Gesond Gesellschaft duerch Präventioun

Reducing the Burden of Chronic Diseases in Luxembourg: Assessing Major Health Determinants to Inform Primary Prevention Interventions.

OBSERVATOIRE
NATIONAL DE LA SANTÉ

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Reducing the Burden of Chronic Diseases in Luxembourg: Assessing Major Health Determinants to Inform Primary Prevention Interventions

National Health Observatory, 2026

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A French translation of this document has been prepared. In the event of any ambiguity, this original English document shall remain the official and authoritative reference.

Acknowledgements

The National Health Observatory would like to express its deepest gratitude to all the individuals and institutions that contributed to the production of this report.

This report is primarily based on data made publicly available up to August 2025, unless otherwise indicated. We would like to express our sincere gratitude to the data producers, without whom this analysis could not have been carried out: the Luxembourg Institute of Health (LIH) and the Health Directorate (DiSa) for the data from the European Health Information Survey (EHIS); the Health Directorate, the Ministry of Education, Children and Youth, and the University of Luxembourg for the data from the Health Behaviour in School-aged Children (HBSC) survey; the Cancer Foundation, the Health Directorate, and ILRES for the data from the National Survey on Tobacco use; the Health Directorate for the statistics on causes of death; STATEC for the data from the EU Statistics on Income and Living Conditions (EU-SILC); and LIH for the indicators from the Patient-Reported Indicator Surveys (PaRIS).

We also benefited from Eurostat's demographic projections, as well as data from the Institute for Health Metrics and Evaluation (IHME) regarding the burden of chronic diseases.

We are grateful to Luxembourg Institute of Socio-Economic Research (LISER), Maria Noel Pi-Alperin and the SHARE project teams for their statistical modeling analyses on the impact of tobacco price increases on chronic disease prevalence.

We would also like to acknowledge the many individuals who shared essential qualitative information for understanding prevention policies in Luxembourg, particularly at the Health Directorate. Our gratitude extends to the whole team of the *Pôle de médecine preventive*, and particularly to Emmanuel Amsallem, Anne Marx, Robert Mann, Pedro Marques, Ferreira Da Costa Marisa, Filipa Tavares Fortuna, Catherine Tomicic, as well as Chantal Brochmann and Silvana Masi. Thank you to Nora Wenner from the Independent Luxembourg Broadcasting Authority, the representatives of the Customs and Excise Agency, as well as the experts who contributed to the analysis of legislation on the sale of alcoholic beverages, along with the members of the Cancer Foundation. From the Ministry of Health and Social Security, Tom Rausch and Brian Schintgen also shared valuable insights into the ongoing actions being carried out by the Ministry of Health and Social Security.

Finally, we extend our gratitude to the Council of Observers for their guidance, constructive feedback and support. We would like to thank the entire team at the National Health Observatory for their continued support throughout the entirety of this report. We are particularly grateful towards Kimberly Chinfatt for her editorial work, careful review of the content, and preparation of the graphic representations, which significantly contributed to the quality of this report. We also thank Linda Kefi for her essential contribution to the layout and design, which helped enhance the clarity and readability of the document.

Foreword

Chronic diseases—such as cancer, cardiovascular diseases, musculoskeletal disorders, depression, dementia, obesity, and chronic respiratory diseases—represent a major burden for population health and healthcare systems, here in Luxembourg and globally. The rise of this burden calls on Luxembourg to strengthen its primary prevention efforts in order to reduce four major health behaviours: tobacco use, alcohol use, unhealthy diet, and physical inactivity.

The World Health Organization (WHO) has identified a set of evidence-based and cost-effective public policies, commonly referred to as ‘best buys’, designed to guide countries in reducing chronic diseases. These interventions, which follow a population-based approach, act on the determinants that shape our living environments and aim to make healthy behaviors easier to adopt by everyone, throughout one’s life course.

By performing a review of national policies in Luxembourg alongside these international recommendations, the report highlights the progress made here and identifies opportunities and areas for improvement in the fight against chronic diseases. This work reflects the National Health Observatory’s core values of transparency, evidence-based approaches, and scientific independence in shaping health policies, and is fully aligned with our mission to evaluate population health and the performance of our health system.

Prepared in 2025, this report supports the government’s efforts to place prevention on the same level as curative care, notably through the development of a national prevention strategy. According to the “NCD Countdown 2030” report, produced in collaboration with the WHO, Luxembourg is currently on track to achieving the Sustainable Development Goal target 3.4—to reduce by one third premature mortality from non-communicable diseases by 2030 compared to 2015—but sustained efforts in prevention, care, and efficiency remain necessary.

