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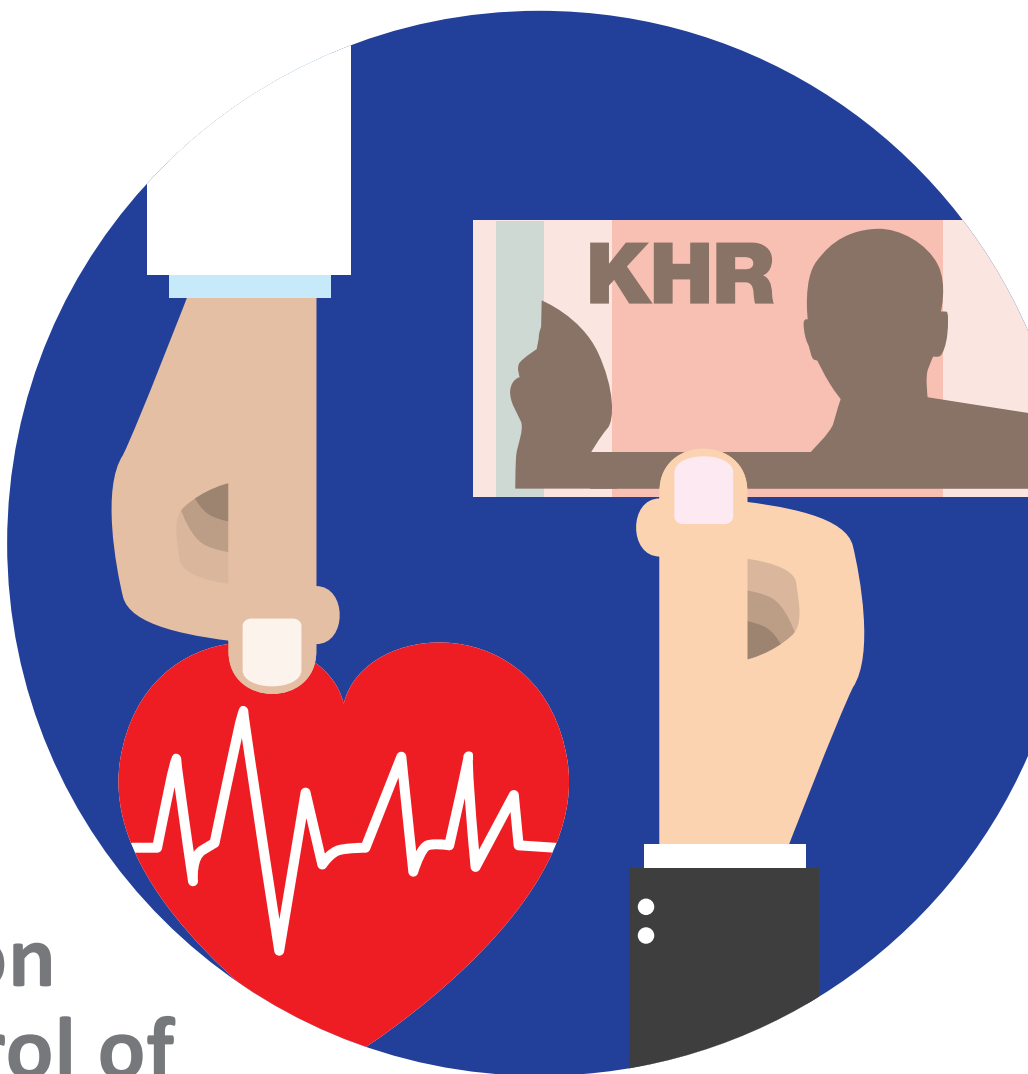
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Prevention and control of noncommunicable diseases in Cambodia

The case for investment

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The case for investment

Prepared for the Ministry of Health of Cambodia
by
United Nations Interagency Task Force on the Prevention
and Control of Noncommunicable Diseases
WHO Regional Office for the Western Pacific
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Authors:
Alexey Kulikov
Aashna Mehta
Dudley Tarlton
Daniel Grafton
Rebekka Aarsand



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Abstract

Noncommunicable diseases (NCDs) such as cancer, cardiovascular disease, diabetes and chronic respiratory diseases and their risk factors are increasing challenges to public health and development in Cambodia. This report presents three analyses that provide evidence that NCDs reduce economic output and proposes potential possible responses, with details of their relative return on investment. An analysis of economic burden shows that economic losses (direct and indirect costs) due to NCDs amount to KHR 5.97 trillion, equivalent to 6.6% of the gross domestic product in 2018. An analysis of the cost of prevention and clinical interventions provides an estimate of the funding required to implement policy interventions. In a cost–benefit analysis, the implementation costs are compared with the estimated health gains to identify the policy packages that would give the greatest return on investment.

Keywords

NONCOMMUNICABLE DISEASES – PREVENTION AND CONTROL
CHRONIC DISEASE – ECONOMICS, PREVENTION AND CONTROL
DELIVERY OF HEALTH CARE
HEALTH CARE FINANCING
HEALTH SYSTEM PLANS
CAMBODIA

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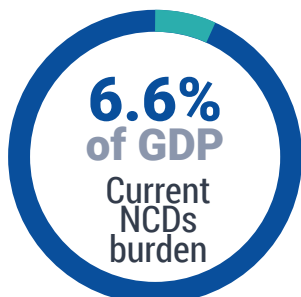
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Acronyms and abbreviations

ASEAN	Association of Southeast Asian Nations
CVD	cardiovascular disease
GDP	gross domestic product
NCD	noncommunicable disease
KHR	Cambodian riel
OECD	Organisation for Economic Co-operation and Development
ROI	return on investment
STEP	STEPwise approach to surveillance (WHO)
UNDP	United Nations Development Programme
WHO FCTC	WHO Framework Convention on Tobacco Control

CAMBODIA

The case for investment in prevention and control of noncommunicable diseases (NCDs)



1.4 trillion KHR
(344 million USD)



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

Billions of KHR and millions of USD



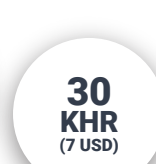
Tobacco control package



Alcohol control package



Salt reduction package



Physical activity awareness package

1227 KHR
(302 USD)



CVD and diabetes clinical interventions

1.7 trillion KHR
(422 million USD)



Return on investment over a 15-year period

Return on investment

Lives saved

Billions of KHR and millions of USD in productivity benefits



10.7

38 000

366 KHR
(89 USD)



5.0

33 000

300 KHR
(73 USD)



9.6

47 000

467 KHR
(114 USD)



10.0

33 000

300 KHR
(73 USD)



0.2

33 000

300 KHR
(73 USD)

Key findings

- NCDs are responsible for 64% of all deaths in Cambodia, and the population has a 23% probability of dying between the ages 30 and 70 years from one of the four main NCDs.
- The total economic burden of NCDs to the Cambodian economy is KHR 5.97 trillion (US\$ 1.5 billion¹) per year, equivalent to 6.6% of the country's annual gross domestic product (GDP).
- By implementing the recommended package of cost-effective policies and clinical interventions for NCDs, the Cambodian economy will gain KHR 1.7 trillion (US\$ 417 million) over 15 years.
- The package of NCD interventions will avert 184 236 deaths and lead to 694 858 healthy life years gained over 15 years.
- NCDs in Cambodia are causing a surge in the cost of health care and welfare and are contributing to reduced productivity.
- This report presents evidence that actions to prevent NCDs in Cambodia are relatively cheap and cost-effective.
- Economic modelling of return on investment (ROI) suggests that the intervention with greatest economic benefit to Cambodia is the package of tobacco interventions, followed by the interventions against physical inactivity and salt.
- A national multisectoral NCD coordination mechanism should be established to bring together and strengthen existing cross-agency initiatives on NCDs.

Executive summary

This report highlights the growing need for investment in prevention and control of noncommunicable diseases (NCDs) in Cambodia, which represent a large burden on the population. The report shows that NCDs such as cancer, cardiovascular disease (CVD), diabetes and chronic respiratory disease cause over two thirds of all deaths and present a 23% increased risk of premature death, before the age of 70. This is due largely to the high prevalence of several major risk factors for NCDs, which remains high, despite notable progress in implementation of certain regulatory measures (e.g. stronger tobacco control legislation).

The package of NCD interventions will lead to significant economic returns for the Cambodian economy, with a gain of KHR 1.7 trillion (US\$ 417 million), restoring 694 858 healthy life-years and averting 184 236 deaths over 15 years.

There are strong economic grounds for addressing NCDs. The report identifies substantial financial benefits to be derived from timely, effective NCD preventive measures. NCDs exert significant downward pressure on the Cambodian economic output. Following a joint United Nations mission to Phnom Penh in August 2018, an extensive economic study conducted in cooperation with the Ministry of Health indicate that Government expenditure on care for NCDs (KHR 343 billion, US\$ 84 million) is just the “tip of the iceberg”, as the hidden additional costs due to absenteeism, reduced capacity at work and premature deaths among young people of working age are nearly 19 times higher, at KHR 5.63 trillion (US\$ 1.4 billion). The total economic burden of KHR 5.97 trillion (US\$ 1.5 billion) is equivalent to 6.6% of the country's annual gross domestic product (GDP), which includes the direct costs of NCDs associated with treatment and care and also the indirect costs that arise from loss of workforce and reduced productivity.

¹ Exchange rates as accessed 13 August 2019 at Morningstar. US\$ 1 = KHR 4086.35.

