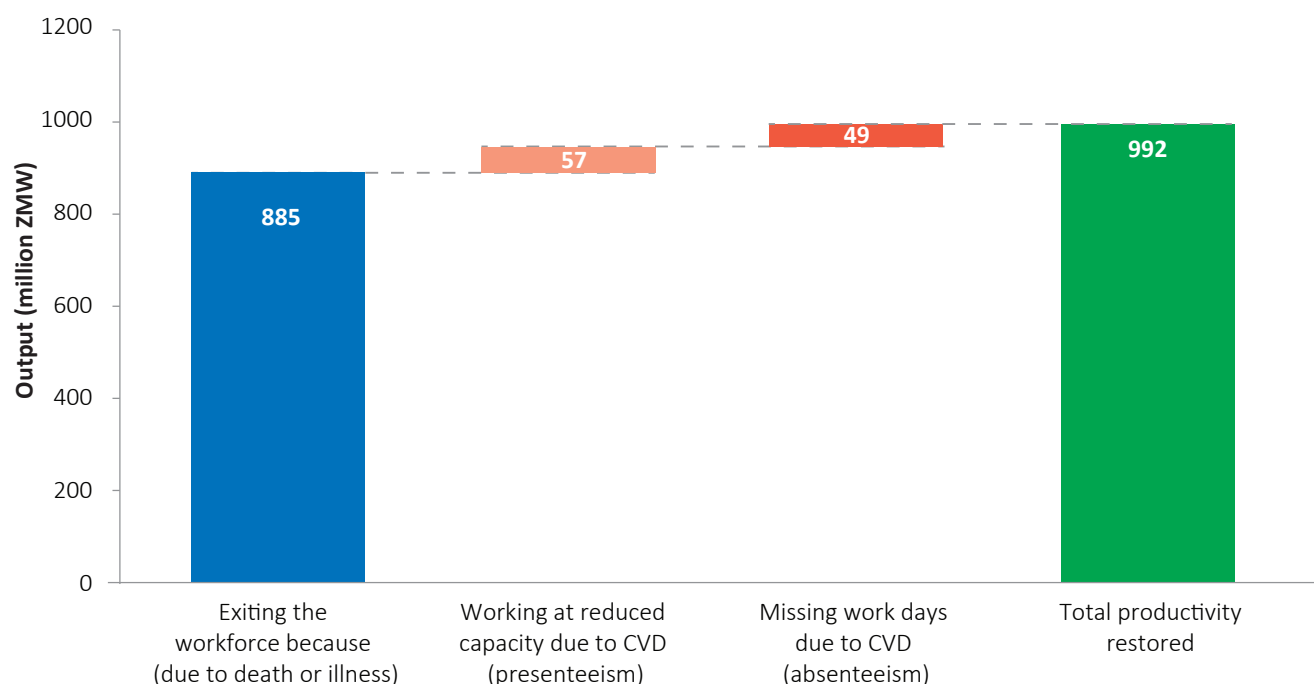
Table 13: Intervention health impacts – Avoided mortality (15-year period)

Intervention Package	Total Deaths avoided (4 main NCDs)	HLY gained (all NCDs)	Avoided cases of stroke	Avoided cases of IHD
Tobacco package	5 870	93 413	4 336	3 969
Alcohol package	1 423	232 020	-	-
Physical Inactivity package	1 831	13 830	1 147	2 566
Clinical package	4 296	23 622	5 248	2 097

6.4 Economic Benefits Assessment

NCDs included in this analysis are associated with a reduction in labour workforce and productivity due to premature mortality, fewer days of work (absenteeism) and reduced productivity while at work (presenteeism). Figure 5 demonstrates the labour productivity gains that result from the prevented deaths and disease cases over the 15-year period, described in Table 13.