Recent developments in tobacco control echo the policies from the “best buys”: the amendment of the anti-tobacco law, the opinion the Court of Auditors on the sustainability of tobacco taxation in the 2026 draft budget, and the results of the Survey on the National Strategy: Tobacco Free Generation, which reveal extensive support for ambitious measures. At the European level, the proposed revision of the Tobacco Taxation Directive, aimed at reducing disparities between Member States, also fuels national debates.

As Luxembourg seeks to strengthen its prevention policies, this report serves both as a mirror and a compass: it sheds light on progress made and guides future actions. We hope that the lessons drawn from this analysis will support decision-makers, health professionals, and society as a whole in their shared commitment to promoting healthier lifestyles and reducing the impact of chronic diseases on individuals, families, and communities.

Thank you for your interest in this report.

Dr. Françoise Berthet
President
National Health Observatory

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List of abbreviations

English		French	
DALY	Disability-adjusted life year	DALY	Année de vie ajustée sur l'incapacité
EHIS	European Health Interview Survey	EHIS	Enquête européenne par interview sur la santé
EU-SILC	European Union Statistics on Income and Living Conditions	EU-SILC	-
FCTC	Framework Convention on Tobacco Control	CCLAT	Convention-cadre pour la lutte antitabac
GBD	Global Burden of Disease (study)	GBD	-
GIMB	Eat healthy, move more *Gesond iessen, Méi beweegen*	GIMB	Bien manger, bouger plus
HBSC	Health Behaviour in School-aged Children	HBSC	-
IHME	Institute for Health Metrics and Evaluation	IHME	Institut pour la Métrique et l'Évaluation de la Santé
NCD	Non-communicable disease	MNT	Maladies non-transmissible
PALMA	Luxembourg Action Plan against Alcohol Misuse	PALMA	Plan d'Action Luxembourgeois de réduction du mésusage de l'alcool
PNLT	Luxembourg National Plan for Tobacco Control	PNLT	Plan national de lutte contre le tabagisme
PN MCNV	National Plan against Cardio-Neuro-Vascular Diseases	PN MCNV	Plan National contre les Maladies Cardio-Neuro-Vasculaires
SDG	Sustainable Development Goals	ODD	Objectif de développement durable
TAPS	Tobacco advertising, promotion and sponsorship	TAPS	Publicité en faveur du tabac, promotion et parrainage
WHO	World Health Organisation	OMS	Organisation mondiale de la santé

Executive summary

The burden of chronic diseases and their prevention in Luxembourg

The disease burden in Luxembourg is dominated by chronic diseases, many of which are preventable. These include cancer, cardiovascular disease, musculoskeletal disorders, depression, dementia, obesity, diabetes and chronic respiratory diseases. Chronic conditions account for 83% of the total disease burden. As a result of population ageing and growth, the absolute burden of chronic diseases could rise by approximately 70% by 2050. All of this calls for strengthening the prevention of chronic diseases.

This report examines the four major health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity—that contribute the most to the burden of chronic diseases. It also assesses social disparities in health. At the core of the report is a review of evidence-based, population-based primary prevention interventions for chronic diseases that are implementable in Luxembourg. Complementary to individual-level prevention measures, these interventions can have a substantial impact on public health. Population-based interventions target social, economic and environmental determinants that shape the living context to ease the adoption of healthy behaviours across all population strata. By addressing these determinants across the life course, population-based prevention contributes to reducing health inequities that stem from disparities, notably in education, income and wealth, and promotes healthy ageing of the whole population.

The report establishes Luxembourg's uptake of population-based primary prevention interventions compared with the World Health Organization (WHO) 'Noncommunicable diseases (NCD) best buys': a set of recommended cost-effective policy options to tackle chronic diseases. Further, the report provides insights into interventions with high potential to yield sizable impact on public health, including estimates of the impact of a tobacco price increase on the burden of chronic diseases in Luxembourg.

Major risk factors

The report examines four major risk factors across demographic and socioeconomic factors.

Tobacco use: In 2022, 19% of 11 to 18 year olds had ever used tobacco. Among adults, the prevalence of daily smoking declined from 26% in 2001 to 15% in 2014. But, progress has since stalled, with the prevalence being still 15% in 2024. Daily smoking is more prevalent among people with a lower level of educational attainment compared with those having a higher level.

