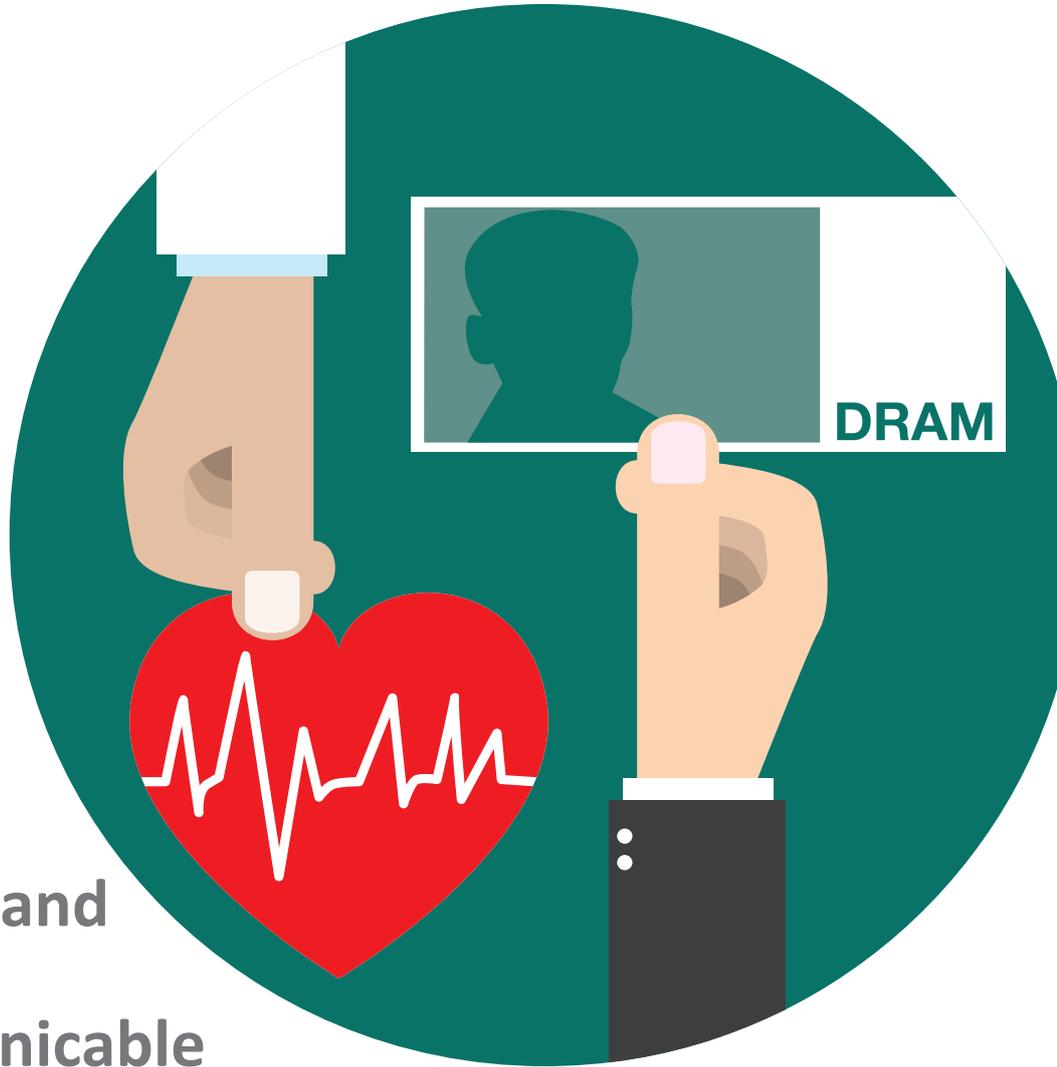




Empowered lives.  
Resilient nations.



# Prevention and control of noncommunicable diseases in Armenia

## The case for investment



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Resilient nations.*



# Abstract

Noncommunicable diseases (NCDs) such as cancer, cardiovascular disease, diabetes and chronic respiratory diseases and their risk factors are an increasing public health and development challenge in Armenia. This report provides evidence through three analyses that NCDs reduce economic output and discusses potential options in response, outlining details of their relative returns on investment. An economic burden analysis shows that economic losses from NCDs (direct and indirect costs) comprise 362.7 billion dram, equivalent to 6.5% of gross domestic product in 2017. An intervention costing analysis provides an estimate of the funding required to implement a set of policy interventions for prevention and clinical interventions. A cost–benefit analysis compares these implementation costs with the estimated health gains and identifies which policy packages would give the greatest returns on investment. For example, the tobacco policy package achieved a return of more than 14.5 dram over 15 years for every 1 dram invested, and for a salt reduction package the equivalent return on investment was more than 14.2 dram for every 1 dram invested.

## Keywords

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

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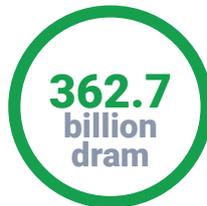
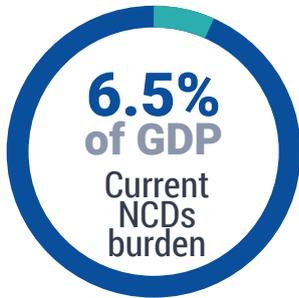
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## Abbreviations

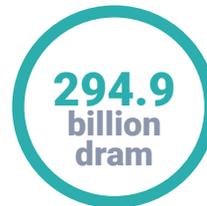
BMI	body mass index
DALY	disability-adjusted life-year
GDP	gross domestic product
MPOWER	monitor tobacco use and prevention policies; protect people from tobacco smoke; offer help to quit tobacco use; warn people about the dangers of tobacco; enforce bans on tobacco advertising, promotion and sponsorship; raise taxes on tobacco [WHO package]
NCD	noncommunicable disease
NGO	nongovernmental organization
PEN	package of essential noncommunicable disease interventions
SHAKE	surveillance; harness industry; adopt standards for labelling and marketing; knowledge; environment [WHO package]
STEPS	STEPwise approach to surveillance [WHO package]
UNDP	United Nations Development Programme

# ARMENIA

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



lost per year



indirect cost due to loss of workforce and reduced productivity



of dying prematurely from one of the four main NCDs

**203.8**  
billion dram



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

Billions of dram

**2.8**



Tobacco control package

**5.6**



Alcohol control package

**5.4**



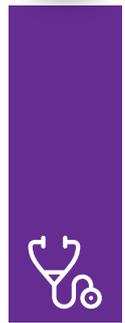
Salt reduction package

**5.4**



Physical activity awareness package

**184.7**



CVD and diabetes clinical interventions

**217.6**  
billion dram



Return on investment over a 15-year period

Return on investment

Lives saved

Billions of dram in productivity benefits



**14.5**

**7 000**

**40.4**



**4.1**

**5 000**

**23.0**



**14.3**

**14 000**

**76.9**



**4.4**

**5 000**

**23.5**



**0.3**

**11 000**

**53.6**

## Executive summary

In mid-2017, given the increasing interest in preventing noncommunicable diseases (NCDs) and the health system reforms within Armenia, WHO and the Ministry of Health discussed the value of investigating the economic case for investing in preventing and controlling NCDs. A joint United Nations visit to Armenia was therefore undertaken in November 2018 to conduct such an economic analysis.

NCDs such as cancer, cardiovascular diseases, diabetes and chronic respiratory diseases and their risk factors (tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity) are an increasing public health and development challenge in Armenia. The probability of premature death (before the age of 70 years) from one of the four major NCDs for a person living in Armenia was 22% in 2016 and was twice as high for men as for women. Cardiovascular diseases are the main driver of premature mortality in the country, and excess male deaths and unhealthy behaviour contribute to the gender gap.

Estimates indicate that 38% of adults have raised blood pressure and 6% have raised blood glucose. Further, 51% of men currently smoke tobacco and 46% of men drink alcohol; among men in the general population, 11% engage in heavy episodic drinking. Half the adult population (48%) is overweight or obese, one of the highest levels in the WHO European Region, and salt intake is high. One third (36%) of the population 18–69 years old have 3–5 NCD risk factors, and one sixth (17%) of the population 40–69 years old are at high risk of a cardiovascular disease event or death over the next 10 years.

Armenia has several policy and legislative frameworks in place for NCDs, including the National Strategic Programme for 2012–2018 and Action plan on three diseases with higher mortality rates: circulatory diseases (cardiovascular diseases), malignant neoplasms and diabetes, Strategic Programme for the Prevention and Control of NCDs for the years 2016–2020 and the related Action Plan, the Strategy for Promoting Healthy Lifestyles for the years 2016–2020 and the related Action Plan and the Tobacco Control Strategy for the years 2017–2020 and the related Action Plan. The United Nations Development Assistance Framework also includes a target related to NCDs. A review of current NCD interventions at the policy and individual service levels uncovered gaps in implementing the WHO-recommended cost-effective NCD preventive and clinical interventions. The review drew attention to areas that need to be strengthened and scaled up to achieve 100% coverage of these interventions.

The premature death, morbidity and disability associated with NCDs negatively affect socioeconomic development. As in many parts of the world, NCDs in Armenia are causing a surge in health-care costs and social care and welfare support needs and contribute to reduced productivity. This report provides evidence that NCDs reduce economic output and discusses potential options in response, including an assessment of their relative returns on investment. Three analyses were performed.

- An economic burden analysis showed the scale of disruption to the economy from NCDs by assessing their direct and indirect costs. Direct costs included government (public) health-care costs for treating cardiovascular diseases, diabetes, cancer and respiratory diseases. Indirect costs were based on disability payments, costs of absenteeism, costs of presenteeism and economic losses from premature deaths among people of working age.

Main results: Government expenditure on health-care for NCDs resulting from NCDs (55.6 billion dram) is just the tip of the iceberg. The hidden additional costs from lost productivity are more than four times higher, at 294.9 billion dram. Altogether, the current economic cost of NCDs to the Armenian economy is 362.7 billion dram per year, equivalent to 6.5% of the country's annual gross domestic product in 2017.

- An intervention costing analysis estimated the funding required to implement a set of interventions for preventing NCDs: policy packages to reduce tobacco use, harmful alcohol consumption and salt consumption and to improve physical activity and a package of clinical interventions for cardiovascular diseases and diabetes.

Main results: The policy packages for 2019–2023 to reduce the consumption of tobacco, alcohol and salt and to increase physical activity were estimated to cost 1.36 billion dram, 2.71 billion dram, 1.80 billion dram and 1.78 billion dram, respectively. The cardiovascular disease and diabetes interventions were found to be the most expensive options, costing 63.6 billion dram.

- A return on investment analysis compared the estimated implementation costs during the costing analysis with the estimated health gains and economic returns of a set of interventions over five- and 15-year periods.

Main results: The tobacco control policy package achieved a benefit–cost ratio of 14.51 and the salt policy package a benefit–cost ratio of 14.28 over a 15-year period. Controlling alcohol and increasing physical activity in the population would also provide high returns on investment (4.14 and 4.40 dram over 15 years, respectively, for each 1 dram invested). The returns on investment for cardiovascular disease and diabetes clinical interventions are lower, at 0.29 dram per 1 dram invested over 15 years.

Alongside current health systems and financing reforms, the Government of Armenia is already taking steps to reduce the burden of NCDs. These include a plan for reducing and preventing the adverse effects of consuming tobacco product, which has been submitted to the Government for approval. The new tobacco legislation, if passed by Parliament this year, would help protect Armenians, and youth in particular, from the devastating health effects of tobacco consumption and second-hand smoke. In addition, the Government is reforming the tax code to accelerate tax increases on alcohol on tobacco. Taxes on sugar-sweetened beverages and regulations on salt to introduce maximum limits in certain foods are also being considered.

These are bold steps the government can take now to invest in the health of the country, saving lives and generating productivity gains that would bolster its economy. The concluding chapter of this report lays out five additional steps and investments the government can take to further increase sustainable development gains. Implementation requires engagement from sectors beyond health, such as finance, economy, education and agriculture, and the benefits from the investments would accrue across the whole of government and society.

# 1. Introduction

Noncommunicable diseases (NCDs) account for an estimated 93% of all deaths in Armenia (WHO, 2018b). The latest figures, from 2016, show that people in Armenia have a 22% chance of dying prematurely – that is, before the age of 70 years<sup>1</sup> – from one of the four main NCDs (cardiovascular diseases, diabetes, chronic respiratory diseases and cancer), with a significantly higher probability for men (31%) than women (15%) (WHO, 2018b). This highlights a significant opportunity to make progress on United Nations Sustainable Development Goals target 3.4, which aims to reduce premature mortality from NCDs by one third by 2030.

The impact of NCDs on human health is clear, but this is only one part of the story. NCDs also result in high economic costs, including direct health-care costs but reaching far beyond. NCDs reduce productivity at the macroeconomic level by interrupting full participation in the labour force and subsequently affecting individuals, their caregivers and the state. When individuals 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 capacity while at work (presenteeism<sup>2</sup>). In low- and middle-income countries, NCDs are estimated to cause more than US\$ 21 trillion in lost economic output between 2011 and 2030, with nearly one third attributable to cardiovascular diseases alone (Bloom et al., 2011). For individuals and governments, spending to treat health problems that could otherwise have been prevented can mean significant opportunity costs,<sup>3</sup> including reduced investment in education, transport projects or other forms of human or physical capital that can produce long-term returns.