The cost analysis of selected intervention packages to address the major NCDs and their risk factors demonstrates, however, that only moderate spending is required to implement preventive measures that could reduce the prevalence of NCDs and mitigate their harmful effects on the Cambodian economy. Specifically, four packages of evidence-based interventions for tobacco control, harmful use of alcohol, physical inactivity and unhealthy diets are reviewed, as is a package of clinical interventions for cardiovascular disease (CVD) and diabetes. Policy packages to reduce the consumption of tobacco, alcohol and salt and to increase physical activity are estimated to cost KHR 34 billion (US\$ 8 million), KHR 60 billion (US\$ 15 million), KHR 49 billion (US\$ 12 million) and KHR 30 billion (US\$ 7.3 million) over 15 years, respectively. The clinical interventions against CVD and diabetes were found to be the most expensive options, costing KHR 1.2 trillion (US\$ 301 million) over 15 years.

Investment in NCD prevention would be highly beneficial for the economy. By factoring in the expected benefits from application of the selected intervention packages (including averted mortality), the analysis of return on investment (ROI) suggests that, for every KHR 1 invested in the policies, a return of up to KHR 11 can be expected. The tobacco policy package would have the highest benefit-to-cost ratio within either 5 or 15 year.

Investment in NCD prevention policies would therefore appear to be beneficial and highly desirable. The report highlights the importance of establishing a national multisectoral NCD coordination mechanism to bring together and strengthen existing initiatives on NCDs. A review of policies and individual services for NCDs reveals gaps in implementation of WHO-recommended cost-effective preventive and clinical interventions. The report draws attention to areas that should be strengthened and extended.

1. Introduction

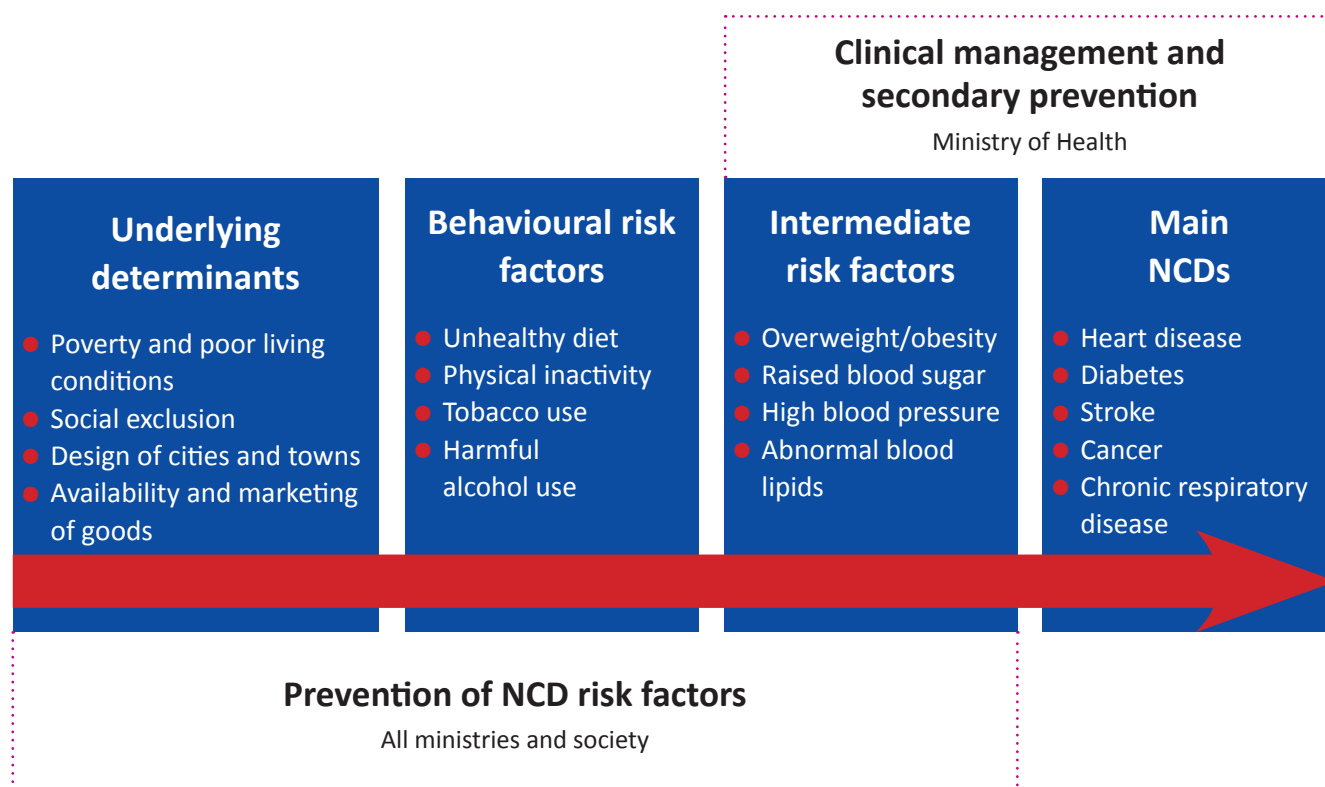
In 2018, NCDs accounted for 64% of all deaths in Cambodia (1). One in every four Cambodians (23%) dies prematurely, before the age of 70 years, from one of the four main NCDs: CVD, diabetes, chronic respiratory disease and cancer. There is therefore a pressing need to make progress specifically on United Nations Sustainable Development Goal target 3.4, to reduce premature mortality from NCDs by one third by 2030. NCDs also affect achievement of other SDGs: SDG 1 (poverty), 2 (malnutrition), 4 (education for sustainable lifestyles), 5 (gender equality), 6 (access to clean water), 7 (access to clean air), 8 (safe working environment), 10 (reduce inequalities), 11 (access to safe, green public places) and 12 (sustainable consumption and production).

The impact of NCDs on human health is only one part of the story, as they also result in high economic costs, far beyond direct costs of health care. NCDs reduce productivity at a macro-economic level by interrupting full participation in the labour force and a subsequent impact on individuals, those who care for them and the State. When people die prematurely, the labour output they would have produced in their remaining working years is lost. In addition, people who have a disease are more likely to miss days of work (absenteeism) or to work at a reduced productive capacity (reduced capacity at work). In low- and middle-income countries, it is estimated that NCDs will result in more than US\$ 21 trillion in lost economic output between 2011 and 2030, nearly one third of that figure being attributable to CVD alone. For individuals and governments, the high financial burden of disease implies significant opportunity costs,² including decreased investment in education, transport projects and other forms of human or physical capital that can have long-term returns.

These significant human and economic costs indicate the importance of reducing the burden of NCDs in Cambodia. WHO recognizes that the risk of NCDs can be reduced by modifying four types of behaviour (tobacco use, harmful use of alcohol, an unhealthy diet and physical inactivity) and metabolic risk factors such as high blood pressure and cholesterol (2). Fig. 1 illustrates the determinants and risk factors that drive the development of

² "Opportunity cost" is used in economics to define the cost of something in terms of a foregone opportunity: "opportunity cost is given by the benefits that could have been obtained by choosing the best alternative opportunity" (Oxford Dictionary of Economics [online]).

Fig. 1. Determinants of NCDs and responsibilities for response



NCDs, many of which are beyond the control of the health sector alone. WHO issued a “menu” of policy options and cost-effective interventions to assist Member States in reducing the NCD burden within its global action plan for the prevention and control of NCDs 2013–2020 (2). These “best buys”, which were updated at the World Health Assembly (3), include measures to reduce behavioural and metabolic risk factors known to lead to NCDs and clinical interventions to prevent and treat disease.

Purpose of the economic analysis component of the case for investment

The negative economic impacts of NCDs are too often overlooked in budgetary allocation and in weighing the pros and cons of stronger fiscal and regulatory action. Quantification of the costs of interventions to prevent and control NCDs and their ROIs in relation to the costs of inaction is a high priority for Member States. Investment cases are designed to help countries make their own economic rationales for action to prevent and control NCDs.

In 2018, the Government of Cambodia invited the WHO and the United Nations Development programme (UNDP) to support national efforts in making a tailor-made NCD investment case. A joint mission of the United Nations Interagency Task Force on the Prevention and Control of Noncommunicable Diseases was therefore undertaken to make such a study in Cambodia in August 2018.

Three types of analysis were performed for the investment case:

- An analysis of economic burden showed the scale of disruption of the economy due to NCDs through an assessment of their direct and indirect costs. The direct costs include the Government (public) costs for treating CVD, diabetes, cancer and respiratory disease. The indirect costs are those of absenteeism, reduced capacity at work and economic losses due to premature deaths of people of working age.
- An intervention costing analysis provided an estimate the funding required to implement a set of interventions for NCD prevention and a package of clinical interventions for CVD and diabetes. The prevention

interventions comprise policy packages to reduce tobacco use, harmful alcohol consumption and unhealthy diets and to increase physical activity.

- The analysis of ROI was a comparison of the estimated costs of implementation from the costing analysis with the estimated health gains and economic returns of the set of interventions over 5 and 15 years.

The investment case allows modelling of scaled-up action and the costs of inaction in the medium (5 years) and long term (15 years). One scenario is 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. In the other scenario, selected policies and clinical interventions are scaled up over the next 15 years. The analysis was conducted with the WHO OneHealth Tool, an epidemiological population model developed by United Nations partners for strategic planning and costing of interventions and projection of the health benefits expected. Health benefits are generated in terms of natural units (cases or deaths averted) but are also monetized by the human capital approach to evaluate benefit–cost ratios (the primary ROI metric) for each package of interventions. In the human capital approach, it is assumed that foregone economic output is equivalent to the total output that would have been generated by workers throughout of their lives until retirement age.

This section describes the overall approach used in this study. Section 2 provides an analysis of NCD behavioural risk factors in Cambodia, including current levels and patterns of tobacco and alcohol consumption, diet and physical inactivity and the prevalence of metabolic risk factors such as raised total cholesterol and raised blood pressure within the population. Section 3 outlines evidence-based policies and clinical interventions that could contribute to reducing the burden of disease – CVD in particular – and current implementation of policies and interventions in Cambodia. Section 4 describes the methods and tools used in the analysis. Section 5 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 and the clinical interventions described. Section 6 outlines the conclusions to be drawn. The data used in calculating the burden of NCDs are listed in Annex 1.