Figure 5: Recovered economic output from implementing tobacco, alcohol, physical inactivity and clinical packages, period 2018-2032



The biggest positive impact on productivity is from decreased premature mortality (89.3% of total productivity gains), followed by reduced presenteeism (5.7%) and absenteeism (5.0%). Policy packages and the clinical treatment for CVD in primary care result in net present value 992 million ZMW (104 million USD) in labour productivity gains over the 15-year period (equivalent to 0.4% of Zambia's 2017 GDP).¹²

6.5 Return on Investment

Comparing the costs and benefits of each package of interventions shows that all the interventions included in the analysis – for tobacco control, alcohol and physical inactivity control and primary care for CVD – have positive returns on investment for the 5 and 15-year periods (Table 14).

Table 14: Costs, benefits and ROI in the 5 and 15-year periods, by interventions package (millions ZMW)

Intervention package	5-year Period			15-year Period		
	Economic benefits	Costs	ROI	Economic benefits	Costs	ROI
Tobacco	20	46	0.4	421	80	5.3
Alcohol	7	40	0.2	99	74	1.3
Physical inactivity	8	13	0.6	141	31	4.5
Clinical	18	28	0.7	330	72	4.6

Tobacco control interventions have the highest ROI: for every ZMW invested in the package of tobacco interventions, the expected return is 5.3 ZMW over the 15-year period. Tobacco interventions are followed by the clinical packages and physical inactivity, which have ROI of 4.6 and 4.5 respectively. The fourth highest ROI was the alcohol package with 1.3.

¹² 2017 GDP was 243 billion ZMW (25 billion USD)

Every package has a positive ROI of at least 1.3 or over for the 15-year period, indicating there are positive returns.

Tobacco control is the clear “best buy”, offering an ROI of 5.3 for the 15-year period.

Over the shorter period (5 years), all analysed packages result in relatively lower ROIs, which can be explained by two factors.

- Policy interventions aimed to change lifestyle need time for the effect to develop. For instance, increasing physical activity may lower blood pressure in the short- to medium-term, but stroke rates will decrease later.
- In the model, policy interventions are not considered to be in effect until the third year of the analysis, which means that development and implementation costs accrue in the first two years, without the policies producing any benefits.

7. Conclusion/Recommendations

The investment case findings underscore the economic, social and sustainable development toll NCDs impose on Zambians every year. NCDs pull people into poverty, widen gender disparities, and increase inequalities. In alignment with the forthcoming National Strategy on Prevention and Control of NCDs, 2018-2022, this report sets out the case for augmenting action against NCDs in Zambia. It assesses the economic burden of NCDs for the country, costs specific interventions and presents a cost–benefit analysis for four intervention packages to demonstrate their economic value.

Results show that investments in four proven and cost-effective intervention packages (“best-buys”) can significantly reduce the burden of NCDs, increasing people’s life expectancy and improving quality of life, while decreasing the economic burden on the national budget. Thus, these investments contribute to the overall socio-economic development of the country, exerting positive ripple effects across society and acting as development accelerators.

The investment case assessed four intervention packages of best-buys within the Zambian context: three policy packages to reduce the prevalence of behavioural risk factors for NCDs – tobacco use, harmful use of alcohol, and physical inactivity –as well as a primary care hypertension intervention for the prevention and control of CVD. The interventions were scaled-up in two time periods, a shorter term 5-year period and a long term 15-year period. Existing national efforts and interventions were taken into account in the economic modelling. The main findings regarding the four packages are as follows:

- Investing in all four policy packages would save more than 13,420 lives over 15 years and provide Zambians an additional 362,885 healthy life years;
- A healthier workforce and reduced premature mortality would increase total GDP by 992 million ZMW (104 million USD) over 15 years;
- Over 15 years, the returns on investment (ROI) for the tobacco package are 5.3 ZMW per ZMW invested, 4.5 for physical inactivity, 4.6 for CVD primary care, and 1.3 for alcohol.