High human and economic costs highlight the need to reduce the burden of NCDs in Armenia. 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 (WHO, 2013). 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.

WHO developed a menu of policy options and cost-effective interventions to assist Member States to reduce the NCD burden within its Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 (WHO, 2013). These best buys were updated at the 2017 World Health Assembly (WHO, 2017a; 2017c) and include measures to reduce behavioural and metabolic risk factors known to lead to NCDs as well as clinical interventions to prevent and treat disease. Recent analysis by WHO (2018c) suggests that every US\$ 1 invested in implementing a package of all 16 best buys in low- and middle-income countries will yield a return of at least US\$ 7 by 2030.

Since heart disease, stroke, myocardial infarction and other circulatory diseases caused 44% of Armenia's deaths in 2016 (WHO, 2018b), the economic analysis detailed in this study focuses primarily on interventions that can reduce this burden of cardiovascular diseases.

## Purpose of the economic analysis component of the case for investment

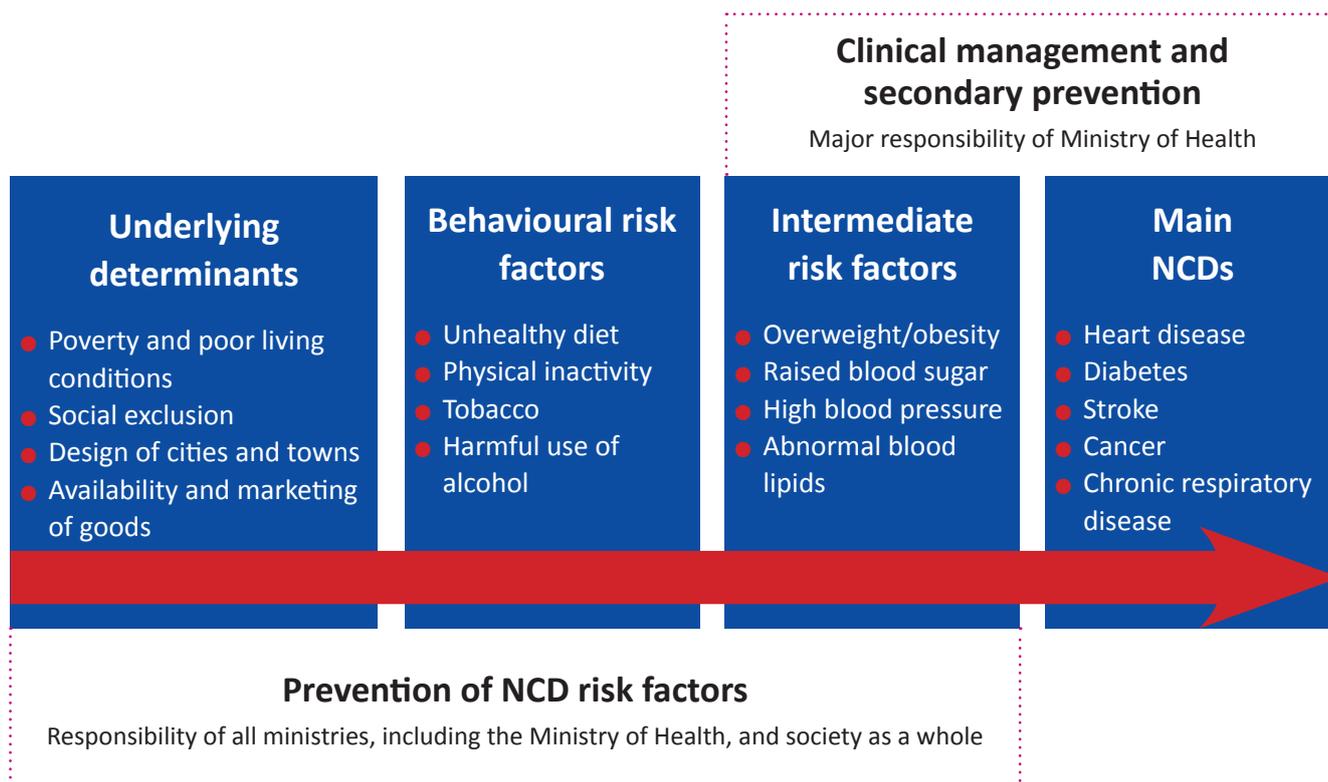
The negative economic effects of NCDs are too often overlooked in budgetary allocation processes and in weighing the advantages and disadvantages of stronger fiscal and regulatory action. Quantifying the costs of management and interventions to prevent and control NCDs, as well as their returns on investment in relation 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.

<sup>1</sup> Definition: percentage of 30-year-old people who would die before their 70th birthday from cardiovascular disease, cancer, diabetes or chronic respiratory disease, assuming that they would experience current mortality rates at every age and would not die from any other cause of death (such as injuries or HIV infection).

<sup>2</sup> Presenteeism is defined as reduced productivity at work.

<sup>3</sup> Opportunity cost is defined as the cost of something in terms of an opportunity forgone: "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**



In mid-2017, given the increasing interest in preventing NCDs and the health system reforms within Armenia, WHO and the Ministry of Health discussed the value of investigating the economic case for investing in NCDs. A joint United Nations visit to Armenia was therefore undertaken in November 2018 to conduct such an economic analysis.

The investment case allows scaled-up action – and the costs of inaction – to be modelled in medium-term (five years) and long-term (15 years) time frames. One scenario is continuing the status quo, in which no new policies are implemented and current coverage levels remain in place – that is, 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 are also monetized in this analysis using the human capital approach to enable benefit–cost ratios (the primary way of measuring return on investment) to be evaluated and reported for each package of interventions. The human capital approach 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 retirement age.

Section 2 analyses NCD behavioural risk factors in Armenia, including current levels and patterns of tobacco, alcohol and salt consumption, physical inactivity and the existing 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 can contribute to reducing the burden of disease – especially cardiovascular diseases – and details the current implementation level of policies and interventions in Armenia. 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 four policy packages described and the clinical interventions. Section 6 outlines the conclusions to be drawn from these.

## 2. Situation analysis: NCDs and risk factors

This section provides an overview of the main behavioural risk factors for NCDs: tobacco use, harmful alcohol consumption, high salt intake and physical inactivity. It also discusses the prevalence of metabolic risk factors, including raised blood pressure, raised cholesterol, obesity and diabetes.

Armenia has a high burden of NCDs and among the highest rates of premature mortality in the WHO European Region. The age-standardized premature mortality rate from the four major NCDs<sup>4</sup> was 470 per 100 000 population in 2015, above the WHO European Region average of 380 per 100 000 population (WHO Regional Office for Europe, 2018b). The life expectancy at birth in Armenia (72 years for men and 78 years for women) was below the regional average of 78 years in 2015 (WHO Regional Office for Europe, 2018a).

In Armenia, cardiovascular diseases comprise the greatest burden of disease for both sexes, to which almost half (48%) of the total deaths are attributed (National Statistical Service, 2015).

### Tobacco use

Data from the 2016–2017 national WHO STEPwise approach to surveillance (STEPS) survey indicate that 28% of the Armenian population 18–69 years old currently smoke, almost all of whom smoke daily (WHO, 2017d). Only 2% of adult women smoke versus 52% of men. Tobacco use remains a problem in Armenia, even though the smoking prevalence for both sexes has decreased slightly since 2012 (WHO Regional Office for Europe, 2016). Smokeless tobacco use is low (<1%).

Compared with other countries in the WHO European Region, Armenia has a low percentage of young smokers. According to Armenia's health system performance assessment, 15% of 15- to 19-year-old boys and 0.4% of 15- to 19-year-old girls smoke daily, but these numbers increase with age (National Institute of Health, 2016). The mean age of initiation of smoking is 18 years, which might be related to the start of the national service for men. However, the national Health Behaviour in School-aged Children survey for Armenia reports a drastic increase in tobacco use among boys 15–17 years old and a positive image of smoking among adolescents and a belief in the benefits of smoking (helps in relaxing, controlling weight, improving mood or work efficiency) (Arabkir Medical Centre, 2016).

Exposure to second-hand smoke is high in Armenia. In the 30 days before the STEPS survey, 54% of women and 58% of men were exposed to second-hand smoke at home, and 21% of women and 32% of men were exposed to second-hand smoke in the workplace (Andreasyan et al., 2018). Further, a recent study estimates that more than 70% of pregnant women in Armenia are exposed to daily second-hand smoke (Reece et al., 2018).

Based on the number of adult smokers in Armenia, which was 591 000 in 2017, WHO estimated that more than half would die prematurely in the absence of stronger policies, projecting 295 500 premature deaths attributable to smoking (WHO Regional Office for Europe, 2017c).

Box 1 summarizes key facts.

#### Box 1. Tobacco snapshot

**Tobacco use** is of major concern, since 52% of Armenian men smoke, almost all every day. The smoking prevalence is significantly higher among men than women.

**Attributable NCDs** include multiple forms of cancer (most commonly lung, oral cavity, larynx, oesophagus, stomach, pancreas, kidney, bladder and breast); ischaemic heart disease, stroke and other cardiovascular and circulatory diseases; chronic obstructive pulmonary disease and pneumoconiosis; and peptic ulcer disease, diabetes, cataract, macular degeneration and rheumatoid arthritis.

<sup>4</sup> Age-standardized overall premature mortality rate (from 30 to under 70 years) for four major NCDs: cardiovascular diseases, cancer, diabetes and chronic respiratory diseases.

## Harmful use of alcohol

The total alcohol consumption per capita per year was 5.5 litres in 2016 and has not decreased substantially since 2010 (5.6 litres) (WHO, 2018a). Although alcohol consumption in Armenia is not exceptionally high, the 2016 STEPS survey shows that 46% of men and 22% of women are current alcohol users, indicating that they have had a drink in the past month (WHO, 2017d).

About 6% of the general population indulge in heavy episodic (binge) drinking,<sup>5</sup> more commonly men (11%) than women (0.1%), according to the 2016 STEPS survey. However, when other sources of data were used to adjust for the underestimation of self-reported alcohol consumption (using supply-based sources of data for example), binge drinking appears to be higher among current users.

According to the 2013–2014 Health Behaviour in School-aged Children study, 16% of boys and 6% of girls 11 years old drink alcohol at least once a week – the highest percentage among all 44 countries where the study has been carried out (Arabkir Medical Centre, 2016). Among 11-year-olds, 7% of boys and 2% of girls had been drunk on at least two occasions; for 15-year-olds, the equivalent figures are 19% of boys and 4% of girls.

In 2016, deaths from cirrhosis of the liver comprised 69% of all liver diseases, with 5% from alcoholic cirrhosis, and 26% of male deaths from road crash injury were attributable to alcohol (WHO, 2018a); for females, these were 35% and 19%, respectively.

Box 2 summarizes key facts.

## Physical inactivity

According to the 2016–2017 STEPS survey, 21% of adults 18–69 years old do not meet the WHO recommendations of at least 150 minutes of moderate-intensity physical activity per week (WHO, 2017d). Almost four fifths (78%) of adults, especially women (89%), do not engage in vigorous physical activity (WHO, 2017d). Half (51%) of the total physical activity is transport-related, 44% is work-related and 5% is recreational (Andreasyan et al., 2018).

Many adolescents in Armenia fail to meet the minimum recommended level of physical activity: 30% of 11- and 13-year-old boys and 26% of 15- and 17-year-old boys are physically active at least one hour per day, according to the latest national Health Behaviour in School-aged Children survey for Armenia (Arabkir Medical Centre, 2016). According to WHO recommendations, 5- to 17-year-old children should be engaged in moderate-to-vigorous-intensity physical activity for at least 60 minutes per day.

Box 3 summarizes key facts.

## Salt

WHO recommends that salt consumption not exceed 5 g per day (equivalent to  $\leq 2$  g of sodium per day). However, salt consumption in Armenia is about twice the recommended daily allowance. Data from a 2010

### Box 2. Alcohol snapshot

**Alcohol use** is slowly rising in Armenia, has not decreased substantially since 2010 and is more than twice as high among men than among women. Half of male drinkers binge. Alcohol consumption among youth is of special concern.

**Attributable NCDs** include multiple forms of cancer, pancreatitis, epilepsy, diabetes, cirrhosis, ischaemic heart disease, stroke and other cardiovascular and circulatory diseases.

### Box 3. Physical inactivity snapshot

**Activity levels** indicate that one fifth of adults are insufficiently active. Half of physical activity is related to transport and two fifths is related to work.