2. Situation analysis: noncommunicable diseases and risk factors

We report here the background information used in preparing the investment case analysis. We addressed NCDs in general, the prevalence of behavioural risk factors in the lifestyles of the Cambodian population and the prevalence of metabolic risk factors such as raised blood pressure and cholesterol and diabetes. These behavioural and metabolic risk factors were selected in order to focus on those most relevant for the economic analysis.

2.1 Tobacco

Cambodia has ratified the WHO Framework Convention on Tobacco Control (WHO FCTC). By 2015, Cambodia had enacted many of the obligations under the WHO FCTC, including a comprehensive law on tobacco control, with health warnings in Khmer and pictorial warnings on tobacco packages that show the effects of tobacco use. Furthermore, it banned smoking of tobacco products in public places and work places, in addition to legislated bans on advertising, promotion and sponsorship of tobacco products (4). The work of the Tobacco Tax Working Group, the WHO Country Office in Cambodia and the Southeast Asia Tobacco Control Alliance resulted in an

Box 1. Tobacco snapshot

Key findings from the WHO FCTC 2019 investment case for tobacco control in Cambodia (4):

1. 15 000 deaths annually attributable to tobacco use
2. KHR 2.7 trillion in total losses due to tobacco use, 90% due to loss of economic productivity
3. 3.0% of GDP lost annually due to tobacco-related illnesses

increase in excise taxes on cigarette products from 15% to 20% and a increase from 65% to 90% on invoice pricing effective 1 April 2016. The current tax on the retail price of cigarettes is 25% on domestic cigarettes and 31.1% on imported products.

The 2014 National Adult Tobacco Survey indicated that there were 1.68 million male smokers aged ≥ 15 , comprising 32.9% of adult Cambodian men (15% of all adults); 16.9% of the population (1.6 million) were daily smokers (32.9% of men and 2.4% of women). Additionally, 4.9% of adults reported current smokeless tobacco use (0.8% among men and 8.6% among women). Exposure to second-hand smoke remains an issue in Cambodia, as, according to the 2016 Global Youth Tobacco Survey (6), nearly 25% of children and young people were exposed to tobacco smoke at home, and nearly 45% of young people were exposed to tobacco smoke in enclosed public spaces.

The main challenge for tobacco control in Cambodia is the affordability of tobacco products. In 2016, WHO found that a pack of 20 of the most widely sold brand of cigarettes in Cambodia was the fourth most affordable in the world, as priced in international dollars, ahead of only Guinea, Paraguay and Rwanda (5).

Tobacco use affects all Cambodians but is more common among those with low incomes: smoking rates among people in the lowest 20% of income are nearly three times those of the wealthiest 20%. Almost all smokers (98%) smoke at least one cigarette a day, and the average smoker smokes 15 cigarettes each day. A 2019 investment case for tobacco control in Cambodia (4) indicated that nearly 15 000 Cambodians die each year from tobacco-related illnesses, equivalent to 290 lives lost every week. Thirty-three percent of tobacco-related deaths in 2017 were among the lowest-earning quintile of Cambodia's population.

2.2 Alcohol

WHO's *Global status report on alcohol and health* (7) indicated that per capita alcohol consumption in Cambodia was 21 L of pure alcohol per year, equivalent to more than 1 L of spirits each week for every Cambodian man and woman. Men are estimated to consume nearly three times as much alcohol (27 L) per capita as women (10 L). Among alcohol drinkers, 12.3% of men and 1% of women "binged" (drank six or more drinks at one sitting) during the month before the survey.

In 2012, an association was found between alcohol consumption and tobacco use in Cambodia, whereby men who smoked were twice as likely to have drunk alcohol in the past week (8). Among young people aged 15–19 years, 42% of males and 27% of females are current drinkers, and about 10% are considered heavy episodic drinkers (9).

Cambodia has made progress recently in using one of the WHO-recommended policy measures to reduce harmful use of alcohol, which is fiscal measures to reduce its affordability. The excise tax on alcohol products was increased from 10% to 20% in 2014 and from 20% to 25% in 2016. They have made less progress in the other two interventions modelled in this investment case. There are currently no restrictions on the retail availability of alcohol and no comprehensive ban on alcohol advertising, promotion or sponsorship.

NCDs account for only half of the disease burden due to alcohol, which is associated with over 200 diseases and conditions. Consequently, the interventions modelled in this report will have returns far beyond the four NCDs included. The benefits of reducing harmful use of alcohol are therefore significantly underestimated. The key facts are summarized in Box 2.

Box 2. Alcohol snapshot

Alcohol use is a concern, as, on average, men drink nearly three times as much as women and one in six male drinkers had drunk six or more drinks at one sitting in the past month.

NCDs attributable to harmful use of alcohol include many forms of cancer, pancreatitis, epilepsy, diabetes, cirrhosis, ischaemic heart disease, stroke and other cardiovascular and circulatory diseases.

2.3 Physical inactivity

Globally, physical inactivity is one of the leading risk factors for NCDs.

The 2016 STEPS showed that 8% of adults aged 18–69 years in Cambodia were sufficiently physically active; however, most did not meet the WHO recommendation of 150 min of moderate–intense physical activity per week or the equivalent. This figure was lower among men (5.5%) than women (11%). The least active group was women ages 18–29 (18.2%). It was found that 76.6% of total physical activity is related to work, 17.8% to transport and 5.6% to recreation.

There is high-level political commitment in Cambodia to increasing physical activity, with direct encouragement from the Prime Minister and the creation of public outdoor spaces. Additionally, school communities, including teachers, parents and food vendors, are promoting the health benefits of being active and sustaining a healthy diet.

The key facts are summarized in Box 3.

Box 3. Physical inactivity snapshot

NCDs attributable to physical inactivity include coronary heart disease, type 2 diabetes and breast and colon cancers (Lee et al., 2012).

Regular physical activity reduces the risks for ischaemic heart disease, stroke, diabetes and breast and colon cancers.

2.4 Unhealthy diet

Unhealthy diets are summarized in salt consumption, given the policy interventions that can be modelled and the data available. Sodium consumption in Cambodia is high. According to the 2016 STEPS, the estimated average intake of 8.5 g of salt per day by adults is higher than the WHO recommendation of < 5 g of salt per day. Men had a higher intake of salt (9.2 g) than women (7.6 g).

The key facts are summarized in Box 4.

Box 4. Salt snapshot

Salt consumption in Cambodia is estimated to be nearly twice the WHO-recommended intake per day.

NCDs attributable to an unhealthy diet include stomach cancer and increased risks for ischaemic heart disease, stroke and other cardiovascular and circulatory diseases due to hypertension.

The proportion of cardiovascular deaths attributable to high sodium is 28.2%.

2.5 Metabolic risk factors

High levels of metabolic factors such as blood pressure, body mass index and blood lipid levels significantly increase the risk of a cardiovascular event. The 2016 STEPS indicated that 19.2% of adults in Cambodia (16.9% of women and 22.0% of men) are overweight, and 3% are obese. The prevalence of raised blood glucose among adults was 9.6%, and 45% of adults > 18 years had raised total cholesterol. The prevalence of raised blood pressure was 14.2%, indicating consumption of diets with high levels of *trans*- and saturated fats and salt.

3. Policies and treatments to reduce the burden of noncommunicable diseases

The Government of Cambodia recognizes the adverse impacts of NCDs on health and development and is committed to tackling NCDs, with many strategies, plans and legislation in tobacco control, harmful use of alcohol, unhealthy diets and physical inactivity in place (Annex 2).

As mentioned in section 1, WHO has published a list of policy options and interventions to prevent and treat NCDs (11). In the following sections, we compare current national work to prevent and control NCDs with this

list in order to identify areas of strength and areas that might require further development or scale-up for full coverage.

3.1 Tobacco

Cambodia has made substantial progress in tobacco control, with smoke-free policies, pictorial health warnings on tobacco packaging and monitoring of tobacco use. Cambodia enacted a law on tobacco control in 2015 and sub-decrees and regulations related to tobacco control. The laws and regulations ban most forms of tobacco advertising, promotion and sponsorship, ban smoking in indoor public places and workplaces and mandate graphic health warnings on tobacco packaging. Taxes on tobacco products remain low, at 25% of the retail price of domestic cigarettes and 31% on imported cigarettes, whereas the guidelines for Article 6 of the WHO FCTC recommends a minimum tax share of 75% of the retail price.

Cambodia established the Inter-ministerial Committee for Education and Reduction of Tobacco Use in 2001, which was renamed the National Tobacco Control Committee in 2017. It is chaired by the Minister of Health and the National Centre for Health Promotion and composed of representatives of 23 institutions and all provincial and city governors. The Ministry of Health plans to establish tobacco control committees at sub-national level.

Cambodia made tobacco control an integral component of the Government's National Multisectoral Action Plan for the Prevention and Control of Noncommunicable Diseases 2018–2027. Specific goals include strengthening enforcement of the laws on smoke-free places; extending bans on advertising, promotion and sponsorship; increasing tobacco taxation; establishing cessation services at health facilities; and conducting public health education campaigns on the harms of tobacco use.

Challenges remain in implementing and enforcing tobacco control at subnational level; engaging the public and partners to apply the law; preventing tobacco industry interference; providing cessation support; and promoting alternative livelihoods for tobacco farmers and workers. The current ASEAN free trade agreement does not include tobacco products on the list of “general exceptions”,³ limiting Cambodia's ability to impose tariffs on imported tobacco products.