Alcohol use: In 2022, 43% of 11 to 18 year olds had ever used alcohol. Among adults, the prevalence of daily alcohol use and weekly binge drinking is more frequent among people with a lower level of educational attainment than among those with a higher level.

Unhealthy diet: In 2022, one out of four 11 to 18 year olds (25%) consumed fruit and vegetables daily. In 2019, 14% of adults consumed at least five portions of fruit and vegetables daily. Both children and adults from socially disadvantaged groups have a lower frequency of daily fruit and vegetable consumption compared with those from more advantaged groups.

Physical inactivity: In 2022, one in six 11 to 18 year olds (16%) engaged in at least 60 minutes of physical activity daily. In 2019, 21% of adults performed weekly aerobic and muscle strengthening activities in line with physical activity recommendations. Children and adults with a higher socioeconomic status meet physical activity recommendations more often than those with a lower socioeconomic status.

Textbox. Social disparities in health behaviours

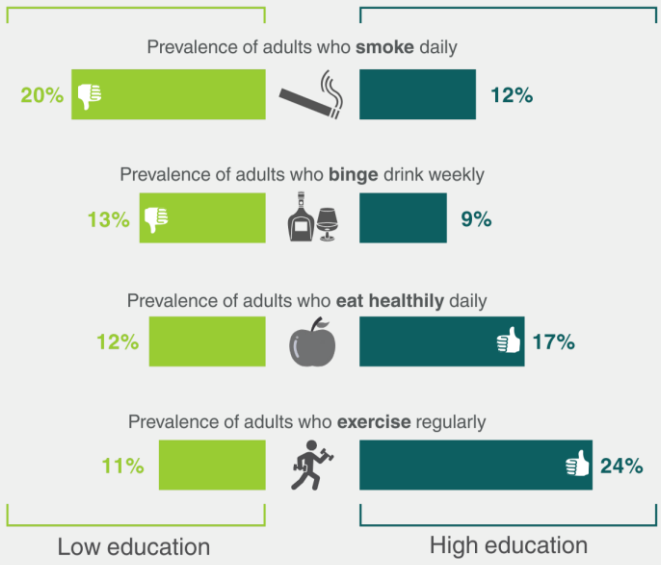


Figure. Prevalence (%) of health behaviours among adults, by educational attainment level, Luxembourg, 2019

Educational attainment influences people's resources, capabilities and opportunities to adopt healthy behaviours. The gap in health behaviours between people with the lowest and highest levels of educational attainment highlights the need for interventions to make healthy choices easier and that also reach socially disadvantaged populations.

Source: Survey on Tobacco use in Luxembourg; EHIS.

Implementation of population-based primary prevention of chronic diseases

The report focuses on population-based primary prevention interventions to tackle the four major risk factors, drawing from the so-called WHO 'NCD best buys'. They comprise a cornerstone of global health strategies in the WHO Global Action Plan for the Prevention and Control of NCDs 2013–2030. Their effective implementation requires coordinated action across multiple public and private sectors, as well as support from civil society.

Tobacco use: The WHO 'NCD best buys' to reduce tobacco use have been partially implemented in Luxembourg. However, tobacco products remain inexpensive, and taxation is low. Increasing tobacco prices in Luxembourg could lead to quick and significant relative reductions in the burden of chronic diseases. The larger the increases in tobacco prices, the greater the public health benefits.

Alcohol use: The WHO 'NCD best buys' targeting advertising restrictions have been implemented to a limited extent. Nevertheless, Luxembourg currently has low excise taxes, lacks minimum pricing for alcoholic beverages and has no restrictions on sales hours. As a result, alcohol is widely available at a low price. 'Best buys' targeting affordability, such as taxation and setting a minimum price, could have a large impact on the alcohol-use related burden of chronic diseases in Luxembourg.

Healthy diet: Luxembourg actively promotes healthy eating and lifestyles through inclusive public campaigns, school and workplace programmes, and outreach to older adults. In schools and childcare settings, public food procurement policies support access to balanced meals, though clearer legal nutritional standards would enhance their effectiveness. However, the voluntary nature of nutrition labelling limits its impact on consumer choices and interventions protecting children from harmful food marketing are absent. Further, food reformulation protecting people from unhealthy food and enhancing food nutrition is limited to restricting trans fats.