**Attributable NCDs** include coronary heart disease, type 2 diabetes and breast and colon cancer (Lee et al., 2012).

<sup>5</sup> Consumed at least 60 grams or more of pure alcohol on at least one occasion in the past 30 days.

cross-country review estimated the salt intake to be 12.3 g per day (equivalent to sodium intake of 4.9 g per day) among people 20 years and older (Powles et al., 2013). The 2016–2017 STEPS survey estimates that people 18–69 years old consume on average 9.8 grams of salt daily (11.0 g for men and 8.4 g for women) (Andreasyan et al., 2018). A 24-hour urinary sodium excretion survey, using gold-standard methods, has not been carried out in Armenia.

The 2016–2017 STEPS survey data show that 35% of adults always or often add salt to their food when eating, and 71% do so when preparing meals at home (Andreasyan et al., 2018).

In 2010, 26% of cardiovascular deaths among people 20–69 years old were attributed to salt consumption exceeding 5 g per day (>2 g of sodium per day) (Mozaffarian et al., 2014).

Box 4 summarizes key facts.

## Metabolic risk factors

High levels of metabolic risk factors – such as raised blood pressure, raised body mass index (BMI) and raised blood lipid levels – significantly increase the risk of having a cardiovascular event. In Armenia, according to the physical measurements carried out as part of the STEPS survey, 48% of adults are overweight (BMI  $\geq 25$  kg/m<sup>2</sup>) and 20% are obese (BMI  $\geq 30$  kg/m<sup>2</sup>) (Andreasyan et al., 2018). For adults 18–69 years old, the prevalence of raised blood pressure<sup>6</sup> is 38%, the prevalence of raised total cholesterol<sup>7</sup> is 24% and the prevalence of raised blood sugar or diabetes<sup>8</sup> is 6%. Men and women do not appear to differ significantly in the prevalence of these risk factors (Andreasyan et al., 2018). Table 1 shows the prevalence of these risk factors by age and sex.

**Table 1. Crude prevalence of metabolic risk factors among adults by age and sex**

Factor	Men		Women	
	18–44 years	45–69 years	18–44 years	45–69 years
Raised blood pressure	25%	64%	18%	66%
Raised total cholesterol	17%	36%	12%	47%
Raised blood sugar	5%	10%	2%	9%

Source: Andreasyan et al. (2018).

Although 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: sex, age, blood pressure, cholesterol, smoking status and whether or not they have diabetes (WHO, 2016a). The prevalence of high cardiovascular risk among adults in Armenia can be estimated from the 2016 survey according to the presence of risk factors or history of cardiovascular disease or diabetes (Andreasyan et al., 2018). These data indicate that 17% of people 40–69 years old have a probability of 30% or higher of having a fatal or nonfatal cardiovascular event within 10 years; this rises with age, but the sexes do not differ significantly (Table 2).

<sup>6</sup> Systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg or currently taking medication for raised blood pressure.

<sup>7</sup> Raised total cholesterol  $\geq 5.0$  mmol/L or  $\geq 190$  mg/dL or currently taking medication for raised cholesterol.

<sup>8</sup> Raised blood glucose (defined as either plasma venous value of  $\geq 7.0$  mmol/L (126 mg/dL) or capillary whole blood value of  $\geq 6.1$  mmol/L (110 mg/dL)) or currently taking medication for diabetes

### Box 4. Salt snapshot

**Salt consumption** is estimated to be about twice the WHO recommendation.

Two thirds of adults add salt when cooking and one third add salt to food before eating it.

**Attributable NCDs** include stomach cancer and increased risk of ischaemic heart disease, stroke and other cardiovascular and circulatory diseases due to hypertension.

**The proportion of cardiovascular deaths attributable to high salt intake is 26%.**

**Table 2. Crude prevalence of high cardiovascular risk among people 40–69 years old by age and sex**

Factor	Men		Women	
	40–54 years	55–69 years	40–54 years	55–69 years
10-year cardiovascular risk $\geq$ 30% or with current cardiovascular disease	13%	22%	14%	19%

Source: Andreyan et al. (2018).

### 3. Policies and treatments to reduce the burden of NCDs

The Ministry of Health in Armenia has taken important steps to create appropriate policy and legislative frameworks to reduce the NCD burden and promote health. The Government of Armenia has adopted several integrated strategies and action plans related to NCDs and their prevention, including the Strategic Programme for the Prevention and Control of NCDs for the years 2016–2020 and the related Action Plan and the Strategy for Promoting Healthy Lifestyles for the years 2016–2020 and the related Action Plan. There are also strategies that target specific NCDs, such as the Strategy for Preventing Cardiovascular Diseases for 2012–2018 and the related Action Plan. The United Nations Development Assistance Framework also includes a target related to NCDs. However, population-level prevention has not made significant progress (WHO Regional Office for Europe, 2016). An intersectoral body gathering all relevant stakeholders was also formally set up in 2015 under the authority of the Prime Minister but has not been active.

Armenia is currently in the process of updating its national development strategy, to align it fully with the Sustainable Development Goals and with the renewed political vision for the country. Although the specific goals and targets of this strategy are still being developed, the government has already communicated its vision of inclusive growth and human capital – health, education and equality – being given particular emphasis. Within this framework, assessing the economic burden of NCDs, highlighting areas and processes that need to be strengthened to address it and developing policy recommendations and costed action plans are particularly timely.

As highlighted in Section 1, WHO has published a menu of policy options and interventions to prevent and treat NCDs (WHO, 2013, 2017b, c). The following sections review current national efforts to prevent and control NCDs against these options to identify areas of strength and areas that need to be further developed or scaled up to achieve full coverage. The assessment draws on the findings of the institutional and context analysis and on relevant published reports from WHO and other bodies. It especially focuses on the packages of policy and clinical interventions (tobacco, alcohol, physical activity and nutrition policies and management of cardiovascular disease and diabetes) on which the economic analysis focuses.

#### Tobacco

Armenia ratified the WHO Framework Convention on Tobacco in November 2004 (WHO, 2017e) but has yet to fully implement several core demand-reduction measures related to the Convention (Table 3). However, the government has made strengthening tobacco control a priority. The Ministry of Health developed and the government adopted the Tobacco Control Strategy for the years 2017–2020 and the related Action Plan. The government is also revising the 2018 tax code to accelerate tobacco tax increases in 2019. Further, in 2018, the Ministry of Health initiated the development of a legislative package that aims at ensuring that current legislation complies with the requirements of the international convention ratified by Armenia. In particular, unlike the current law, a law on the reduction and prevention of health damage caused by tobacco products and their substitutes has been drafted with new wording. At the same time, draft amendments to the related draft

laws were adopted, such as laws amending the Law on Local Self-government, the Law on Advertising, the Law on Local Taxes and Payments and the Code on Administrative Offences. In accordance with the Tobacco Control Strategy, the new law would expand bans on indoor smoking in public places, as well as bans on tobacco advertising, sponsorship and promotion. The law would also strengthen enforcement mechanisms.

The law will be submitted to Parliament in 2019, and passage of the law would be a strong step towards improving the health and longevity of Armenians. The new legislative package would simultaneously bring Armenia closer to meeting its national and international obligations, including under the WHO Framework Convention on Tobacco Control, the Comprehensive and Enhanced Partnership Agreement<sup>9</sup> between the European Union and Armenia and the Tobacco Control Strategy for the years 2017–2020 and the related Action Plan.

Concerted coordination between government sectors and other actors underpins effective tobacco control, especially because many of the benefits and activities of tobacco control are realized in domains outside of health. This is why parties to the WHO Framework Convention on Tobacco have an obligation under Article 5.2(a) of the Convention to establish or reinforce and finance a national multisectoral coordinating mechanism and or focal points for tobacco control.<sup>10</sup> Armenia has a dedicated tobacco control focal point and programme situated under the National Institute of Health, but it has not instituted a multisectoral coordination mechanism.

Although there used to be a coalition of nongovernmental organizations (NGOs) related to tobacco control under the public health department of the American University of Armenia, NGO-led activities have slowed and or shifted to other work because of lack of funding. Increased international cooperation and stronger coordination between the government and NGOs through the national tobacco control programme would enhance the tobacco control response.

Table 3 summarizes Armenia’s current tobacco control measures in the MPOWER intervention package, as reported in the *WHO report on the global tobacco epidemic* (WHO, 2017f) and supplemented by the institutional and context analysis. The table indicates that tobacco control measures under the WHO Framework Convention on Tobacco require strengthening, especially regarding enforcing advertising bans, the taxation and affordability of cigarettes and smoke-free environments.

**Table 3. Current state of tobacco control measures in Armenia**

Policy name	Current state of implementation
Monitor tobacco use and prevention policies	Recent, representative and periodic data is available for adults and young people, such as from the 2016–2017 STEPS survey and a larger health system performance assessment survey (WHO Regional Office for Europe, 2016).
Protect people from tobacco smoke	The WHO report assessed that only three of the eight categories <sup>a</sup> of public places were completely <sup>b</sup> smoke-free (WHO, 2017f). Places that are not yet completely smoke-free include government facilities, indoor offices and workplaces, cafés and restaurants, public transport and other indoor public places. Smoking violations incur fines for the patron but not for the establishment (WHO Regional Office for Europe, 2017d). No funds are dedicated for enforcement, and no system requires investigating citizens’ complaints.

<sup>9</sup> Signed in March 2017, Articles 28 and 92 of the Comprehensive and Enhanced Partnership Agreement mention implementation of the WHO Framework Convention on Tobacco Control as necessary to fight the smuggling of excisable products and to prevent and control NCDs.

<sup>10</sup> A WHO Framework Convention on Tobacco Control Article 5.2(a) toolkit to assist parties in institutionalizing effective national, multisectoral coordinating mechanisms is available at: <http://www.who.int/ftc/implementation/cooperation/5-2-toolkit/en>.

**Table 3. (continued)**

Policy name	Current state of implementation
Offer to help to quit tobacco use	Nicotine replacement therapy is legally sold in pharmacies without prescription but without public subsidy. Tobacco-cessation services are available in some health clinics with some public subsidy (WHO, 2017f). There is mandatory training of primary health care workers on lifestyle counselling and training of trainers in brief interventions on tobacco control. Some tobacco-cessation counselling or treatment may be provided during preventive health-care check-ups (WHO Regional Office for Europe, 2016). The STEPS survey found that 10% of respondents 18–69 years old (17% of men and 2% of women) had been advised by a doctor or health worker to quit using tobacco or to not start (Andreasyan et al., 2018). There is no toll-free telephone quitline.
Warn about the dangers of tobacco	Since December 2016, health warnings on tobacco packages are mandated to cover 50% of the front and rear of the principal display area and include a photograph or graphic warning (WHO, 2017f). There is no data on anti-tobacco mass-media campaigns.
Enforce bans on tobacco advertising, promotion and sponsorship	Through a law adopted in 2006, bans exist on national and international <sup>c</sup> television, radio, billboards and online advertising but not in print media (WHO Regional Office for Europe, 2017d). Free distribution of tobacco products is banned, but all other forms of indirect advertising, such as through promotional discounts and sponsored events, are legal.
Raise taxes on tobacco	The total taxes levied on the most sold brand of cigarettes comprised 35% of the retail price in 2016, of which 18.3% was specific excise tax and 16.7% was value-added tax (WHO, 2017f). The specific value-added component is not automatically adjusted for inflation, so cigarettes were not less affordable in 2016 than in 2008. According to WHO recommendations, the amount of total tax per pack should comprise at least 75% of the retail price.

<sup>a</sup>Legislation was assessed to determine whether smoke-free laws provided for a complete indoor smoke-free environment at all times, in all the facilities of each of the following eight categories of place: health-care facilities; educational facilities other than universities; universities; government facilities; indoor offices and workplaces not considered in any other category; restaurants or facilities that serve mostly food; cafés, pubs and bars or facilities that serve mostly beverages; and public transport (WHO, 2017a).

<sup>b</sup>“Complete” means that smoking is not permitted, with no exceptions allowed.

<sup>c</sup>The law does not explicitly address cross-border advertising. However, since advertising is banned on all television and radio, it is interpreted that the ban covers both domestic and international levels.

Implementing a combined package of tobacco control policies in accordance with the Framework Convention on Tobacco Control would be expected to reduce the smoking prevalence by 42% within five years (WHO Regional Office for Europe, 2017a). Most of the policy interventions listed in Table 3 are also WHO best buys (WHO, 2017a): that is, effective interventions with cost–effectiveness ratios  $\leq 100$  international dollars per disability-adjusted life-year (DALY) averted in low- and middle-income countries. This list largely corresponds with those listed in the OneHealth Tool that were modelled here as part of the return on investment analysis:

- monitor tobacco use and prevention policies
- protect people from tobacco smoke
- offer to help quit tobacco use: mCessation
- warn about danger: warning labels
- warn about danger: mass-media campaign
- enforce bans on tobacco advertising
- enforce restrictions on youth access

- raise taxes on tobacco
- plain packaging of tobacco products.

## Alcohol

The global strategy and European action plan to reduce the harmful use of alcohol and the updated Appendix 3 of WHO’s Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 list core policy options for alcohol control (WHO, 2010, 2017a; WHO Regional Office for Europe, 2012).

These are reproduced in Table 4, alongside some of the achievements in reducing alcohol consumption in Armenia. This assessment draws on various sources.