Most of the policy interventions listed above are also WHO “best buys” (3), that is, interventions with a cost–effectiveness ratio of ≤ 100 international dollars per disability-adjusted life-year averted in lower- and middle-class countries. This list largely corresponds to that in the OneHealth Tool and can be modelled as part of the ROI analysis:

- Monitor tobacco use/prevention policies.
- Protect people from tobacco smoke.
- Offer help in quitting tobacco use: mCessation.
- Warn about danger on warning labels.
- Warn about danger in mass-media campaigns.
- Enforce bans on tobacco advertising.
- Enforce restriction of access by young people.
- Raise taxes on tobacco.
- Ensure plain packaging of tobacco products.

³ Products that are harmful for health are excluded from duty-free provisions.

3.2 Alcohol

Cambodia has implemented its National Policy and Strategy for the Reduction of Alcohol Use (2013–2017). One of its four strategies is enactment of public health legislation to regulate alcohol advertising, production and sales, for example, by increasing taxes, as was done in 2014 and 2016. An alcohol working group and a draft law on alcohol products control, which includes regulating manufacture, import and distribution by retailers and wholesalers. An inter-ministerial committee approved the comprehensive law in July 2015 before submitting it to the Council of Ministers. The Council of the Ministers has requested the Ministry of Health to make revisions, and discussion on the law was reconvened in 2019. In the meantime, more advocacy is needed to ensure that a comprehensive, effective law is adopted (12).

The updated Appendix 3 of WHO's global action plan for the prevention and control of NCDs 2013–2020 (3) lists core policy options for alcohol control, which were modelled for the ROI analysis:

- Raise taxes on alcoholic beverages.
- Enforce restrictions on the availability of retailed alcohol.
- Enforce restrictions on alcohol advertising.
- Enforce drink–driving laws (sobriety checkpoints).

The modelling accounts for the health and economic burden of alcohol only as it relates to the four NCDs. WHO found that all NCDs account for roughly half the disease burden due to alcohol, indicating that the burden of alcohol consumption and the benefits of alcohol regulation are significantly understated in this investment case. Not included among the benefits of alcohol control are the resulting reductions in alcohol-attributable violence, road traffic accidents, mental health disorders, suicide and infectious diseases.

3.3 Physical inactivity

Cambodia has encouraged physical activity by increasing the numbers of green spaces and walking paths. The Prime Minister has encouraged people to exercise and has directed provincial governors to create environments that promote physical activity. Further, a health education syllabus, including physical activity and healthy diet, was approved by the Minister of Education, Youth, and Sport.

The updated Appendix 3 of WHO's global action plan for the prevention and control of NCDs 2013–2020 (3) lists several policy options for improving physical activity levels. The ROI analysis models the policy change of conducting public awareness campaigns on physical activity.

3.4 Unhealthy diet

Cambodia has several policies and guidelines for strengthening food safety and nutrition, such as the National Policy on School Health Policy approved by the Council of Ministers in 2019; the Education Strategic Plan 2011–2018; Guidelines on Strengthening Security, Safety and Hygiene in School (2013); Ministry Order on Strengthening Interventions for Safety and Healthy Food in Public and Private Schools (2019); Guidelines on Hygiene Measures in School for School Meal Programme (2014); and a National Strategy on Water Sanitation and Hygiene 2011–2025.

Several interventions are in place to improve nutritional status: deworming, water and sanitation, school meals, promotion of healthy food and nutrition and reviewing food and beverage marketing to children. The next steps will include establishing a new office on health, nutrition and hygiene; developing a national curriculum and core syllabus for health, nutrition and hygiene; and preparing standards, textbooks and training for teachers, in line with the Curriculum Framework of General Education and Technical Education in 2016 (12).

4. Methods

A multidisciplinary team comprising staff from WHO headquarters and the WHO Country Office in Cambodia, the United Nations Interagency Task Force on the Prevention and Control of Non-communicable Diseases and UNDP undertook an initial mission to collect and analyse data in Phnom Penh between 27 and 31 August 2018. The aim was to complete a three-tier economic NCD investment case, complemented by institutional and context analyses. The investment case was developed after intensive follow-up work. Clinical interventions for CVD and diabetes were included, with policy interventions for tobacco, harmful alcohol use, salt consumption and physical inactivity. Table 1 lists the interventions.

Table 1. Interventions included in the study

Clinical intervention		Policy intervention			
CVD	Diabetes	Tobacco	Alcohol	Salt	Physical activity
Treatment for high absolute risk of CVD or diabetes (> 30%)	Standard glycaemic control	Protect people from tobacco smoke	Enforce restrictions on availability of retailed alcohol	Surveillance	Awareness campaigns to increase physical activity
Treatment of new cases of acute myocardial infarct with aspirin	Intensive glycaemic control	Warn about danger through mass media campaign	Enforce restrictions on alcohol advertising	Liaise with industry for reformulation	
Treatment of cases with established ischaemic heart disease or post-myocardial infarct	Retinopathy screening and photocoagulation	Enforce bans on tobacco advertising	Enforce drunk-driving laws (sobriety checkpoints)	Adopt standards for front of pack labelling	
Treatment for established cerebrovascular disease and post stroke		Raise taxes on tobacco	Raise taxes on alcoholic beverages	Adopt standards to combat misleading marketing	
		Plain packaging of tobacco products		Knowledge: education and communication	
				Environment: salt reduction strategies in community eating spaces	

Interventions were selected according to the availability of relevant data for computation of both costs and health impacts. The baseline year for the analysis was 2018. The analysis comprised four parts:

- analysis of economic burden,
- calculation of costs of clinical and policy interventions,
- assessment of the health impacts of the interventions and
- analysis of ROI within 5 and 15 years.

Each part is described below.

4.1 Calculation of economic burden

In our analysis, indirect costs are those associated with reduced workforce participation and the resulting reduction in national productivity, i.e. the costs of absenteeism and reduced capacity at work and the economic losses due to premature deaths caused by NCDs. These costs were computed with the human capital approach. Local data on population by age and gender were provided by the National Institute of Statistics, and age- and gender-disaggregated mortality rates from diabetes, chronic respiratory disease, ischaemic heart disease, hypertensive heart disease, cardiomyopathy, myocarditis and cancers were obtained from Global Burden of Disease data from the Institute of Health Metrics and Evaluation (13). Age- and gender-disaggregated prevalence rates of diabetes and hypertension were obtained from the 2016 STEPS and were thereafter aggregated to reflect the total prevalence of and mortality from those diseases for both the entire population and the working-age population, defined as people aged 15–64 years for this analysis. Data on total Government health expenditure were obtained from the WHO Global Health Expenditure Database (14). The share of total health expenditure on each NCD group was however not available for Cambodia, and we therefore used the median percentage spent on each disease condition in several countries from a WHO study (11) to compute the direct health expenditure of the Cambodian Government on each of the disease areas.

The economic burden was computed as follows:

Step 1: The annual value in terms of economic output was computed for each full-time worker in Cambodia from the GDP per employed person. Data on the GDP, the total labour force aged 15–64 years, the unemployment rate and the labour force participation rate were taken from the World Bank database (15) to determine the total employed labour force in Cambodia.

Step 2: Data on the extent to which NCDs reduce economic productivity were taken from literature on the reduction in labour force participation rate resulting from hypertension and diabetes, the reduction in full-time hours worked owing to absenteeism and the reduction in productivity due to reduced capacity at work (16,17).

Step 3: The exact number of employed people with NCDs in Cambodia was determined for 2018 from data on the labour force participation rate, unemployment rate and mortality rates. From the working-age population with NCDs, we excluded those who either chose not to participate in the labour force or were unemployed, those who could not participate in the labour force due specifically to their NCD and those who had died from one of the NCDs under study. The result obtained represented the number of active workers with NCDs in Cambodia.

Step 4: Economic losses due to premature death were computed from the number of active workers who had died and workers who could not participate in the labour market because of NCDs. We also ascertained the costs associated with absenteeism and reduced capacity at work for surviving active workers with NCDs. We applied the relevant productivity figures estimated in step 2 to the relevant population determined in step 3 and multiplied the figure by the Cambodian GDP per employed person to arrive at the total indirect costs associated with each NCD group.

4.2 Calculation of costs of policies and interventions

The costs associated with policies and interventions were estimated with the WHO costing tool for NCD prevention and control, which permits identification, quantification and the value of the resources required for every policy and intervention that is incorporated. The tool costs human resources, training, external meetings, mass-media campaigns and miscellaneous equipment required to enact policies and programmes on the basis of assumptions made by WHO experts on the inputs required to implement and enforce each policy at national, regional and district levels. Unit costs for resource items are available from the WHO-CHOICE database (18). The tool was updated for the present analysis by the method described by Bertram and colleagues (19). We updated the following variables from information available in the World Bank database (15): per capita GDP in terms of purchasing power parity, the purchasing power parity conversion factor, the official exchange rate, per capita GDP, petrol per litre, labour participation rate of people aged ≥ 16 years and general domestic Government health expenditure as a percentage of current health expenditure. Additionally, the World Bank income group classification was updated with the proportion of the total population > 15 years of age computed from local data.

The costs of clinical interventions were calculated with the OneHealth Tool, which has built-in functionality to estimate the costs of each intervention by computing the additional number of people in need of care who are targeted by the respective intervention, multiplied by the per capita resource requirements for the intervention. This is then multiplied by the unit cost of each resource to arrive at the total cost per intervention. Use of the OneHealth Tool is detailed in the manual (20) and also discussed in the guidance note for investment cases (21).

The annual cost of both the policy and clinical interventions were computed for the 15-year period. The costs were discounted by the net present value approach. Discounting is vital, as a unit of currency is worth less in the future than today because of the time value of money. To compute the costs of both policy and clinical interventions, both tools must have both a baseline and target coverage levels for all interventions. In the absence of local data, default data based on global estimates was used for the computations.

4.3 Health effects of policy and clinical interventions

The One Health Tool was used to assess the benefits of implementing or scaling up policy and clinical interventions by modelling the number of disease cases averted, healthy life years gained and lives saved over the 15 years under study. Local data from the STEPS in Cambodia were fed into the tool to determine the prevalence of risk factors disaggregated by age group and gender.