The policy packages are shown to display greater cost-effectiveness in the 15-year period, rather than in the shorter 5-year period, highlighting the need for long-term investments in NCD prevention and a scaled-up NCD action plan for Zambia. Unless NCD risk factors are addressed, the burden of NCDs will become greater, as the population of Zambia continues to grow, forcing the economy to operate at sub-optimal levels. The risk factor

policy interventions and primary care intervention packages modelled under this investment case provide a cost-effective solution to the growing challenge of NCDs.

The following lists four steps the Government can take to strengthen NCD prevention and control:

1. Raise awareness of the true costs of NCDs and the enormous development benefits of investing in the five intervention packages of proven, cost-effective best-buys.

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 NCD prevention and control. An advocacy strategy with key messages, for example on how interventions analysed here can support economic growth and improve population health, can assist policymakers in disseminating the message. To help stem the NCD epidemic, it is imperative that Zambia raises awareness among the public, particularly among the youth.

2. Pass the new, comprehensive tobacco control law, The Tobacco Products and Nicotine Products Control Bill.

Zambia's 1992 Public Health (Tobacco) Regulation does not cover many areas that are critical to effective tobacco control. The Government could further increase the benefits of tobacco control measures, by: (a) expanding the ban on tobacco advertising, promotion and sponsorship (TAPS); (b) fully enforcing the ban on smoking in public places; (c) increasing tobacco excise taxes, with a predominantly specific excise tax component; (d) mandating large graphic health warnings on tobacco products and implementing new measures such as mass media campaigns; and (e) making tobacco cessation services widely available and accessible.

The Ministry of Health can work with parliamentarians, civil society, the Attorney General's Office, and other ministries to pass the new tobacco control bill. Passing this new legislation will help Zambia fulfil its obligations under the WHO FCTC, drive sustainable development and meet its commitment to health in all policies. Further, by banning sales of single cigarettes and smaller packs, effectively taxing roll-your-own cigarettes, and banning marketing that appeals to the younger generation, the new legislation would help protect Zambia's youth among whom tobacco use is on the rise.

3. Develop a comprehensive approach to sin taxes, resulting in increases of the tobacco and alcohol excise taxes and allocations of revenue towards NCD prevention and control.

Increasing taxes on health-harming products is one of the most effective measures a government can take to reduce consumption of such products, improving population health, while increasing government revenue for national development priorities. Revenue from sin taxes could finance the package of interventions modelled under the investment case, and components of Zambia's National Health Strategic Plan 2017-2021, the National Strategy on Prevention and Control of NCDs 2018-2022, the upcoming National Tobacco Control Strategy, as well as other key development priorities.

The Ministry of Health can work with the Ministry of Finance to create an enabling environment for an effective tax structure; one that emphasises a specific tax component and taxes all tobacco products in a similar fashion to reduce consumers substituting to cigars, chew or roll-your-own (loose-leaf) tobacco. Zambia should ensure tobacco taxes comprise 75 percent of retail price, as recommended by the WHO FCTC and modelled under the investment case.

4. Strengthen national coordination and planning for the prevention and control of NCDs.

The investment case demonstrates that NCDs pose a sustainable development challenge for Zambia with implications for the Ministries of Finance, Education, Labour, Agriculture, Commerce, Trade and Industry, other sectors, civil society and Parliamentarians. An effective response to NCDs calls for a whole-of-government approach with the involvement of non-governmental actors throughout all sectors of society. A national coordi-

nation mechanism (NCM) is an effective tool for mobilising a whole-of-government and whole-of-society response.

Zambia's 2017-2021 National Health in All Policies Strategic Framework calls for a national multi-sectoral coordination mechanism (NCM) to be established in order to facilitate implementation of the Health in All Policies Framework. This NCM could also serve as a mechanism for the Government to clarify roles and responsibilities of different sectors, strengthen policy coherence, and effectively cost, finance and operationalise strategies and programmes for NCD prevention and control. Such a coordinating mechanism needs to operate under agreed terms of reference, must be protected from vested and commercial interests of the tobacco, alcohol and food industries, and should create technical working groups on programmatic areas, as necessary.

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