**Table 4. Current state of alcohol control interventions in Armenia**

Policy	Policy options	Current state of implementation
Taxation	Increase excise taxes on alcoholic beverages	The tax rate on alcoholic beverages is 20% of the retail price. Alcohol taxation follows the price index but is not related to alcohol content. A special tax of 10% applies to imported alcoholic beverages, but no special taxes exist on products attractive to young people. The country scored “limited” on taxation in one WHO report (WHO Regional Office for Europe, 2016), and “partly achieved” in another (WHO Regional Office for Europe, 2017b).
Advertising	Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media)	Regulations on the content and volume of alcohol marketing are in place but are only scored as “limited” in one WHO report (WHO Regional Office for Europe, 2016), and “partly achieved” in another (WHO Regional Office for Europe, 2017b). Advertising for beer, wine and spirits is restricted on national television, radio and billboards; however, there is no restriction on external advertising. Alcohol marketing is banned on television, but not all day and product placement is allowed. Indirect advertising through sports sponsorship is allowed.
Availability	Enact and enforce restrictions on the physical availability of retailed alcohol (via reduced hours of sale)	Armenia has legislation that sets special restrictions and regulations on the sale of alcohol in government and educational institutions. Otherwise, no regulations exist for on- and off-premise sales of alcoholic beverages regarding hours and locations of sales, other than some restrictions for young people for a few hours in the evening. The minimum age for sale of all alcohol products is 18 years and is not well enforced. The restrictions in place were scored as “limited” in one WHO report, and the enforcement of minimum purchase age was scored as “moderate” (WHO Regional Office for Europe, 2016). Another report considered the restrictions in this area as “partly achieved” (WHO Regional Office for Europe, 2017b).

**Table 4. (continued)**

Policy	Policy options	Current state of implementation
Drink–driving	Enact and enforce drink–driving laws and blood alcohol concentration limits via sobriety checkpoints	The maximum permissible level of blood alcohol content allowed while driving is 0.4 g/L according to current legislation, and blood alcohol concentration limits do not differ between novice and professional drivers. The police are planning to develop such proposals for legislative change, but it has not been done yet. This area was scored as “moderate” in a WHO report (WHO Regional Office for Europe, 2016).
Brief interventions	Provide brief psychosocial intervention for people with hazardous and harmful alcohol use	There is mandatory training of primary health care workers on lifestyle counselling.

Within Table 4, the first three policy interventions listed are also WHO best buys; the fourth and fifth are WHO effective interventions, with cost–effectiveness ratios >100 international dollars per DALY averted in low- and middle-income countries. These largely correspond with those listed within the OneHealth Tool that were modelled in the investment case as part of the return on investment analysis:

- enforce restrictions on the availability of retail alcohol
- enforce restrictions on alcohol advertising
- enforce drink–driving laws (sobriety checkpoints)
- raise taxes on alcoholic beverages.

## Physical inactivity

The updated Appendix 3 of WHO’s Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 lists several policy options for improving physical activity levels (WHO, 2017c). These are reproduced in Table 5, alongside some of the achievements in increasing physical activity in Armenia.

**Table 5. Current state of physical activity interventions in Armenia**

Policy	Policy options	Current state of implementation
Knowledge	Implementation of public awareness and motivational communications for physical activity, including mass-media campaigns for physical activity behaviour	No national public awareness campaign on physical activity was implemented between 2013 and 2017. This area was scored as “not achieved” in a recent WHO report (WHO, 2017b). The Mayor of Yerevan has been promoting public awareness of physical activity by carrying out promotional activities and participating in a cycling marathon.

**Table 5. (continued)**

Policy	Policy options	Current state of implementation
Health system	Provision of physical activity counselling and referral as part of routine primary health care services through a brief intervention	There is still room for improving awareness-raising about physical activity and diet in primary care. There has been no workforce development in this area, which has therefore been scored as “limited” in a WHO report (WHO Regional Office for Europe, 2016). Lifestyle counselling is part of the terms of reference of primary health care providers, but in practice they are overwhelmed with paperwork and have little time for this.
Environment	<p>Ensuring that macro-level urban design incorporates the core elements of residential density, connected street networks that include sidewalks, easy access to a diversity of destinations and access to public transport</p> <p>Provision of convenient and safe access to high-quality public open space and adequate infrastructure to support walking and cycling</p>	Bicycles are popular among young people, but cycling is deemed dangerous since streets are narrow and cycle lanes do not exist apart from a few painted lines in the road. No cities in Armenia participate in the WHO European Healthy Cities Network, and Armenia does not have a national healthy cities network. In Yerevan, exercise equipment has been placed in a few public spaces as part of their renovation of housing.
Setting	<p>Implementation of a whole-of-school programme that includes high-quality physical education, availability of adequate facilities and programmes to support physical activity for all children</p> <p>Implementation of multicomponent workplace physical activity programmes</p>	<p>A 40-minute exercise slot is provided in the school curriculum, to take place 2–3 times per week. There is a health hour lesson in schools for promoting knowledge and skills on healthy lifestyles. A few schools have been piloting health-promoting school policies.</p> <p>The state of workplace interventions is generally unknown.</p>
Promotion	Promotion of physical activity through organized sport groups and clubs, programmes and events	Some gymnasiums are being built, but these are private and not easily affordable for the general population. Popular sports are wrestling, boxing and chess rather than team sports. Some sports activities are provided through after-school activities but are not free of charge (although low cost).

The OneHealth Tool can model the following policy change as part of the return on investment analysis:

- public awareness campaigning on physical activity.

### High consumption of salt, *trans*-fat and sugar

Salt-reduction policies have been assessed overall as not achieved (WHO, 2017b). Table 6 compares Armenia’s current state against SHAKE, a set of WHO measures that outline steps countries can take to reduce salt intake (surveillance; harness industry; adopt standards for labelling and marketing; knowledge; environment) (WHO, 2016b).

**Table 6. Current state of policies to reduce salt consumption in Armenia**

Policy	Description <sup>a</sup>	Current state of implementation
Surveillance: measure and monitor salt use	Measure and monitor population salt consumption patterns and the sodium content of food	A 24-hour urinary sodium excretion survey (gold standard) has not been carried out, but salt consumption was estimated using urine spot tests as part of the 2016–2017 STEPS survey (Andreasyan et al., 2018) (see details in Section 2). The sodium content of food is not routinely monitored.
Harness industry: promote reformulation of foods and meals to contain less salt	Set target levels for the amount of salt in foods and meals and implement strategies to promote reformulation	There is a stated intention to promote salt reduction and to work with industry on product reformulation. Industry has been asked to review salt levels. It is within the prerogative of the Ministry of Economic Development and Investments to approve standards and regulations.
Adopt standards for labelling and marketing: implement standards for effective and accurate labelling and marketing of food	Adopt front-of-pack nutrition labelling systems (such as colour-coded for salt content level and high-salt warning)	Food labelling is “in the pipeline”.
Knowledge: educate and communicate to empower individuals to eat less salt	Implement integrated education and communication strategies to raise awareness about the health risks and dietary sources of salt to change behaviour	Public awareness programmes about healthy eating are limited, with a few television shows talking about healthy eating and increasing health messages.
Environment: support settings to promote healthy eating	Implement multicomponent salt-reduction strategies in community settings (such as schools, workplaces and hospitals)	There is no school menu oversight, especially in regions. The World Food Programme started a feeding programme for primary school children.

<sup>a</sup>The information in the description column is derived from the SHAKE technical package for salt reduction (WHO, 2016a).

Four of these interventions are assessed as WHO best buys (reformulation; environment; knowledge; and labelling). These policy interventions correspond with those listed within the OneHealth Tool that can be modelled as part of the return on investment analysis:

- surveillance
- harness industry for reformulation
- adopt standards: front-of-pack labelling
- adopt standards: strategies to combat misleading marketing

- knowledge: education and communication
- environment: salt-reduction strategies in community-based eating spaces.

In addition, the updated Appendix 3 to WHO’s Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 (WHO, 2017c) contains two effective interventions (with cost–effectiveness ratios >100 international dollars per DALY averted in low- and middle-income countries) on *trans*-fat and sugar, respectively, and Table 7 shows the current state of implementation for these.

**Table 7. Current state of policies for *trans*-fat and sugar in Armenia**

Policy	Description	Current state of implementation
		No national policies that limit or eliminate industrially produced <i>trans</i> -fat in the food supply are in place. There is no evidence that intake of <i>trans</i> -fat have been reduced. One WHO report scored interventions in this area as “limited” (WHO Regional Office for Europe, 2016), and another scored them as “not achieved” (WHO Regional Office for Europe, 2017b).
<i>Trans</i> -fat	Eliminate industrial <i>trans</i> -fat by developing legislation to ban their use in the food chain	As of 1 January 2018, a new standard for the content of industrial <i>trans</i> -fatty acids in oil and fat products came into force in the Russian Federation and countries of the Eurasian Economic Union (TR CU 024/2011: Technical regulations for oil and fat products, approved by the decision of the Customs Union Commission of 09.12.2011, No. 883). The industrial <i>trans</i> -fatty acid content in hard margarines, soft and liquid margarines, milk fat substitutes and fats for special purposes must not exceed 2.0% of the total fat content of the food product. It is not clear to what extent this has been implemented in Armenia.
Sugar	Reduce sugar consumption through effective taxation on sugar-sweetened beverages	No action has been taken to reduce free sugar intake. A tax on sugar-sweetened beverages is being prepared.

Since the OneHealth Tool cannot yet calculate the impact of interventions on fat and sugar, these are not included in the return on investment analysis.

### Clinical interventions for cardiovascular diseases and diabetes

The updated Appendix 3 of WHO’s Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 lists multiple clinical interventions for cardiovascular diseases and diabetes (WHO, 2017c). Table 8 reproduces a selection of those most relevant to this analysis alongside an assessment of the situation in Armenia.

**Table 8. Current state of clinical policies to reduce cardiovascular disease risk in Armenia**

Policy	Description	Current state of implementation
Cardiovascular risk assessment and management	Screening for risk of cardiovascular disease and diabetes	A national screening programme for cardiovascular disease risk factors is in place, and doctors at the primary health-care level are trained to calculate cardiovascular disease risk. A programme to increase the effective detection of hypertension exists, but the hypertension detection is still poor and not sufficiently controlled. According to the STEPS survey, only 68% of adults report that they ever had their blood pressure measured, significantly fewer men than women (men 61% [95% confidence interval 55–66%]; women 77% [95% confidence interval 74–80%]). Only 35% of adults identified with raised blood pressure <sup>1</sup> have been diagnosed with hypertension, <sup>2</sup> which seems to be significantly lower for men than women (men 28% [95% confidence interval 21–34%]; women 40% [95% confidence interval 36–45%]) (Andreasyan et al., 2018).
	Provision of drug therapy (including glycaemic control for diabetes and control of hypertension using a total risk approach) and counselling to individuals who have had a heart attack or stroke and to people with high risk ( $\geq 30\%$ ) of a fatal or nonfatal cardiovascular event in the next 10 years	Individual doctors have established a diabetes register, but the diabetes detection rate against the estimated prevalence is not monitored. There is no monitoring of hypertension management of people with diabetes (WHO Regional Office for Europe, 2016). According to another survey, of those who were prescribed antihypertensive drugs, 80% did not take their medication during the 24 hours before the survey (National Institute of Health, 2016). According to the STEPS survey, of those diagnosed with hypertension, <sup>3</sup> only 64% receive treatment <sup>4</sup> (men 60% [95% confidence interval 46–74]; women 66% [95% confidence interval 59–72%]), and only 16% of those diagnosed are currently controlled <sup>5</sup> (men 16% [95% confidence interval 5–27%]; women 16% [95% confidence interval 10–22%]) (Andreasyan et al., 2018). In fact, the mean blood pressure of those diagnosed with hypertension is 183/125, well above target levels. Overall, primary health care has a limited scope in Armenia: the proportion of primary health care centres offering cardiovascular disease risk stratification is between 25% and 50% (WHO, 2018b). The STEPS survey found that 43% of high-risk individuals received drug therapy and counselling to prevent heart attacks and strokes (Andreasyan et al., 2018).