The overall effect of the interventions under study was then ascertained in terms of gains in GDP. Data on reductions in worker productivity due to NCDs were incorporated into the tool as for the analysis of the economic burden of NCDs. The health interventions are expected to reduce the projected incidence of NCDs, which is associated with gains in healthy life-years lived. An increase in the GDP as a result of avoided absenteeism and reduced capacity at work was computed by accounting for the healthy life-years gained, GDP per employed person and reductions in the rates of absenteeism and reduced capacity at work attributable to the interventions under study. The increase in participation of the labour force as a result of avoided deaths was computed in order to estimate the increase in the economic output attributable to the value of avoided mortality. The projected economic gain from the interventions comprised the values of avoided reduced capacity at work, avoided absenteeism and avoided mortality. The impact of each intervention package, measured as the resulting rise in GDP, was estimated by combining these three kinds of gain.

4.4 Clinical interventions for cardiovascular disease and diabetes

The updated Appendix 3 of WHO's *Global action plan for the prevention and control of NCDs 2013–2020* (3) lists many clinical interventions for CVD and diabetes. The One Health Tool can model the following packages of interventions as part of the ROI analysis:

- screening for risk of CVD or diabetes,
- treatment for people with a high absolute risk of CVD or diabetes (> 30%),
- treatment of new cases of acute myocardial infarction with aspirin,
- treatment of cases of established ischaemic heart disease and post-myocardial infarction,
- treatment of established cerebrovascular disease and post-stroke,
- treatment of rheumatic heart disease (with benzathine penicillin),
- standard glycaemic control,
- intensive glycaemic control,
- retinopathy screening and photocoagulation and
- neuropathy screening and preventive foot care.

4.5 Return on investment

ROI is a commonly used measure of the efficiency of investment in health care, involving a comparison of the magnitude and timing of benefits from health interventions directly with the magnitude and timing of their corresponding costs. ROI is the ratio of the discounted (present) value of the benefits to the costs of health interventions

An Excel model developed by WHO for used in the UNDP/WHO Joint Programme on Governance of NCDs in 2015 was used for the analysis. We used the tool to estimate the economic gains that would be expected to accrue from investing in both clinical and policy interventions, using outputs generated by the One Health Tool and the NCD costing tool described above.

ROI rates were computed for all intervention packages, namely for CVD and diabetes, tobacco, alcohol, salt and physical activity. The ROI for each intervention package in Cambodia was arrived at by comparing the impact in terms of gains in GDP with the total cost of setting up and implementing the interventions with the net present value approach to future costs and economic gains, with 3% discounting.

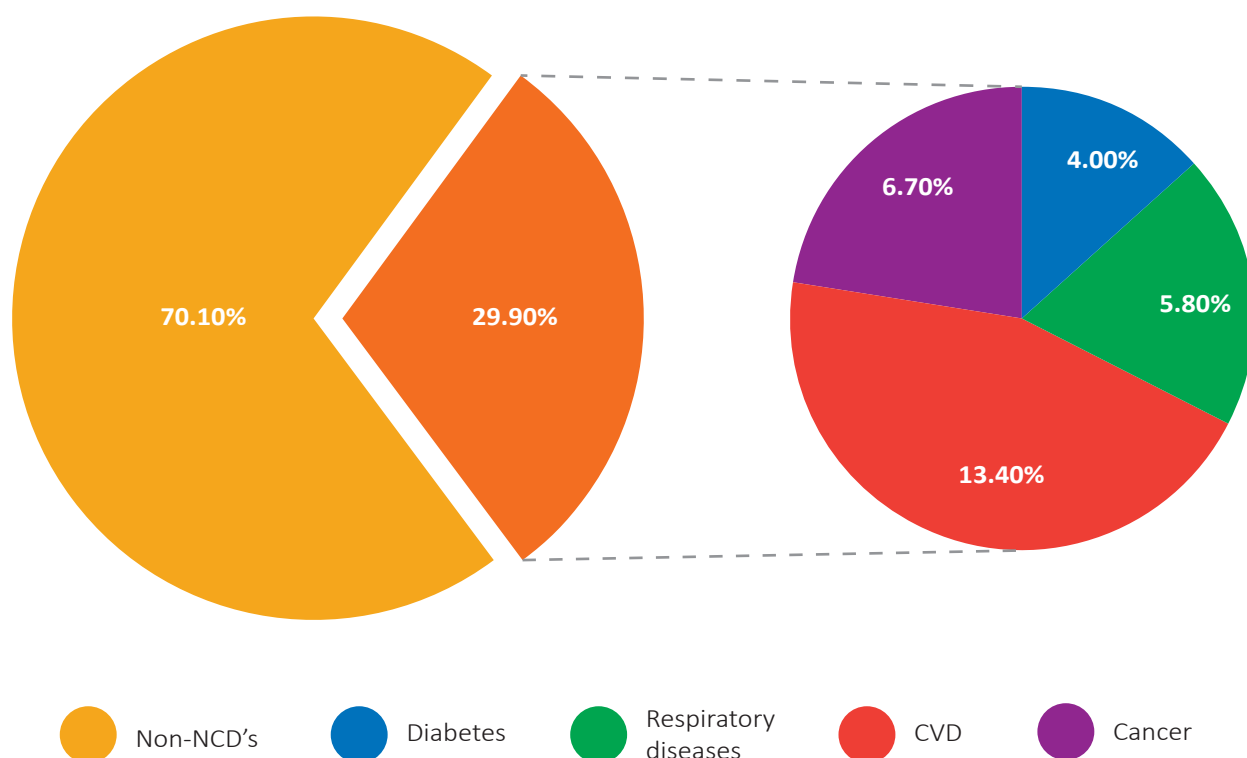
5. Results

This section, which presents the results of our analysis, is organized into five parts: economic burden of NCDs, costs of interventions, health benefits of interventions, economic benefits and ROI. The analysis of economic burden comprised direct and indirect costs.

5.1 Direct costs

For the purpose of this analysis, only Government expenditure was considered direct costs. Total Government health expenditure in Cambodia was KHR 1.2 trillion (US\$ 281 million). Our estimates suggest that the Government spent KHR 343 billion (US\$ 84 million) on the four major NCD groups under study (see Fig. 1), so that more than 25% of all Government health expenditure in Cambodia is attributable to the four disease groups. CVD accounted for the major share (13.4% of Government health spending), at KHR 154 billion (US\$ 38 million). Government expenditure on chronic respiratory diseases, diabetes and cancers was KHR 67 billion (US\$ 16 million) (5.8%), KHR 46 billion (US\$ 11 million) (4%) and KHR 77 billion (US\$ 19 million) (6.7%), respectively.

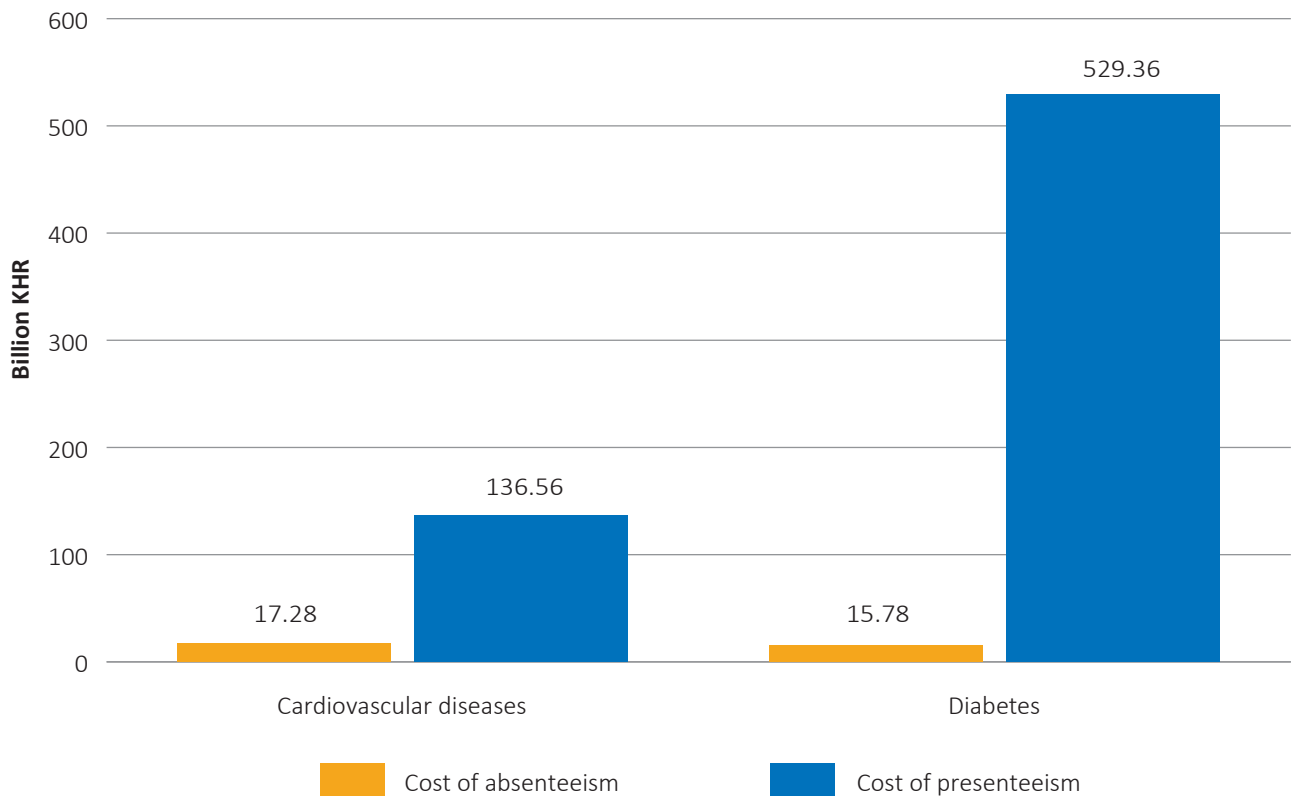
Fig. 2. Cambodian Government expenditure on NCDs