Physical inactivity: Luxembourg implements diverse communication campaigns, events, and programmes to foster physical activity. Active mobility is integrated into the National Mobility Plan 2035 and can be further promoted through health-focused communication.

Key messages and policy implications

1. Chronic diseases, including cancer, cardiovascular disease, musculoskeletal disorders, depression, dementia, obesity, diabetes and chronic respiratory diseases, account for 83% of the burden of disease in Luxembourg. These are preventable through population-based, primary prevention interventions.

2. Population ageing and growth will lead to a substantial rise in chronic diseases.

3. The chronic disease burden in Luxembourg is fuelled by the high prevalence of four health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity.

4. Social disparities exist across the four health behaviours. People with a lower level of education more frequently use tobacco, engage in binge drinking, have an unhealthy diet and lack physical activity, compared with those who have a higher level of education.

5. Interventions addressing the affordability and availability of tobacco and alcohol, and regulatory measures enhancing a nutritious diet are effective but have not been comprehensively implemented in Luxembourg. Increasing the tobacco prices in Luxembourg would reduce the burden of chronic diseases. Although Luxembourg has implemented some of the WHO 'NCD best buys', opportunities remain to align with these evidence-based recommendations.

6. Most of the population-based and evidence-based interventions from the 'NCD best buys' would improve health behaviours and reduce the chronic disease burden quickly, with a measurable impact within five years of their implementation and beyond.

7. Population-based interventions that facilitate healthy choices have the potential to reduce inequalities in the burden of chronic diseases, as they also reach socioeconomically disadvantaged people and foster equitable healthy ageing for the whole population.

Definitions and key concepts

Chronic diseases

In this report, the term ‘chronic diseases’ refers to long-term, noncommunicable diseases (NCDs). The term is used to characterise diseases that last for months or years, and that result from a combination of genetic, physiological, environmental and socioeconomic factors, as well as health behaviours. Chronic diseases become more frequent with advancing age, making them particularly relevant in the context of an ageing population. The major chronic diseases in Luxembourg are cancer, cardiovascular disease, musculoskeletal disorders, depression, dementia, obesity, diabetes and chronic respiratory diseases.

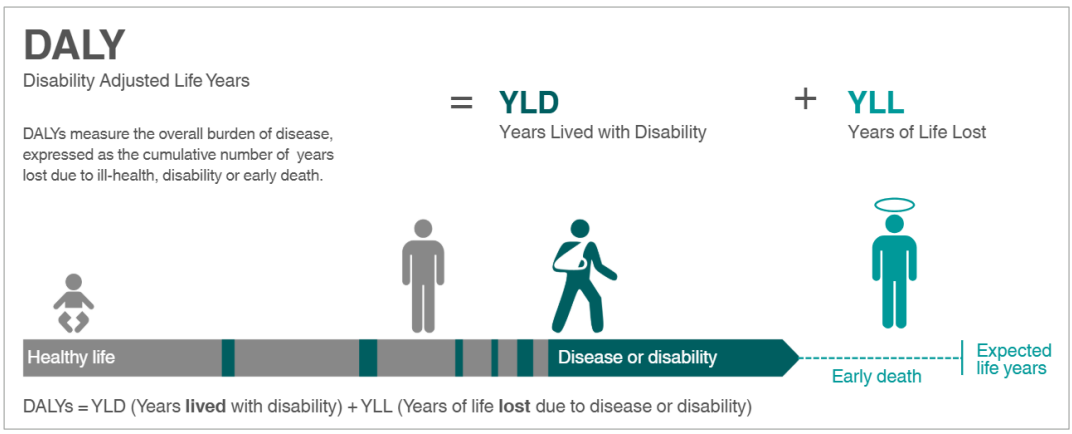
Disease prevention

Disease prevention encompasses measures aimed at averting the occurrence of disease, halting its progress and reducing its consequences once it is established. Primary prevention of chronic diseases aims to prevent their occurrence by lowering the exposure to risk factors that are common to a range of these diseases. This can be achieved through interventions that directly target changes in health behaviours, or through ones that address the social determinants of health by acting on environmental, economic and social conditions, thereby influencing health behaviours. Interventions can take place at the individual level or can be population-based. The term ‘primordial prevention’ is also used to describe interventions that target the structural roots of health and diseases. Secondary prevention aims for the early detection of existing disease with a view to arresting or delaying the progression of the disease and its effects, for example, through screening. Tertiary prevention generally refers to disease management strategies or rehabilitation intended to avoid or reduce the risk of deterioration or complications from established disease, for example, through patient education and physical therapy.[1,2] In this report, we concentrate on the primary prevention of chronic diseases through interventions implemented at the population level.