**Table 8. (continued)**

Policy	Description	Current state of implementation
Acute myocardial infarction and stroke	Treatment of new cases of acute myocardial infarction with either acetylsalicylic acid or acetylsalicylic acid and clopidogrel or thrombolysis or primary percutaneous coronary interventions	According to the WHO NCD Progress Monitor 2018, clinical practice guidelines for the four main diseases, including cardiovascular diseases, are in place and being implemented. There is no routine monitoring of the quality of care. Achievement in the treatment of acute myocardial infarction and stroke is scored as “moderate” in a WHO report (WHO Regional Office for Europe, 2016).
	Treatment of acute ischaemic stroke with intravenous thrombolytic therapy	
	Treatment of people established ischaemic heart disease and after myocardial infarction	According to the STEPS survey (Andreasyan et al., 2018), 9% of adults have ever had a heart attack or chest pain from heart disease (angina) or a stroke (cerebrovascular accident or incident). Family doctors assess cardiovascular disease risk factors after stroke. The proportion of those taking aspirin or statins to prevent or treat heart disease is relatively low (12% and 3%, respectively, for people 45–69 years old) (Andreasyan et al., 2018). Independent of social group, following acute myocardial infarction or stroke, people are offered medication free of charge for two months. After two months, this continues if disability status is assigned.
Diabetes	Glycaemic control	People with diabetes do not receive organized education on physical activity and diet. Diabetes health schools do not exist. A national diabetes registry does not exist either, so monitoring coverage of services for people with diabetes and outcomes is difficult. According to the STEPS survey (Andreasyan et al., 2018), 61% of men and 50% of women diagnosed with diabetes were taking prescribed medication for it, and 16% of men and 22% of women were taking insulin. Diabetes drugs are free of charge for people with diabetes, regardless of social group. People with diabetes have to pay for glycated haemoglobin tests, and the uptake is estimated to be low (WHO Regional Office for Europe, 2016).
	Diabetic retinopathy screening and foot care to avoid complications	Although their uptake and quality are not monitored, eye examinations are offered annually. Routine foot examinations are apparently offered, and performance indicators exist in bonus payments.

<sup>1</sup> Systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg or currently taking medication for raised blood pressure.

<sup>2</sup> Told by a doctor or other health worker that they have raised blood pressure or hypertension.

<sup>3</sup> Told by a doctor or other health worker that they have raised blood pressure or hypertension.

<sup>4</sup> Treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker in the past two weeks.

<sup>5</sup> Physical measurement of blood pressure is  $< 140/90$  mmHg.

The OneHealth Tool is able to model the following package of interventions as part of the return on investment analysis:

- screening for the risk of cardiovascular diseases or diabetes
- treatment for those with high absolute risk of cardiovascular diseases or diabetes (>30%)
- treatment of new cases of acute myocardial infarction with aspirin
- treatment of people with established ischaemic heart disease and after myocardial infarction
- treatment for people with established cerebrovascular disease and after stroke
- standard glycaemic control
- intensive glycaemic control
- retinopathy screening and photocoagulation
- neuropathy screening and preventive foot care.

## Summary

The review of current NCD interventions at the policy and individual service levels described in this section indicated gaps in implementing the WHO-recommended cost-effective NCD preventive and clinical interventions and drew attention to areas that need to be strengthened and scaled up to achieve 100% coverage. These findings were discussed with the Ministry of Health, which estimated the current level of coverage based on the assessment above, as summarized in Table 9.

**Table 9. Estimated current coverage of NCD interventions to be costed within the OneHealth Tool**

<b>Tobacco</b>	
Monitor tobacco use and prevention policies	100%
Protect people from tobacco smoke	50%
Offer to help quit tobacco use: mCessation	50%
Warn about danger: warning labels	100%
Warn about danger: mass-media campaign	25%
Enforce bans on tobacco advertising	50%
Enforce youth access restriction	50%
Raise taxes on tobacco	25%
Plain packaging of tobacco products	0%
<b>Hazardous alcohol use</b>	
Enforce restrictions on availability of retail alcohol	50%
Enforce restrictions on alcohol advertising	10%
Enforce drink-driving laws (sobriety checkpoints)	50%
Raise taxes on alcoholic beverages	25%
<b>Physical activity</b>	
Public awareness campaigning on physical activity	25%
<b>Salt</b>	
Surveillance	75%

**Table 9. (continued)**

Harness industry for reformulation	0%
Adopt standards: front-of-pack labelling	0%
Adopt standards: strategies to combat misleading marketing	0%
Knowledge: education and communication	25%
Environment: salt-reduction strategies in community-based eating spaces	0%
<b>Clinical interventions: cardiovascular diseases</b>	
Screening for risk of cardiovascular diseases and diabetes	75%
Treatment for those with high absolute risk of cardiovascular diseases and diabetes (>30%)	50%
Treatment of new cases of acute myocardial infarction with aspirin	75%
Treatment of cases with established ischaemic heart disease and post-myocardial infarction	75%
Treatment for those with established cerebrovascular disease and post-stroke	50%
<b>Clinical interventions: diabetes</b>	
Standard glycaemic control	75%
Retinopathy screening and photocoagulation	25%
Neuropathy screening and preventive foot care	25%

The authors estimated the coverage of policy interventions based on the assessment in Section 3, discussed with the national team during November 2018 and then adjusted.

## 4. Methods

A multiagency, multidisciplinary team comprising staff from WHO (headquarters, WHO Regional Office for Europe and WHO Country Office in Armenia), the United Nations Interagency Task Force on the Prevention and Control of Non-communicable Diseases, the United Nations Development Programme (UNDP) and the National Research Centre for Preventive Medicine and Center for Healthcare Quality Assessment and Control of the Ministry of Health of the Russian Federation undertook initial data collection and analysis in Armenia from 13 to 15 November 2018 to complete a three-tier economic NCD investment case, complemented by an institutional and context analysis. The team consisted of health economists, epidemiologists and social development and public health experts. Intensive follow-up work (described below) was undertaken as part of the methods for collecting and analysing data.

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

- calculating the economic burden of NCDs in terms of direct costs and indirect costs (absenteeism, presenteeism and premature death);
- costing interventions (clinical and policy interventions);
- assessing health impact; and
- return on investment analysis.

It also briefly describes the institutional and context analysis methods.

## Calculating the economic burden of NCDs

WHO and the United Nations Development Programme developed the model for calculating the economic burden of NCDs, which provides estimates of the current direct and indirect costs of NCDs in Armenia. The data used for the population by age and sex for the period 2018–2033 were modelled based on the population trends during 2011–2017. The details incorporated were incidence rates by age and sex for heart attack and stroke and prevalence by age and sex for diabetes, hypertension and chronic respiratory diseases (Andreasyan et al., 2018). The mortality rates by age and sex were applied for each condition. The model calculated projections for incidence, prevalence and mortality for diabetes, cardiovascular diseases and chronic respiratory diseases between 2018 and 2033, holding current rates constant.<sup>11</sup> These projections were summarized as total incidence, prevalence and mortality for both the entire population and the working-age population, defined as people 15–64 years old.

The following steps were carried out to calculate the economic costs.

- Total government health expenditure data and the share of total health expenditure on each NCD group (cardiovascular diseases, diabetes, cancer and respiratory diseases) are available in Armenia. The National Institute of Health presented these data for 2015–2016. Direct non-health-care costs comprised disability payments, which were calculated using the number of people who became disabled from diseases included in the analysis and annual payments to people with disabilities (448 022 dram per person per year).
- The annual value (in terms of economic output) of each full-time worker in Armenia was calculated. This is based on gross domestic product (GDP) per employed person, defined as the country's GDP (5.58 trillion dram in 2017) divided by its total employed labour force. Local data on the total labour force aged 16 years and older (1.76 million), the unemployment rate (17.8%) and the labour force participation rate (50.1%) were used to determine the total employed labour force for Armenia.
- Data were incorporated on the extent to which NCDs reduce worker productivity. From the academic literature (Anesetti-Rothermel & Sambamoorthi, 2011; Wang et al., 2003), rates were found to describe (1) the reduction in labour force participation from hypertension, stroke, acute myocardial infarction and diabetes; (2) the reduction in full-time hours worked because of absenteeism; and (3) the reduction in productivity because of presenteeism.
- The exact number of people with NCDs working in Armenia in 2017 was determined. Using the labour force participation, unemployment and mortality rates, the model began with people of working age with NCDs; subtracting those who chose not to participate in the labour force or were unemployed; subtracting those who could not participate in the labour force specifically because of their NCD; and, finally, subtracting those who had died. The result estimated the number of active workers with NCDs.
- The final steps were to calculate economic losses from premature deaths based on the numbers of workers who had died and would-be workers who could not participate in the labour force and to calculate the costs of absenteeism and presenteeism for surviving active workers with NCDs. The model applied the relevant productivity figures found in the second step to the populations determined in the third step and multiplied this by the GDP per employed person. This calculation resulted in the total indirect costs of each NCD.

## Calculating the costs of policy and clinical intervention

The costs of policy intervention were calculated using the WHO Costing Tool (WHO, 2012). The OneHealth Tool was used to calculate the costs of clinical interventions. This identifies, quantifies and values each resource required for the intervention as follows.

<sup>11</sup> The model estimates growth in prevalence, incidence and mortality from population growth only and not growth in disease rates.

- For each policy, the WHO Costing Tool or OneHealth Tool costs human resources, training, external meetings, mass-media campaigns (such as television and radio time and newspaper advertisements) and other miscellaneous equipment needed to enact policies and programmes.
- Each policy contains assumptions, set by WHO experts, about the quantity of input required to implement and enforce it – the WHO costing tool or OneHealth Tool estimates the quantity of resources needed at the national, regional and district levels; the unit costs for resource items are taken from the WHO-CHOICE database (Bertram et al., 2017; Stenberg, 2018).

## Return on investment

Return on investment is a performance measure used to evaluate the efficiency of health-care investment. It compares the magnitude and timing of benefits from health interventions directly with the magnitude and timing of investment costs. Return on investment is the ratio of the discounted (present) value of the benefits to the investment costs. Future costs and benefits are discounted, since a unit of currency in the future is worth less than a unit today because of the time value of money. Return on investment analysis, based on an Excel model developed by WHO for this analysis, provided estimates for the economic gains that accrue from investing in the set of cost-effective interventions identified during the visit. Table 9 lists the policy-based interventions included in this calculation.

The method used is the NCD return on investment model developed in 2015 for use by the UNDP/WHO Joint Programme on Governance of Noncommunicable Diseases using the OneHealth Tool and WHO Costing Tool. More detail on the use of the OneHealth Tool is available from the OneHealth Tool manual (Avenir Health, 2017) and is discussed in detail in a new guidance note for investment cases for preventing and controlling NCDs (WHO & UNDP, 2018).

To work out the overall impact of the set of interventions on GDP, productivity measures were assessed using the following steps.

Data on the amount by which NCDs reduce worker productivity were incorporated, as noted for the model on the economic burden of NCDs. Since interventions reduce the projected incidence of ischaemic heart disease and stroke, there is an associated increase in the number of healthy life-years of the population. Considering the increase in healthy life-years, GDP per employed person and the reduction in rates for absenteeism and presenteeism can determine the increase in GDP attributed to the value of the avoided absenteeism and presenteeism.

The increase in labour force participation caused by avoided deaths was calculated by considering the labour force participation rate in Armenia and the projected number of deaths avoided. Avoided mortality was monetized by multiplying by the GDP per worker, as outlined above.

The return on investment was calculated for the interventions listed in Table 9. These were selected based on the available data to ensure sufficient data for calculating the costs and health effects.

The projected economic gains from implementing interventions that are considered cost-effective were therefore the value of avoided presenteeism, the value of avoided absenteeism and the value of avoided mortality. The impact of an intervention, measured as the total increase in GDP, was calculated by combining the three types of gain.

The return on investment for Armenia was arrived at by comparing the impact (increase in GDP) of the interventions with the total costs of setting up and implementing the interventions. It was calculated using the net present value approach to future costs and economic gains, with 3% discounting.

## Institutional and context analysis

The institutional and context analysis component of the investment case involved the multiagency, multidisciplinary United Nations mission team meeting with various government sectors and other in-country stakeholders, including the United Nations Country Team, donors and development banks. Discussed at these meetings was how NCDs impact the national development agenda, the priorities of various sectors and stakeholders and how these actors could support a strengthened whole-of-government NCD response in Armenia, including implementing investment case findings. Specifically, from 13 to 15 November 2018, the mission team met bilaterally with representatives from the Ministry of Health, Ministry of Economic Development and Investments and Ministry of Labour and Social Affairs; the United Nations Country Team; and the World Bank. A round-table gathered the aforementioned representatives, participants from the Ministry of Education and Science, the Ministry of Sport and Youth Affairs, the Ministry of Justice, the National Statistical Service, the Embassy of the Russian Federation to Armenia and the United States Agency for International Development. The valuable insights gained from these discussions are incorporated throughout this report.

## 5. Results

This section assesses the economic burden of NCDs, summarizes the component parts of the return on investment analysis – including health benefits, economic benefits and total costs – and discusses the return on investment for each package of interventions.

### Annual economic burden

#### Direct costs

The estimate of the direct costs of the economic burden considered only government health-care expenditure. It does not include private out-of-pocket health-care expenditure, costs to third-party insurers and non-health-care costs such as transport.

Total government health expenditure for Armenia in 2017 was 87.9 billion dram. As noted above, the share of total health expenditure for each NCD group (cardiovascular diseases, diabetes, cancer and respiratory diseases) for 2015–2016 is known from the national health accounts. Assuming no changes to this breakdown, the annual spending on the four main groups of NCDs for 2017 is 55.8 billion dram (63% of total health expenditure): 35.9 billion dram (41% of total health expenditure) on cardiovascular diseases, 8.0 billion dram (9% of total health expenditure) on cancer, 9.4 billion dram (11% of total health expenditure) on chronic respiratory diseases; and 2.3 billion dram (3% of total health expenditure) on endocrine and metabolic diseases (largely diabetes) (Fig. 2).