5.2 Indirect costs

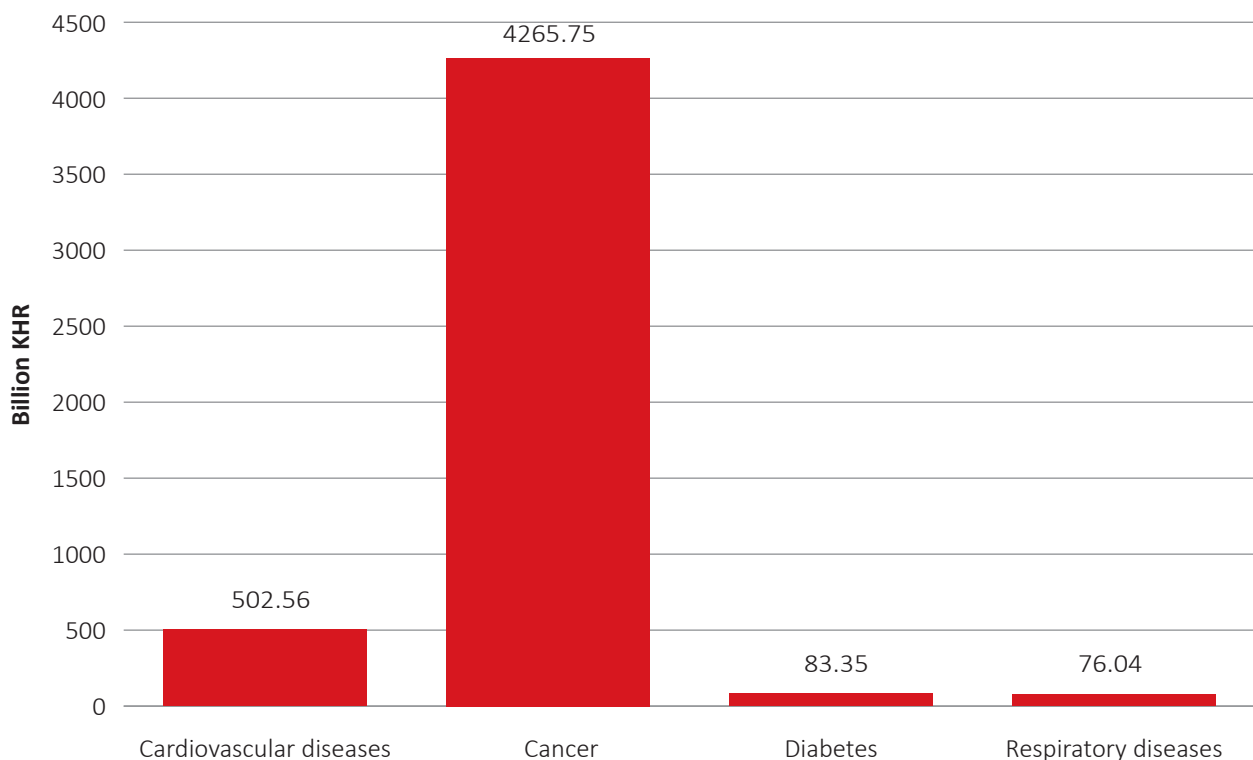
The indirect economic costs were divided into three: costs of absenteeism, costs of reduced capacity at work and costs resulting from premature deaths attributed to the NCDs under study. The costs of both absenteeism and reduced capacity at work could be computed only for CVD (hypertension) and diabetes. The costs are thus substantially underestimated for CVDs because of lack of local data on the incidence of stroke and myocardial infarction, which had to be excluded from our analysis. Productivity losses due to absenteeism were estimated to be equivalent to the full productivity loss of 1659 workers due to CVD and 1515 workers due to diabetes, which resulted in a total cost of absenteeism in Cambodia of KHR 33 billion (US\$ 8 million). The corresponding productivity loss due to reduced capacity at work was found to be equivalent to 13 108 full-time workers for hypertension and 50 811 workers for diabetes, resulting in a total burden of reduced capacity at work of KHR 666 billion (US\$ 163 million) (Fig. 2).

Fig. 3. Costs of absenteeism and reduced capacity at work due to hypertension and diabetes in KHR billions



The cost of premature deaths was computed by considering the total output that would have been generated by workers during their lives before retirement. The total cost of premature deaths was estimated to be KHR 4.93 trillion (US\$ 1.2 billion). The loss was the highest for cancers, at KHR 4.3 trillion (US\$ 1.1 billion), followed by CVD, at KHR 503 billion (US\$ 123 million) (Fig. 3).

Fig. 4. Costs of premature deaths from four NCDs, in KHR billions



5.3 Total economic costs

The total burden of NCDs in Cambodia was KHR 5.97 trillion (US\$ 1.5 billion), equivalent to 6.6% of the national GDP in 2017. This was due primarily to high indirect costs, which constituted about 95% of the total economic burden (Fig. 4). Economic losses due to premature death alone accounted for 83% of the total burden. Economic losses due to indirect costs (absenteeism, reduced capacity at work, premature death) were KHR 5.63 trillion (US\$ 1.4 billion), which is nearly 19 times higher than the direct costs, with Government spending on the four main NCDs estimated at KHR 343 billion (US\$ 84 million). Table 2 presents the total direct and indirect costs by NCD group. The highest economic burden was cancers (KHR 4.3 trillion, US\$ 1.1 billion), followed by CVD (KHR 810 billion, US\$ 199 million) and diabetes (KHR 674 billion, US\$ 165 million).

Fig. 4. Structure of the economic burden of NCDs in Cambodia, 2018

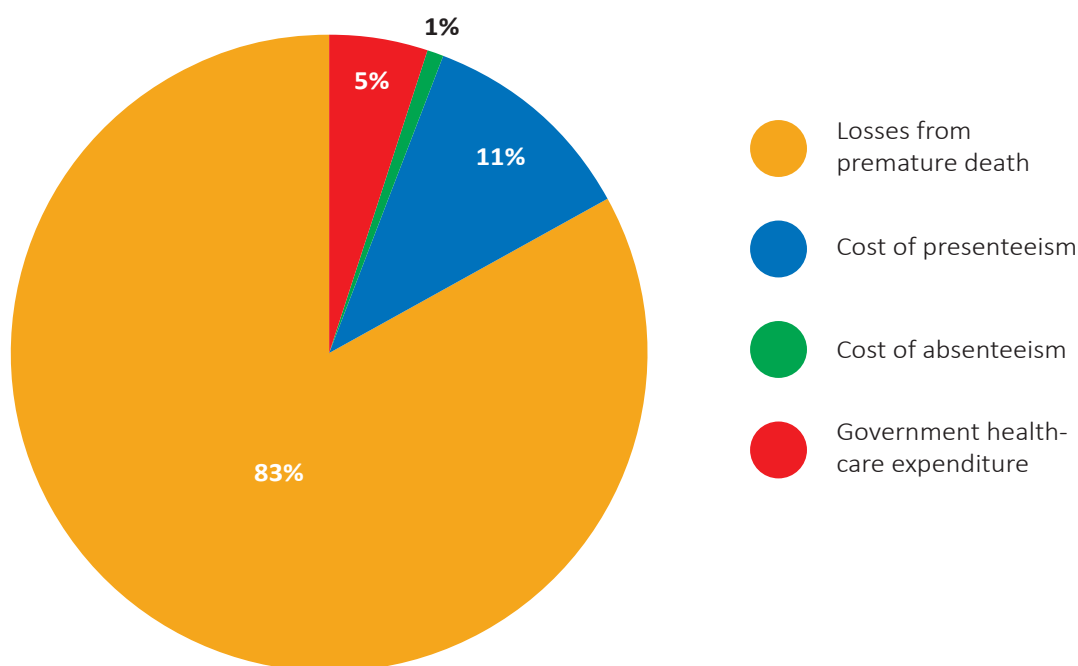


Table 2. Economic burden of NCDs in Cambodia in KHR billions, 2018

Cost	CVD	Cancer	Diabetes	Respiratory diseases	Total
Direct costs					
Government health care expenditure	154	77	46	67	343
Indirect costs					
Absenteeism	17	Data not available	16	Data not available	33
Reduced capacity at work	137	Data not available	529	Data not available	666
Premature death	503	4 266	83	76	4 928
Total indirect costs	656	4 266	628	76	5 626
Total economic burden					
Total costs	810	4 343	674	143	5 970

5.4 Intervention costs

The costs of interventions were estimated for the period 2019–2033. Table 3 shows the costs in net present-value terms for the first 5 years and cumulative costs for the 5- and 15-year periods.

The largest estimated costs were for a package of clinical interventions for CVD and diabetes at KHR 371 billion (US\$ 91 million) for 5 years and KHR 1.23 trillion (US\$ 302 million) for 15 years, which cost far more than the entire policy package combined. Of the policy interventions, the costliest was the alcohol package, at KHR 22 billion (US\$ 5.4 million) and KHR 60 billion (US\$ 15 million) projected for the 5- and 15-year periods, respectively. It should be noted, however, that the total revenue from alcohol taxation in the country was KHR 265.51 billion (US\$ 66 million) in 2017 alone. The salt reduction package was the second costliest, costing KHR 17 billion (US\$ 4.2 million) in the first 5 years and KHR 49 billion (US\$ 12 million) over 15 years.