Burden of disease and Disability-Adjusted Life Years: DALYs

Burden of disease analysis measures the impact of living with illness and injury and dying prematurely. The summary metric is 'disability-adjusted life years' (DALYs), which measures the years of healthy life lost from death and illness. One DALY is the loss of the equivalent of one year of full health. The absolute number of DALYs for a disease is the sum of years of life lost due to early death (YLLs) and years of healthy life lost due to disability (YLDs) due to prevalent cases of the disease or health condition within a population (Figure 1).[3,4]

Figure 1. How Disability-Adjusted Life Years (DALYs) are calculated. An infograhic



Source: Wiki Commons. Figure adapted from Wikimedia (https://commons.wikimedia.org/wiki/File:DALY_disability_affected_life_year_infographic.png)[5]

DALYs have been measured in the Global Burden of Disease (GBD) study conducted by the Institute of Health Metrics and Evaluation (IHME) since 1990, and this has been used as a source of the burden of disease data for this report.[6] The Disease Burden Unit at the WHO was created in 1998. Burden of disease analysis also features prominently in the World Bank's 1993 World Development Report.[7] It is a widely used tool to identify the most serious health problems currently facing a population, to allow comparisons across countries and to estimate the future burden. Results from the GBD are estimates from statistical models to deal with data quality and data gaps. Their aim is to help prioritise public health actions, but they are not designed for monitoring or evaluation.

In this report, the burden of disease is estimated and expressed as 1) the 'relative burden of disease', computed as the number of DALYs per 100 000 persons in a given year—a rate that allows for comparisons between populations; and 2) the 'absolute burden of disease', computed as the total count of DALYs, allowing estimation of the burden of a disease on a given population at a given time, depending on the size and age structure of the population. The absolute burden of disease is used to present the total DALY count in 2021 compared with the foresighted DALY count for 2050.

Cost-effectiveness

Effectiveness of a health intervention is quantified by its measurable impact on health status. Cost-effectiveness expresses the trade-off between the monetary resources required to achieve the resulting health gain; it is calculated as the cost per unit of health outcome. Several summary measures capture health outcomes, often used are disability-adjusted life years (DALYs), which combine years of life lost due to premature death and years lived with disability. Cost-effectiveness analyses are useful to compare different interventions according to how much money would need to be spent to achieve a common health gain, such as one DALY averted. The most cost-effective interventions have the lowest monetary costs to achieve one unit of the health gain. The WHO 'NCD best buys' is a set of implementable interventions that have shown to be most cost-effective, with an average of less than 100 international dollars for each DALY averted (<Intl$100/DALY) in low-income or lower-middle income countries.[8,9] Recent analysis shows rapid public health benefits within five years after implementation of 'best buys' in high income countries.[10]

Healthy ageing

The WHO defines healthy ageing as the process of developing and maintaining the functional ability that enables wellbeing in older age.[11] In this report, healthy ageing is used to express the opportunity to live a long life in good health.