#### Indirect costs

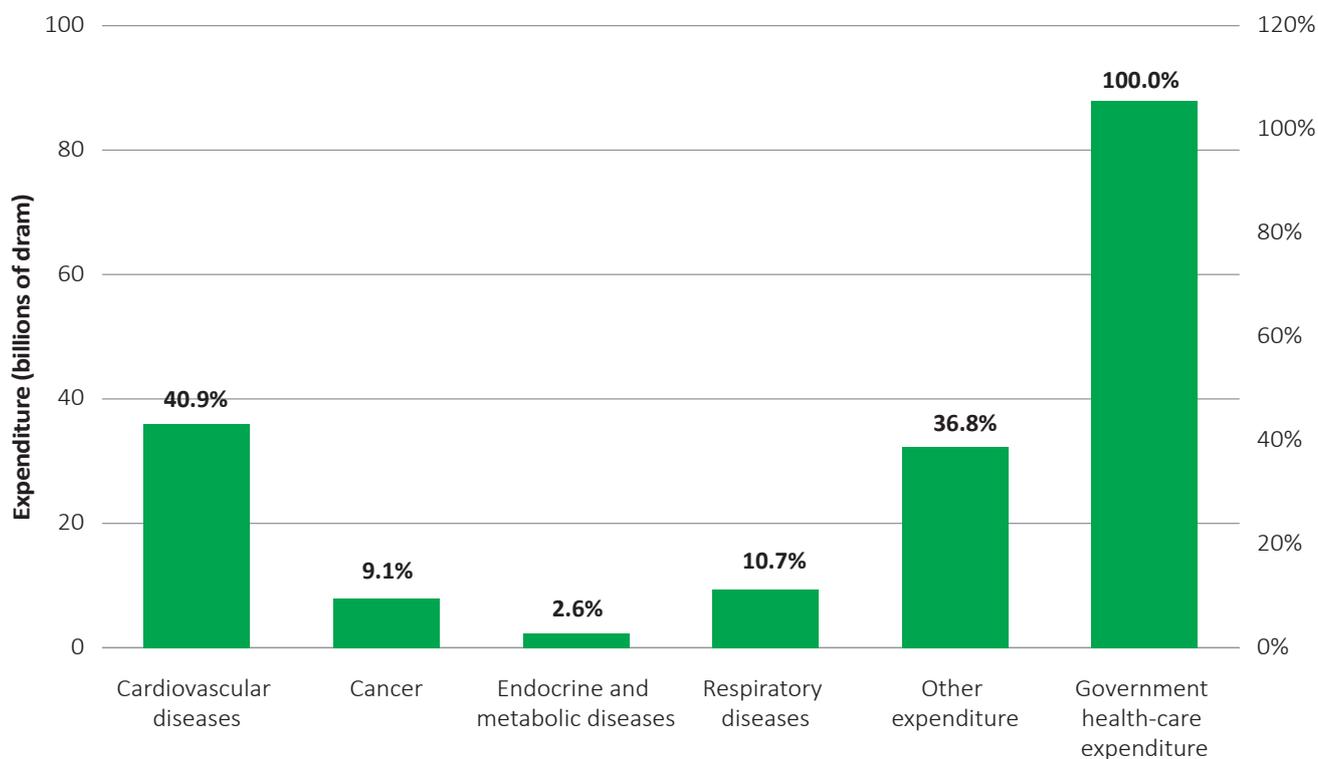
For Armenia, indirect economic losses caused by NCDs were calculated from reduced labour force participation, increased absenteeism and presenteeism and losses from premature death.

Indirect costs (losses from absenteeism, presenteeism and premature deaths) were calculated using the human capital method.

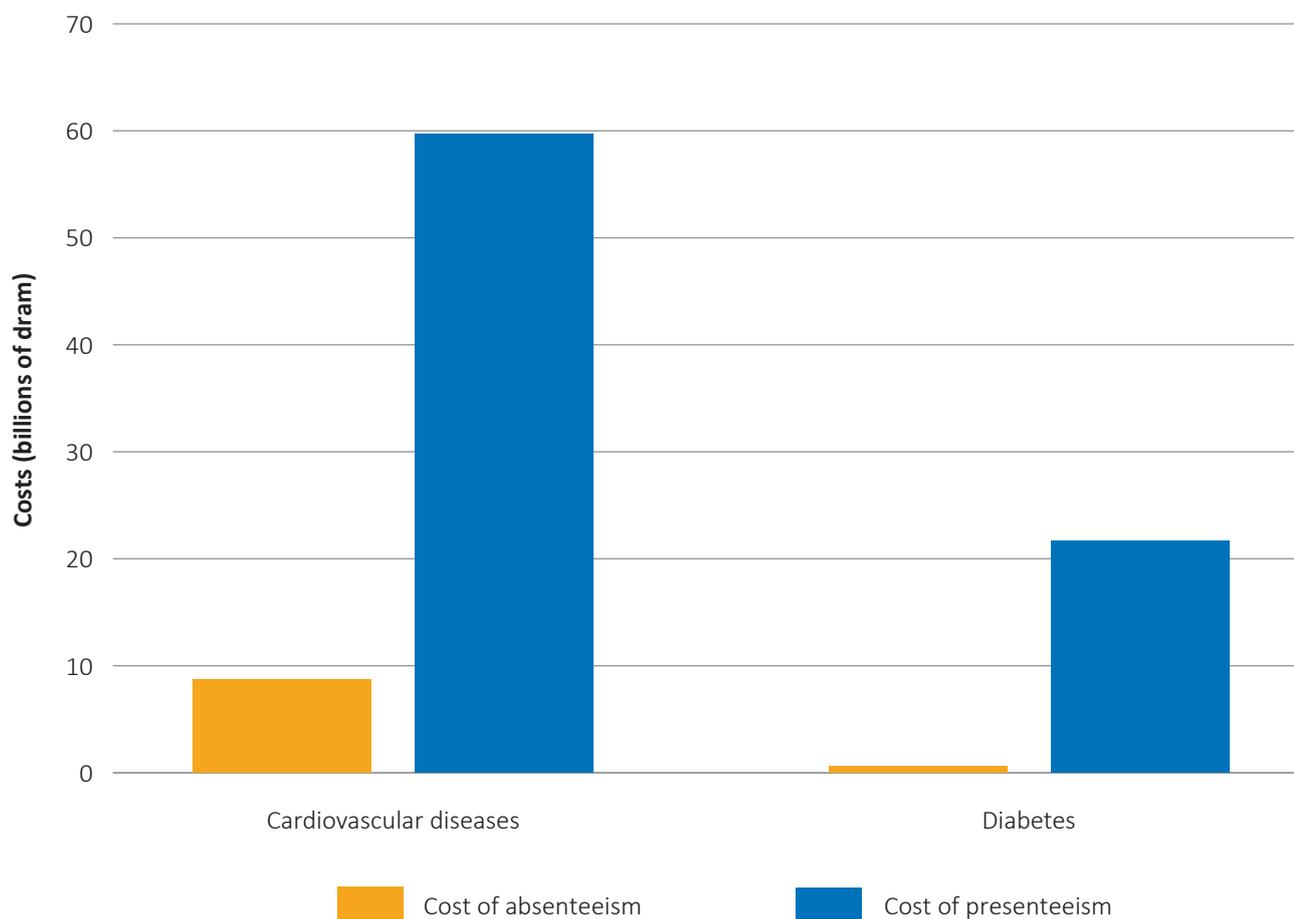
The calculation of absenteeism and presenteeism is based on the human capital approach and the proportion of the workforce living with NCDs (Fig. 3). These figures could only be calculated for cardiovascular disease and diabetes, because relevant studies on chronic respiratory diseases and cancer are lacking in the literature. Productivity losses due to absenteeism per year were estimated to be equivalent to the full productivity loss of 1918 workers for cardiovascular disease and 143 workers for diabetes, which resulted in a total cost of absenteeism of 9.3 billion dram for Armenia. For presenteeism, the corresponding calculation found the productivity loss

to be the equivalent of 13 170 fully productive workers for cardiovascular disease and 4785 fully productive workers for diabetes, resulting in a burden of presenteeism of 81.4 billion dram.

**Fig. 2. Government health-care expenditure in Armenia in billions of dram, 2017**

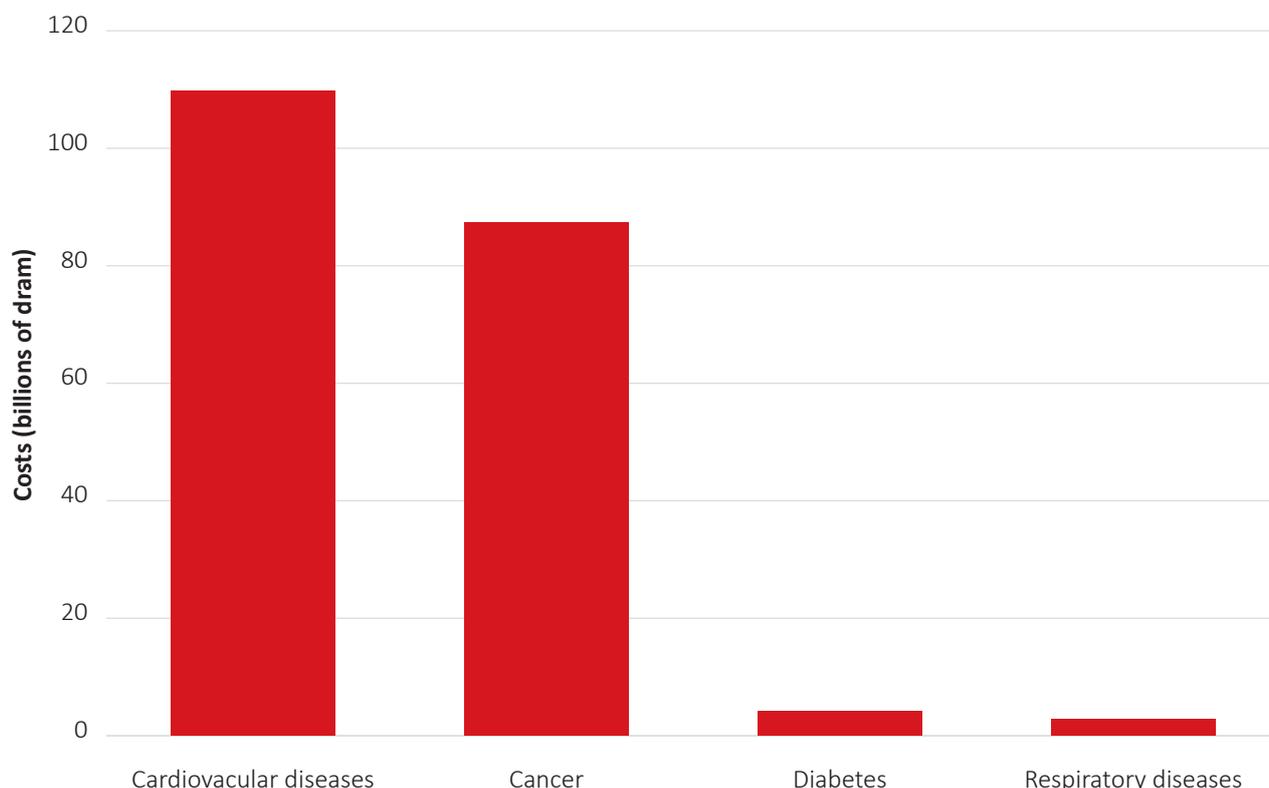


**Fig. 3. Costs of absenteeism and presenteeism for cardiovascular disease and diabetes in billions of dram, 2017**



Losses from premature death were also estimated using the human capital approach and are equivalent to the total output that would have been generated by workers during their lives until reaching retirement age. The costs of premature death were calculated by determining the proportion of the years of life lost that occur within the working population (labour force participation rate times the age-specific employment rate) because of the four main NCDs in 2017 and multiplying this figure (31 891) by the GDP per working person. The total costs of premature death were estimated to be 204.2 billion dram (Fig. 4).

**Fig. 4. Costs of premature death for four NCDs in billions of dram, 2017**



Cardiovascular disease and cancer are the costliest of the four NCDs in terms of premature death; the economic burden from mortality associated with diabetes and respiratory diseases is limited.

### Total economic costs

Table 10 shows the total direct and indirect costs of NCDs in Armenia. The indirect economic costs are 4.3 times higher (294.9 billion dram) than the direct costs (health-care expenditure and disability payments). The estimated direct costs, measured as government expenditure for the four main NCDs and disability payments, is already 67.8 billion dram, but additional losses to the economy from absenteeism, presenteeism and premature death amount to 294.9 billion dram. This would be even larger if the costs of absenteeism and presenteeism could be estimated for cancer and chronic respiratory diseases.

The total burden on the economy of Armenia is 362.7 billion dram, equivalent to 6.5% of GDP in 2017.