Table 3. Estimated costs of policy and clinical interventions in KHR billions, 2019–2033

Intervention type	2019	2020	2021	2022	2023	Total for 5 years	Total for 15 years
Policy interventions							
Tobacco	3.3	3.1	2.6	2.7	2.4	14.4	34.4
Alcohol	4.5	4.9	4.2	4.1	3.9	21.8	60.3
Physical activity	1.4	1.9	1.8	1.7	1.7	8.7	29.9
Salt	2.8	3.8	3.4	3.3	3.2	16.7	48.6
Total for policy interventions	12.2	13.9	12.1	12.0	11.4	61.8	173.3
Clinical interventions							
CVD and diabetes	70.4	72.2	74.2	76.1	78.1	371.2	1227.2
Total costs for policy and clinical interventions	82.7	86.2	86.3	88.1	89.6	433.1	1 400.6

5.5 Health benefits

All interventions together would result in significant health gains, totalling 694 858 healthy life-years gained and 184 236 deaths averted over the 15-year period up to 2033. Maximum health gains were observed from salt interventions, which are expected to provide 251 134 healthy life-years gained and 46 951 deaths averted. The interventions that would result in the second and third highest healthy life-years gained and deaths averted are for tobacco and hazardous alcohol use, which would result in 161 578 and 94 241 healthy life-years gained and 38 095 and 33 080 deaths averted, respectively (Table 4).

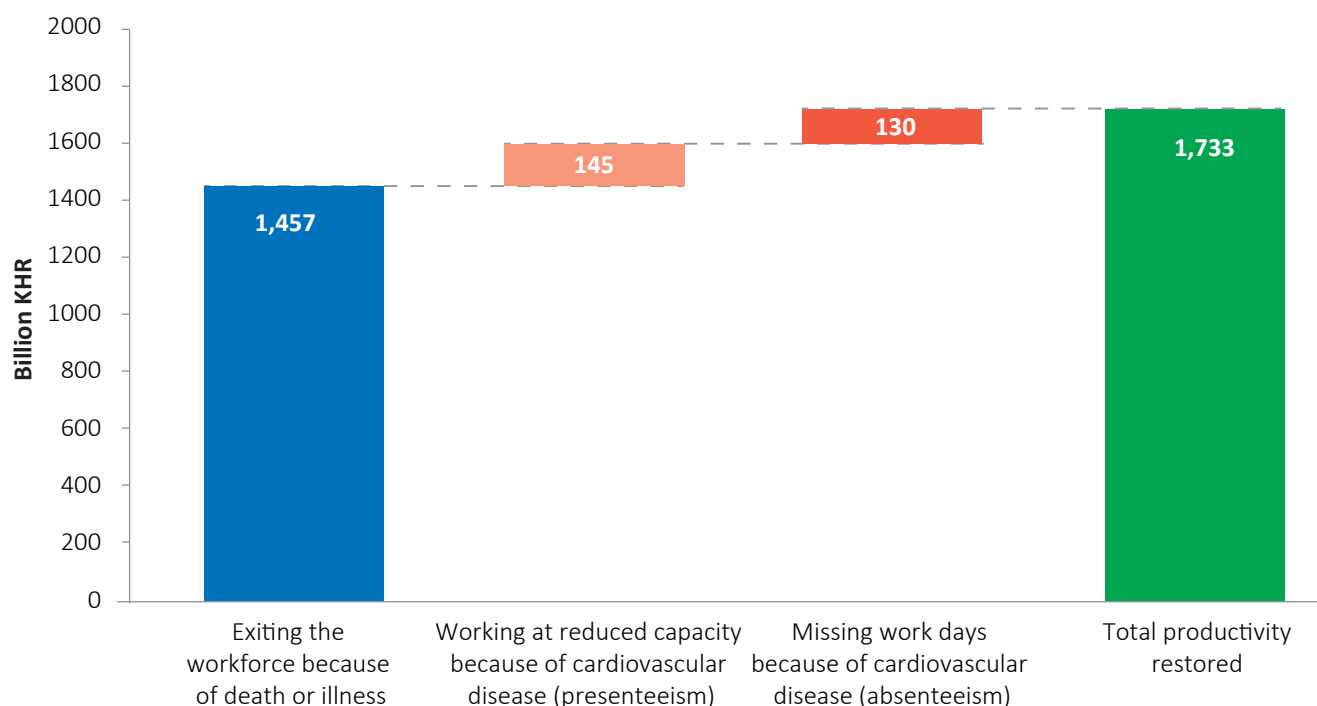
Table 4. Estimated health benefits over 15 years

Intervention package	Healthy life-years gained	Deaths averted
Policy interventions		
Tobacco	161 578	38 095
Alcohol	94 241	33 080
Salt	251 134	46 951
Physical activity	94 022	33 062
Clinical interventions		
CVD and Diabetes	93 883	33 048

5.6 Economic benefit

The highest productivity gains due to the interventions would be in terms of reduced mortality (84% of recovered economic output), followed by reduced capacity at work (8.2%) and absenteeism (7.5%). The combined recovered economic output from both the clinical and the policy intervention packages in net present-value terms would be KHR 1.7 trillion (US\$ 417 million) or roughly 2% of Cambodia's 2017 GDP over 15 years (Fig. 5).

Fig. 5. Economic output recovered with the policy and clinical intervention packages over 15 years (in billion KHR)



5.7 Return on investment

A comparison of the costs of implementing and scaling up both policy and clinical interventions with the economic benefits resulting from these interventions demonstrated that the benefits outweigh the costs in both the short (5 years) and the longer term (15 years). The returns on investment are substantially higher for the policy intervention packages than the clinical intervention packages (Table 5).

Table 5. Costs, benefits and ROI at 5 and 15 years, by intervention package (in billion KHR)

Intervention package	5 years			15 years		
	Total costs	Total productivity benefits	Ratio of benefit to cost	Total costs	Total productivity benefits	Ratio of benefit to cost
Policy interventions						
Tobacco	14	79	5.5	34	366	10.7
Alcohol	22	67	3.1	60	300	5.0
Physical inactivity	9	67	7.7	30	300	10.0
Salt	17	84	5.0	49	467	9.6
Clinical interventions						
CVD and diabetes	371	67	0.2	1,227	300	0.2

The highest benefit-to-cost ratio was observed for the tobacco intervention package, at 5.5 in 5 years and 10.7 in 15 years, followed by the intervention package for physical inactivity, at a benefit-to-cost ratio of 7.7 in 5 years and 10.0 in 15 years. The ratio for the salt intervention package was estimated to be 5.0 in 5 years and 9.6 in 15 years, and that for the alcohol intervention package was 3.1 in 5 years and 5.0 in 15 years. The benefit-to-cost ratio for the CVD and diabetes intervention package was 0.2 in 5 years and 0.2 in 15 years. Significantly lower ratios for clinical interventions are commonly observed, because of higher treatment costs and lower potential benefits than policy interventions.

Policy packages, including for tobacco, physical activity, salt and alcohol, are clearly the “best buys”, offering the highest ROIs over 15 years.

6. Conclusions and recommendations

The findings of this investment case analysis underscore the economic, social and sustainable development toll that NCDs impose on the Cambodian economy and the benefits of immediate action. NCDs pull people into poverty and increase inequalities. This report sets out the case for further investment in action against NCDs by assessing the economic burden of NCDs for Cambodia, the costs of specific interventions and cost–benefit analyses for five intervention packages to demonstrate their economic value.

In 2018, the Government spent KHR 343 billion (US\$ 84 million) on treatment for NCDs, representing 26% of all Government health care expenditure. CVD accounted for the largest share (13%) of expenditure on NCDs, costing the Government KHR 154 billion (US\$ 38 million). We also quantified lost productivity due to premature mortality, absenteeism and reduced capacity at work of people with CVD and diabetes, which together constitute the indirect costs from NCDs.

While the investment case confirms that Cambodia faces a growing epidemic of NCDs, it shows the path forward. The findings show that investment in five proven, cost-effective intervention packages (the “best-buys”) could significantly reduce the burden of NCDs, increase people’s life expectancy and quality of life and decrease the burden on the State budget and national economy. Thus, these investments would contribute to the overall socio-economic development of the country, with positive ripple effects across society, and accelerate development.

In this investment case, we assessed five cost-effective intervention packages of best buys in the Cambodian context: four policy packages to reduce the prevalence of behavioural risk factors for NCDs – tobacco use, harmful use of alcohol, physical inactivity and excessive salt consumption – and one clinical intervention package for CVD and diabetes. National efforts and interventions were accounted for in the economic modelling. The main findings for the five packages were as follows.

- The recovered economic benefit of investing in all five policy packages would be KHR 1.7 trillion (US\$ 417 million) over 15 years.
- Over 15 years, the packages to reduce tobacco use and physical inactivity would have the highest ROIs:
 - For the tobacco package, every KHR 1 invested would yield KHR 10.7 in return. The overall cost would be KHR 34 billion (US\$ 8.3 million).
 - For every KHR 1 invested in increasing physical activity in the population, Cambodia would receive KHR 10 in return. The overall cost would be KHR 30 billion.

- The next highest ROIs would be for the salt reduction (KHR 9.6 benefit per KHR 1 invested) and alcohol packages (KHR 5.0 benefit per KHR 1 invested), costing KHR 49 billion (US\$ 12 million) and KHR 60 billion (US\$ 15 million), respectively.
- The CVD and diabetes clinical package is estimated to cost KHR 1.2 trillion (US\$ 294 million) and to yield an ROI of 0.24 per KHR invested.

The analysis revealed areas that should be strengthened in order to implement the WHO-recommended cost-effective NCD preventive and clinical interventions. As the packages to reduce tobacco use and increase physical activity would provide the greatest ROIs, scaling up effective tobacco control initiatives and awareness campaigns to increase physical activity should be given priority. The Government should also strengthen alcohol control and make investments to reduce salt consumption, as both yield high ROIs. Scaling up CVD and diabetes clinical interventions should not be neglected, however, as introduction of these packages could avert 33 048 deaths over 15 years.

Six steps that the Government could take to strengthen NCD prevention and control are listed below.

- 1. Raise awareness about the true costs of NCDs and the enormous benefits for development of investing in the five packages of proven, cost-effective interventions.**

Policy-makers in all sectors are encouraged to share the findings of this investment case in all sectors of Government, Parliament, civil society, the public, development partners and academic institutions to strengthen public and political support for NCD prevention and control. An advocacy strategy with messages on, for example, how the interventions analysed here can support economic growth and improve population health, could assist policy-makers in disseminating the message. To help stem the NCD epidemic, it is imperative that Cambodia raise awareness in the public, particularly among young people.

- 2. Strengthen tobacco control measures and enforce them.**

The Government of Cambodia is committed to fully implementing the WHO FCTC, and Cambodia's Tobacco Control law from 2015 is a strong piece of legislation that protects the population. The Government could further increase tobacco control by: (a) increasing tobacco excise taxes, with a specific excise tax component, to reduce the affordability of tobacco products; (b) fully enforcing the ban on smoking in public places; (c) extending the ban on tobacco advertising, promotion and sponsorship to include point-of-sale advertising and corporate social responsibility; and (d) implementing new measures such as mass media campaigns and plain packaging.

Several of these policies are low-cost with high returns, including plain packaging, bans on advertising, promotion and sponsorship and especially raising taxes. High returns were demonstrated in the joint United Nations–Cambodian Government investment case for tobacco control, completed in July 2019 (6). The report also provides evidence that tobacco tax increases are pro-economy and pro-development, benefiting the lowest-income segments of society the most.

The Ministry of Health could review and amend the current legal, policy and regulatory framework for tobacco control to strengthen tobacco control measures, working with Parliamentarians, the Attorney General's Office and relevant ministries. This could include initiating the legal process for joining the Protocol to Eliminate Illicit Trade in Tobacco Products. International partners could provide legal expertise.

As recommended in the needs assessment of the WHO FCTC, the Ministry of Health should work with the Ministry of Education to ensure that tobacco control is incorporated into teachers' instruction manuals and student textbooks in the new curriculum that is being prepared. Collaboration between the Ministry of Health, the Ministry of Information and others is also necessary to develop a comprehensive communications strategy

to inform the public about the harms of tobacco (particularly of chewing tobacco) and second-hand smoke and about the Tobacco Control Law and the enormous benefits of stronger tobacco control at individual, household and business levels.

3. Adopt a comprehensive set of salt reduction policies, regulations and interventions.

The Government could adopt salt reduction targets for industrially produced foods (such as bread, meat products, savoury snacks and drinks) by regulating maximum limits, as has been done in many countries. Government officials could draw on the WHO modelling study, which describes the sodium reductions necessary in different food categories (22). The regulation would apply to all foods on the market, including in supermarkets, and thus ensure equal treatment. This should not undermine other initiatives such as salt iodization, which should be universal, in accordance with WHO policy.

The Government could also make a concerted effort to ensure mandatory labelling of sodium content and introduce a front-of-pack labelling system to allow evaluation of the sodium content (e.g. high, medium or low). The Government could introduce mandatory restrictions on the marketing of foods high in salt (in addition to fats and sugar), and a new law should be passed to ban *trans*-fats in all foods. The literacy of the population about the importance of salt reduction could be improved via communication campaigns and by training primary health care personnel in advising patients.

4. Promote physical activity through national mass public awareness campaigns and increase leadership to ensure that health is central to urban planning.

The Government could increase its promotion of physical activity by organizing local campaigns, including “fun runs”, triathlons and mass cycling events. In addition, the Government should strengthen multi-sectoral action to incorporate healthy, age-friendly principles into urban development. Municipal and local governments should ensure that policies for “healthy cities” and “age-friendly cities” are used in all urban planning and development, including increasing the availability of public transport, green spaces, cycle ways and other urban infrastructure that enables physical activity and reduces exposure to air pollution.

5. Take a comprehensive approach to taxes on health-harming products (health taxes), prioritizing increases in excise taxes on tobacco, alcohol and sugar-sweetened beverages, and using portions of the additional revenue for NCD prevention and control.

Higher taxes on health-harming products is one of the most effective measures a government can take to reduce their consumption and improve population health while increasing Government revenue for national development priorities. Increasing taxes on sugar-sweetened beverages can help curb obesity, type 2 diabetes and tooth decay, especially in lower-income, less-educated, younger populations. It has been shown that a tax on sugary drinks that increases the price by 20% can significantly reduce consumption (23) and also encourage pro-health product reformulation by manufacturers (24). Cigarette taxes in Cambodia are currently far below the WHO FCTC-recommended level of at least 75% of the retail price (with an at least 70% excise tax component). It is recommended that the Ministry of Health continue to work with the Ministry of Economy and Finance to create an enabling political, policy and social environment for tax increases on tobacco products, including restructuring (simplifying) the tax system, taxing all tobacco products similarly to prevent consumers from switching to other tobacco products, and increasing tobacco tax rates regularly to reduce the affordability of tobacco products.

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

This investment case demonstrates that NCDs pose a challenge to sustainable development in Cambodia, with implications for the ministries of Economy and Finance, Education, Labour, Agriculture, Commerce, Industry and

Handicrafts, other sectors, civil society and the National Assembly. An effective response to NCDs calls for a whole-of-government approach with the involvement of nongovernmental actors in all sectors of society, such as through a national coordination mechanism.

Cambodia has various mechanisms for coordinating prevention and control of NCDs, such as the NCD Taskforce the Ministry of Health, which coordinates the activities of donors and nongovernmental organizations; the NCD focal points in each provincial health department; and the Inter-ministerial Committee for Tobacco Control. It is recommended that Cambodia strengthen such coordination by establishing a national mechanism to implement the National Multisectoral Action Plan for the Prevention and Control of NCDs, potentially co-chaired by the Ministry of Health and another ministry or at a higher level (e.g. by a Deputy Prime Minister), as many of the causes of NCDs lie beyond the health sector. Such a coordinating mechanism should have agreed terms of reference and be protected from the vested and commercial interests of the tobacco, alcohol and food and beverage industries. Technical working groups could be formed on specific areas, as necessary. Given the decentralized governance structure in Cambodia, the Government should ensure that national commitments are operationalized locally. The Government should consider including representative of civil society organizations on the national coordination committee and provide support to active nongovernmental organizations to assist it in NCD prevention and control.

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Annex 1. Data used to calculate burden of noncommunicable diseases

Table A1. Share of major NCDs in total health care expenditure

Category	Australia	Canada	Czechia	Germany	Estonia	France	Georgia	Hungary	India	Netherlands	Republic of Korea	Slovenia	United States of America
World Bank income group	High	High	High	High	High	High	Low-middle	High	Low-middle	High	High	High	High
CVD	8.6%	9.0%	9.2%	16.2%	22.0%	12.0%	0.8%	18.4%	11.1%	15.6%	13.4%	13.6%	17.0%
Cancers (neoplasm)	4.7%	3.1%	5.5%	7.9%	9.4%	7.1%	1.9%	8.2%	5.5%	4.7%	7.7%	6.7%	7.2%
Endocrine and metabolic diseases	4.4%	2.1%	2.0%	4.0%	5.4%	3.9%	0.0%	6.1%	2.7%	4.8%	4.1%	2.4%	4.4%
Respiratory diseases	4.8%	4.5%	3.2%	5.4%	7.2%	7.3%	0.4%	5.8%	4.9%	8.9%	10.8%	6.2%	6.6%
Total for four NCDs	22.5%	18.7%	19.9%	33.5%	44.0%	30.3%	3.1%	38.5%	34.0%	24.2%	36.0%	28.9%	35.2%

Source: Garg CC, Evans DB. What is the impact of noncommunicable diseases on national health expenditures: a synthesis of available data. Geneva: World Health Organization; 2011 (NCD discussion paper no. 3) (<http://www.who.int/healthsystems/NCDdiscussionpaper3.pdf>; accessed 23 August 2017).

Table A2. Productivity data

Disease	Parameter value	Year	Source of data	Reference
Reduction in rate of labour force participation				
Hypertension	11.0%	2009	Institute for Research and Information in Health Economics	1
Stroke	11.0%	2009	Institute for Research and Information in Health Economics	1
Acute myocardial infarction	11.0%	2009	Institute for Research and Information in Health Economics	1
Type 2 diabetes	11.0%	2009	Institute for Research and Information in Health Economics	1
Reduction in full-time hours due to absenteeism				
Hypertension	0.5%	2011	Population Health Management	
Stroke	5.5%	2011	Population Health Management	2
Acute myocardial infarction	1.1%	2011	Population Health Management	2
Type 2 diabetes	0.3%	2011	Population Health Management	2
Reduction in productivity due to reduced capacity at work				
CVD, stroke	3.7%	2011		3
Diabetes	11%	2011		4
Time it takes to replace workers (percentage of a year)	20%	2012	Center for American Progress	5

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Annex 2. Policies and legislation to reduce the burden of NCDs

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Ministry of Health. Prakas on procedures to conduct tobacco control inspection for tobacco control inspectors of the Ministry of Health was signed by the Minister of Health on 30 December 2016.

Ministry of Economy and Finance. Prakas on establishment of tobacco tax working group (TTWG) which is chaired by the Secretary of State of the Ministry of Economy and Finance on 24 October 2011, 20 October 2013 and 27 April 2015.

Ministry of Health. Prakas on procedures to conduct tobacco control inspection for tobacco control inspectors of the Ministry of Health was signed by the Minister of Health on 30 December 2016.

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⁴ A regulation issued by a minister or by the Governor of the National Bank of Cambodia on banking or financial issues

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The WHO Western Pacific Region

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Western Pacific is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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Development of this investment case was coordinated by a joint WHO and UNDP team. This investment case report is for advocacy purposes and provides a set of options for action to reduce the burden of the noncommunicable diseases in Cambodia.