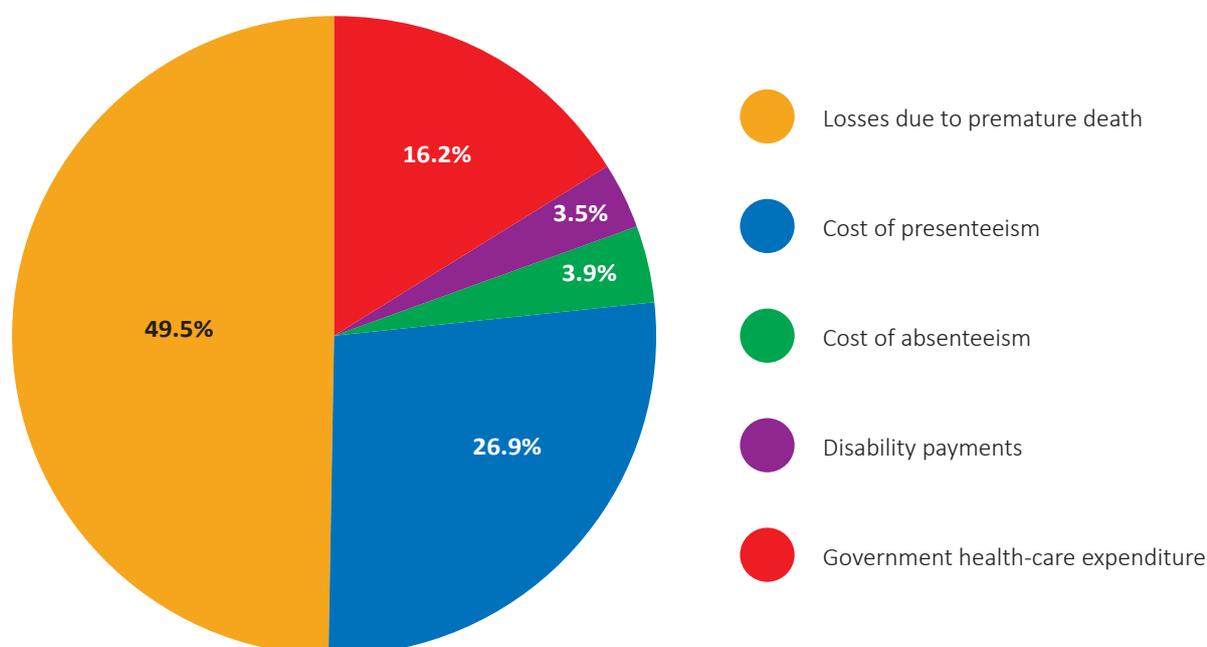
Fig. 5 shows the structure of the economic burden of NCDs in Armenia in 2017. Government health-care expenditure represents only 16.2% of all NCD-related costs – just the tip of the iceberg of the total economic burden.

**Table 10. Economic burden of NCDs in Armenia in billions of dram, 2017**

Cost	Cardiovascular diseases	Cancer	Endocrine and metabolic diseases (largely diabetes)	Chronic respiratory diseases	Total
<b>Direct costs</b>					
Health-care costs					
<i>Government expenditure</i>	35.9	8.0	2.3	9.4	55.6
Non-health-care costs					
<i>Disability payments</i>	7.8	2.8	0.9	0.7	12.2
<b>Total direct costs</b>	<b>43.8</b>	<b>10.7</b>	<b>3.2</b>	<b>10.1</b>	<b>67.8</b>
<b>Indirect costs</b>					
Absenteeism	8.7	NA	0.6	NA	9.3
Presenteeism	59.7	NA	21.7	NA	81.4
Premature deaths	109.8	87.4	4.2	2.8	204.2
<b>Total indirect costs</b>	<b>178.2</b>	<b>87.4</b>	<b>26.5</b>	<b>2.8</b>	<b>294.9</b>
<b>Total burden</b>	<b>221.9</b>	<b>98.1</b>	<b>29.7</b>	<b>12.9</b>	<b>362.7</b>

NA: not available.

**Fig. 5. Structure of the economic burden of NCDs in Armenia, 2017**



### Costs of intervention

The costs of intervention were estimated for the period 2018–2033. Table 11 shows the costs for each of the first five years of this period and the five-year and 15-year totals.

The cardiovascular disease clinical interventions produced the largest estimated costs. Treating people who have cardiovascular diseases and diabetes costs 11.7 billion dram in the baseline year and increases to 13.8 billion dram in 2023. Implementing the entire cardiovascular disease and diabetes clinical intervention package over the five-year scale-up period would cost 63.6 billion dram.

The total costs for the tobacco package based on MPOWER guidelines are 1.36 billion dram for five years and 2.79 billion dram for 15 years, although the individual interventions in the package vary in implementation costs. Certain policies, such as mass-media campaigns or protecting people from smoking, have large planned costs. Nevertheless, numerous low-cost tobacco policies exist, including package warning labels, bans on tobacco advertising and raising taxes. The alcohol control package would cost an estimated 2.71 billion dram in five years; the salt reduction package, 1.80 billion dram; and the physical activity awareness interventions, 1.78 billion dram.

**Table 11. Estimated costs of policy and clinical interventions in billions of dram, 2019–2033**

Intervention type	2019	2020	2021	2022	2023	Total for five years	Total for 15 years
Tobacco control package	0.24	0.32	0.25	0.29	0.25	1.36	2.79
Alcohol control package	0.47	0.65	0.51	0.58	0.51	2.71	5.57
Physical activity awareness package	0.26	0.39	0.37	0.38	0.38	1.78	5.35
Salt reduction package	0.28	0.38	0.37	0.38	0.39	1.80	5.39
All policy interventions, total	1.25	1.74	1.50	1.62	1.53	7.64	19.10
Cardiovascular disease and diabetes clinical intervention package	11.7	12.2	12.7	13.2	13.8	63.6	184.7

## Health benefits

All interventions significantly reduce the number of lives lost to causes related to cardiovascular diseases (Table 12). Salt interventions have the greatest impact in terms of mortality (13 690 lives saved), followed by cardiovascular disease and diabetes clinical interventions (10 622) and tobacco interventions (7293).

**Table 12. Estimated health benefits over 15 years**

Intervention package	Strokes averted	Acute ischaemic heart disease averted	Mortality averted	Healthy life-years gained
Cardiovascular disease and diabetes clinical interventions	3 536	3 955	10 622	43 883
Tobacco interventions	3 331	3 638	7 293	36 352
Alcohol interventions	1 477	1 073	4 664	14 846
Physical activity interventions	1 501	1 202	4 747	15 551
Salt reduction interventions	12 401	11 112	13 690	69 481

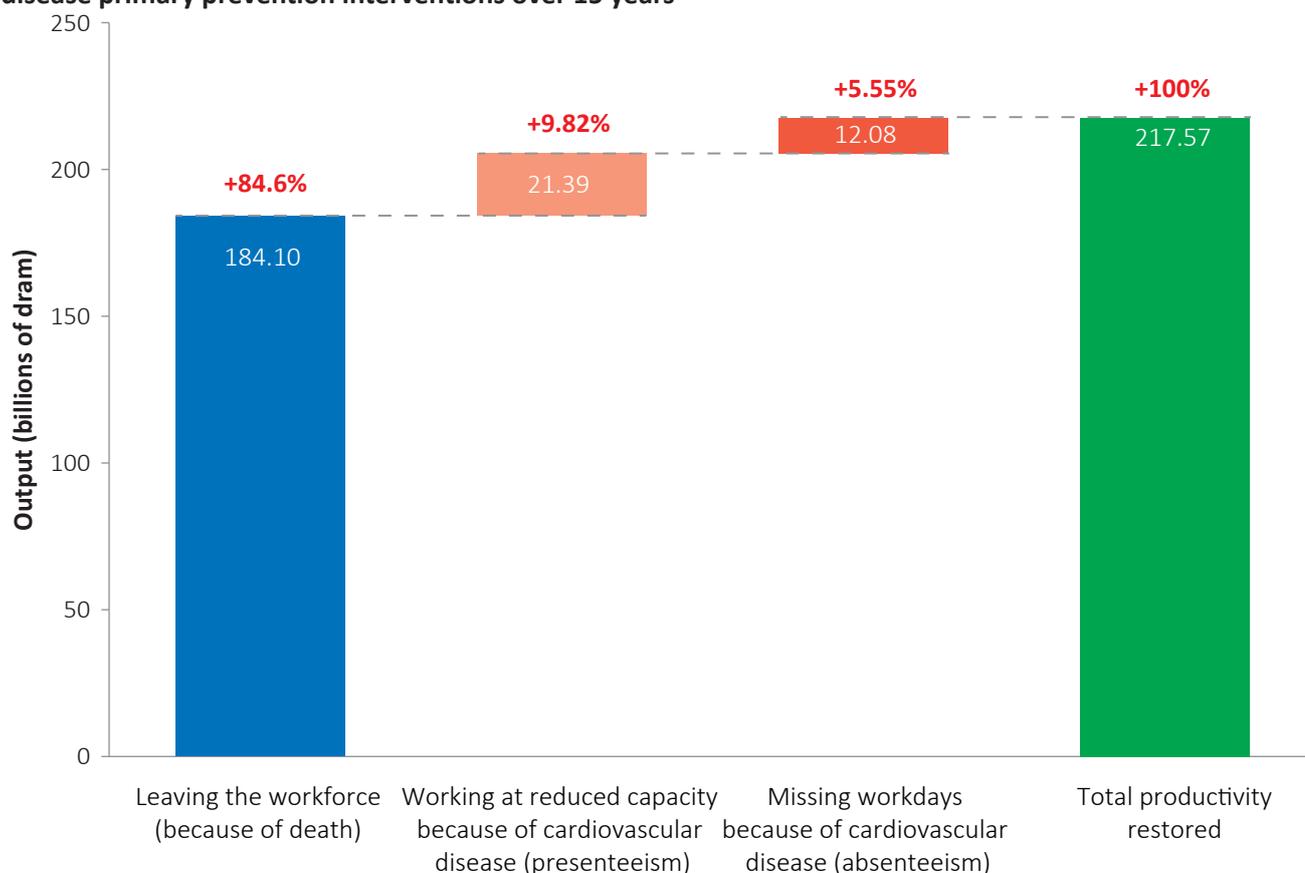
Each set of interventions also adds healthy life-years to the population. The cardiovascular disease clinical interventions and tobacco and salt reduction packages prevent strokes and cardiovascular events, and thus

individuals avoid disabling states (such as partial paralysis from stroke) that can increase pain and suffering, reduce mobility and impair speech and thought. Thus, the largest gains in healthy life-years are achieved with the salt reduction intervention (69 481 healthy life-years gained), the cardiovascular disease and diabetes clinical interventions (43 883 healthy life-years gained) and the tobacco interventions (36 352 healthy life-years gained).

## Economic benefits

The NCDs included in this analysis reduce the labour workforce and productivity through premature mortality, fewer days of work (absenteeism) and reduced productivity while at work (presenteeism). Fig. 6 demonstrates the labour productivity gains that would result from the prevented deaths and disease cases over 15 years, described in Table 12.

**Fig. 6. Recovered economic output expected from tobacco, alcohol, physical activity, salt and cardiovascular disease primary prevention interventions over 15 years**



The greatest positive impact on productivity is from reduced mortality (84.6% of total productivity gains), followed by reduced presenteeism (9.8%) and absenteeism (5.6%). The policy packages and cardiovascular disease and diabetes in primary care result in a net present value of 217.57 billion dram in labour productivity gains over 15 years (equivalent to 3.9% of Armenia's GDP in 2017).

## Return on investment

Comparing the costs and benefits of each package of interventions shows that all the NCD prevention interventions at the population level for risk behaviour included in the analysis – for tobacco and alcohol control, salt reduction and increasing physical activity – have returns on investment greater than 1 dram for each 1 dram invested over 15 years (Table 13).

**Table 13. Costs, benefits and return on investment at five and 15 years, by intervention package (billions of dram)**

Intervention package	Five years			15 years		
	Total costs	Total productivity benefits	Return on investment	Total costs	Total productivity benefits	Return on investment
Tobacco	1.36	6.50	4.79	2.79	40.43	14.51
Alcohol	2.71	2.76	1.02	5.57	23.05	4.14
Physical activity	1.78	2.87	1.61	5.35	23.52	4.40
Salt	1.80	2.76	1.53	5.39	76.92	14.28
Cardiovascular disease and diabetes clinical interventions	63.62	8.97	0.14	184.74	53.64	0.29

The tobacco control package has the highest return on investment of any intervention: for 1 dram invested in the tobacco control package, the expected return is 4.79 dram for the first five years and 14.51 dram for 15 years. Salt interventions also produce a high return on investment over both five (1.53) years and 15 years (14.28), as does the physical activity package (1.61 and 4.40). The alcohol control package provides a return on investment of 4.14 dram over 15 years.

The package of clinical interventions, although important in fulfilling the right to health, provides a return on investment of less than 1 dram per 1 dram invested. This is frequent in health economics because of the high costs of medical treatment. Further, these treatment options (treatment, secondary prevention after acute events and other) have low potential to increase labour force participation after stroke, myocardial infarction and diabetes. But lack of return on investment does not mean absence of cost-effectiveness: these interventions can be still cost-effective from the perspective of other types of economic analysis.

Policy packages (salt reduction, tobacco control and physical activity) are the clear best buys, offering the highest return on investment over 15 years.

## 6. Conclusion

The investment case findings underscore the economic, social and sustainable development toll NCDs impose on Armenians every year. NCDs not only impede Armenia's efforts to increase efficiency in the health sector, reduce out-of-pocket expenditure and expand health-care coverage among the population, NCDs also hinder the country's broader development priorities of increasing human capital, reducing poverty and inequality and strengthening inclusive economic growth.

In 2016, 26 300 people died from NCDs while still in their prime productive years (WHO, 2018b) and, in 2017, NCDs cost Armenia's economy 362.7 billion dram. Of this financial burden, government expenditure on NCDs and disability payments account for 18.7%, and economic losses from premature mortality, absenteeism and presenteeism comprise the remaining 81.3%. The costing method used does not include private expenditure on health, which would further add to the overall picture of the NCD economic burden in Armenia.

Although the investment case results confirm that Armenia faces an urgent epidemic of NCDs, it also shows an alternate path forward. The results show that investing in five proven and cost-effective intervention packages (best-buys), can significantly reduce the burden of NCDs, increasing people's life expectancy and quality of life while decreasing the burden on the national budget. Thus, these investments contribute to the overall socioeconomic development of the country, exerting positive ripple effects across society and accelerating development.

The investment case assessed five cost-effective intervention packages of best buys within Armenia's 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 related to cardiovascular diseases and diabetes. The economic modelling considered existing national efforts and interventions. The main findings regarding the five packages are as follows.

- Investing in all five policy packages would save more than 41 000 lives over 15 years.
- Over 15 years, the packages to reduce tobacco and salt consumption result in the highest returns on investment.
  - For every dram invested in the tobacco control package, Armenia receives 14.51 dram in return. The overall cost is 2.79 billion dram.
  - For the salt consumption package, every dram invested yields 14.28 in return. The overall cost is 5.39 billion dram.
- The next highest returns on investment are for the physical activity (4.14) and alcohol packages (4.4). The investment packages would cost 5.57 billion and 5.35 billion dram, respectively.
- The cardiovascular disease and diabetes clinical package would cost 184.74 billion dram and yields a return on investment of 0.29 dram per dram invested.

The analysis drew attention to specific areas that need to be strengthened and scaled up to implement the WHO-recommended cost-effective NCD preventive and clinical interventions. Since the packages to reduce tobacco and salt consumption largely provide the greatest return on investment, scaling up tobacco control and effective salt reduction initiatives should be urgently given priority. Strengthening the alcohol control law and other alcohol interventions, increasing physical activity campaigns and scaling up cardiovascular disease and diabetes clinical interventions should not be neglected either, since introducing these packages could avert more than 20 000 deaths over a 15-year period. The following lists five 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.** Policy-makers 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 the interventions analysed here can support economic growth and improve population health, can assist policy-makers in disseminating the message. To help stem the NCD epidemic, it is imperative that Armenia raise awareness among the public, particularly among youth.
2. **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 setting maximum limits through regulation, as has been done in many countries. Government officials can draw on the WHO modelling study (WHO Regional Office for Europe, 2018c), which provided significant insight on how much sodium needs to be reduced in different food categories. The regulation would apply to all foods available on the market, including in supermarkets, and thus ensure

equal treatment. This would not undermine other initiatives, such as salt iodization, which should be universal and in accordance with WHO policies.

In addition, the government could make a concerted effort to ensure mandatory labelling of sodium and introduce a front-of-pack labelling system that makes evaluative judgment about the sodium content (such as high, medium or low). The government could introduce mandatory restrictions on marketing foods high in salt (in addition to fat and sugar). Finally, the literacy of the population about the importance of salt reduction could be improved via communication campaigns and by training primary health care personnel to provide advice to patients.

- 3. Pass the new, comprehensive tobacco control law.** Armenia's current laws do not cover many areas that are critical to effective tobacco control. For example, the investment case demonstrates the additional benefits of: (a) expanding the ban on tobacco advertising, promotion and sponsorship; (b) expanding and enforcing the ban on smoking in public places; (c) increasing tobacco excise taxes; and (d) implementing new measures such as mass-media campaigns and plain packaging. Several of these policies have low cost but high returns, including package warning labels and plain packaging, bans on tobacco advertising, sponsorship and promotion and raising taxes. 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 and closely monitor its enforcement.

Given the economic benefits of tobacco control demonstrated in this investment case, it is recommended that the Ministry of Health work with the Ministry of Finance to sustainably finance and strengthen the national tobacco control programme under the National Institute of Health. A national tobacco control programme can spearhead efforts to train teachers, health professionals and law enforcement professionals; conduct national-level mass-media campaigns; and work to achieve goals and targets under Armenia's tobacco Control Strategy for 2017–2020 and related Action Plan.

The government could also establish a national coordination mechanism for tobacco control, headed by the Ministry of Health, situated within the National Institute of Health, and with the active participation of the Ministries of Finance, Education and Science, Labour and Social Affairs, Agriculture and Economic Development and Investments, other sectors, civil society and parliamentarians.<sup>12</sup> A tobacco control national coordination mechanism could – at least initially – be a technical working group under a broader national coordination mechanism for NCDs. A joint discussion paper by UNDP and the WHO Framework Convention on Tobacco Control Secretariat demonstrates how tobacco impacts virtually every Sustainable Development Goal (2017). These findings should be used to advocate for stronger collaboration and coordination among sectors.

- 4. Develop a comprehensive approach to sin taxes, resulting in increases in the tobacco and alcohol excise taxes and introducing taxes on sugar-sweetened beverages.** The government is revising the tax code to accelerate tax increases on tobacco and alcohol over the next several years and is considering introducing taxes on sugar-sweetened beverages. Increasing taxes on health-harming products is one of the most effective measures a government can take to reduce the consumption of such products, improving population health while increasing government revenue for national development priorities.<sup>13</sup> In Armenia, revenue from sin taxes could finance components of future national health strategies and plans, the Tobacco Control Strategy or other key development priorities such as those outlined within the upcoming Armenian development strategy 2030.

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<sup>12</sup> Armenian officials may wish to refer to the UNDP and WHO Framework Convention on Tobacco Convention Secretariat joint publication *Toolkit for Parties to implement Article 5.2 (a) of the WHO Framework Convention on Tobacco Control* for sample terms of reference, rules of procedure and codes of conduct, among other tools.

<sup>13</sup> The 2015 Addis Ababa Action Agenda on Financing for Development, the global financing framework for sustainable development agreed by United Nations Member States, specifies price and tax measures on tobacco as an important and underutilized revenue stream to finance national development efforts (United Nations General Assembly, 2015).

However, at 35% of retail price, cigarette tax levels in Armenia are still far below the WHO Framework Convention on Tobacco Control recommended levels of taxes comprising 75% of retail price, as modelled by the investment case. The tax rate on alcoholic beverages is currently at 20% of the retail price. Although Armenia produces alcoholic beverages and tobacco leaf, most of these products are exported for sale in foreign markets. Since increased tax rates apply to domestic sales but not exports, increased taxes would not harm these industries. The Ministry of Health can work with the Ministry of Finance to create an enabling environment for tax increases on tobacco and alcohol products, including by restructuring the tax system in a way that emphasizes a specific tax component. The Ministry of Health can work with the Ministry of Finance and WHO to design and introduce an effective tax on sugar-sweetened beverages.

5. **Strengthen national coordination and planning for preventing and controlling NCDs.** The investment case demonstrates that NCDs pose a sustainable development challenge for Armenia with implications for the Ministries of Finance, Economic Development and Investments, Education and Science, Labour and Social Affairs and Agriculture, other sectors, civil society and parliamentarians. An effective response to NCDs calls for a whole-of-government approach with the involvement of nongovernmental actors throughout all sectors of society. A national coordination mechanism is an effective tool for mobilizing a whole-of-government and whole-of-society response. A national coordination mechanism was established in 2016 but is not active. Under the leadership of the Ministry of Health, the national coordination mechanism for NCDs should be reactivated, as envisaged under the Strategic Programme for the Prevention and Control of NCDs for the years 2016–2020 and the related Action Plan. 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. The government can draw on previous successes in coordinating across sectors, such as through the country coordinating mechanism for combating HIV and the national coordination mechanism on antimicrobial resistance.

Further, the new administration is working to establish new or updated sectoral strategies, investment frameworks and broader development planning documents. This is therefore an opportune time for the Ministry of Health, Ministry of Economic Development and Investments and other sectors to champion integrating NCD control and prevention into relevant national and sectoral planning and policy documents. These include the Armenian development strategy 2030 and the Strategic Programme for the Prevention and Control of NCDs for the years 2016–2020 and the related Action Plan, which the Ministry of Health plans to update for the year 2019. Within the latter, the Ministry of Health could give priority to near- and medium-term priorities, taking the investment case findings into consideration, ensuring to include other relevant ministries in the strategy development process. Given the development dimensions of NCDs, many ministries in Armenia view NCD prevention and control as a win-win opportunity. Priorities laid out within the national NCD strategy would also serve as the foundation for annual work plans of the national coordination mechanism.

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# Annex 1. Data used for calculating the NCD burden

Table A1. Productivity data

Disease	Parameter value	Year	Source of data	Details of data source
<b>Reduction in labour force participation rate</b>				
Hypertension	11.0%	2009	Barnay & Debrand	Barnay T, Debrand T (2006). Effects of health on the labour force participation of older persons in Europe. Questions d'Économie Santé. 109 ( <a href="http://www.irdes.fr/english/2006/issues-in-health-economics.html">http://www.irdes.fr/english/2006/issues-in-health-economics.html</a> , accessed 11 February 2019).
Stroke	11.0%	2009	Barnay & Debrand	Barnay T, Debrand T (2006). Effects of health on the labour force participation of older persons in Europe. Questions d'Économie Santé. 109 ( <a href="http://www.irdes.fr/english/2006/issues-in-health-economics.html">http://www.irdes.fr/english/2006/issues-in-health-economics.html</a> , accessed 11 February 2019).
Acute myocardial infarction	11.0%	2009	Barnay & Debrand	Barnay T, Debrand T (2006). Effects of health on the labour force participation of older persons in Europe. Questions d'Économie Santé. 109 ( <a href="http://www.irdes.fr/english/2006/issues-in-health-economics.html">http://www.irdes.fr/english/2006/issues-in-health-economics.html</a> , accessed 11 February 2019).
Type 2 diabetes	11.0%	2009	Barnay & Debrand	Barnay T, Debrand T (2006). Effects of health on the labour force participation of older persons in Europe. Questions d'Économie Santé. 109 ( <a href="http://www.irdes.fr/english/2006/issues-in-health-economics.html">http://www.irdes.fr/english/2006/issues-in-health-economics.html</a> , accessed 11 February 2019).
<b>Reduction in full-time hours due to absenteeism</b>				
Hypertension	0.5%	2011	Mitchell & Bates	Mitchell RJ, Bates P (2011). Measuring health-related productivity loss. Popul Health Manag. 14(2): 93–8.
Stroke	5.5%	2011	Mitchell & Bates	Mitchell RJ, Bates P (2011). Measuring health-related productivity loss. Popul Health Manag. 14(2): 93–8.
Acute myocardial infarction	1.1%	2011	Mitchell & Bates	Mitchell RJ, Bates P (2011). Measuring health-related productivity loss. Popul Health Manag. 14(2): 93–8.
Type 2 diabetes	0.3%	2011	Mitchell & Bates	Mitchell RJ, Bates P (2011). Measuring health-related productivity loss. Popul Health Manag. 14(2): 93–8.

**Table A1. (continued)**

Disease	Parameter value	Year	Source of data	Details of data source
<b>Reduction in productivity due to presenteeism</b>				
Cardiovascular disease and stroke	3.7%	2011	Wang et al.	Wang PS, Beck A, Berglund P, Leutzinger JA, Pronk N, Richling D et al. (2003). Chronic medical conditions and work performance in the health and work performance questionnaire calibration surveys. <i>J Occup Environ Med.</i> 45:1303–11.
Diabetes	11%	2011	Holden et al.	Holden L, Scuffham PA, Hilton MF, Ware RS, Vecchio N, Whiteford HA (2011). Which health conditions impact on productivity in working Australians? <i>J Occup Environ Med.</i> 53:253–7.
Time it takes to replace workers (percentage of a year)	20%	2012	Boushey & Glynn	Boushey H, Glynn SJ (2012). There are significant business costs to replacing employees. Washington (DC): Center for American Progress ( <a href="https://www.americanprogress.org/issues/labor/report/2012/11/16/44464/there-are-significant-business-costs-to-replacing-employees">https://www.americanprogress.org/issues/labor/report/2012/11/16/44464/there-are-significant-business-costs-to-replacing-employees</a> , accessed 14 February 2019).

## The WHO Regional Office for Europe

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 Europe 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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