Social determinants of health

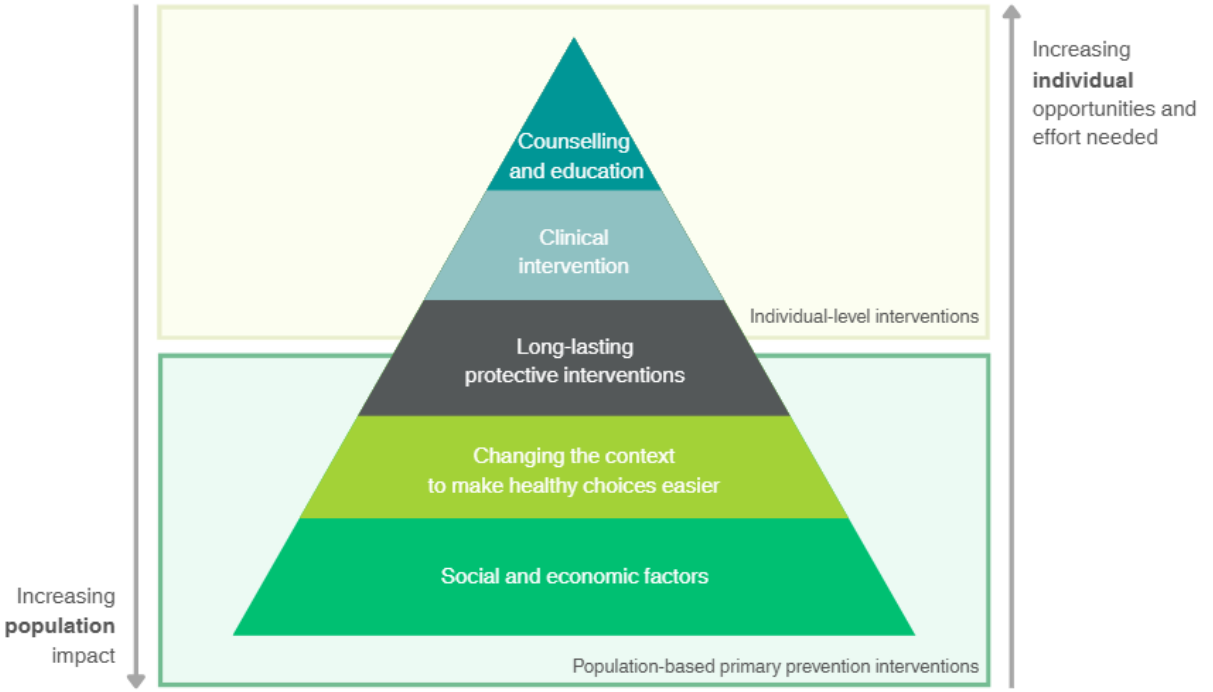
The social determinants of health are the social, economic, environmental, commercial, cultural and political conditions in which people are born, grow, live, work and age, and that are considered drivers of the risk of developing chronic diseases. Social determinants of health influence a person's opportunity to be healthy, their health behaviours, risk of illness and healthy life expectancy. Health inequalities result from the uneven distribution of these social determinants across different strata of the population.[12–14] Population-level primary prevention interventions target these determinants.

1. Introduction

In Luxembourg, chronic diseases, such as cancer, cardiovascular diseases, musculoskeletal disorders, obesity, diabetes, depression, dementia and chronic respiratory diseases, are the leading causes of morbidity and mortality. Four health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity—are major shared and modifiable causes of these conditions. Hence, reducing the prevalence of these risk factors is essential to prevent chronic diseases, delay their occurrence, and reduce their public health consequences.

Primary prevention interventions can follow different strategies to address these health behaviours. Many interventions focus on encouraging individuals to give up unhealthy behaviours or to adhere to healthier ones, illustrated by the top tiers of the health impact pyramid (Figure 2). For example, smoking cessation programmes or clinical treatment interventions can be beneficial to individuals, especially if they are at high risk of related diseases. However, the more these approaches target individuals, the more they rely on individual agency, including opportunities and effort (Table 1). They often fail to trigger large shifts towards better health behaviours across the entire population.

Figure 2. The health impact pyramid



Adapted from Frieden T. R., A Framework for Public Health Action: The Health Impact Pyramid. 2010[15]

To fully tap into the potential of public health prevention, interventions that target the individual should be accompanied by population-based interventions, illustrated by the lower tiers of the health impact pyramid (Figure 2). These interventions aim to influence health behaviours by targeting social, economic, and environmental determinants of health. They aim to modify the social context in which people live, to make healthy choices easy. Examples include increasing the prices of unhealthy products (e.g. tobacco, alcohol and sugar), food modifications (e.g. iodising salt and reducing trans-fatty acids) or designing cities to promote active mobility. As these interventions act at a structural level, they reach all strata of the population and have a sustained impact on health behaviours and the related chronic disease burden, and thus they lead to a greater public health impact. Of note, some of these population-based interventions support early childhood development and enable children to grow into healthy adults; from a life-course prevention perspective, this is key to reducing the burden of chronic diseases in the long term.[13]

This report looks at population-based primary prevention strategies, focusing on the internationally recommended 'best buys' for tobacco use, alcohol use, unhealthy diet and physical inactivity, to curb the global rise in the chronic disease burden linked to population ageing and growth.[8,16] Most of these interventions can bring measurable public health benefits shortly after implementation (Chapter 3), while also extending their effects over the long term and increasing the number of years people spend in good health.[10] In doing so, they support healthy ageing across the population.[17,18]

Drawing on findings from modelling Luxembourg-specific data, the report illustrates the impact of a population-based prevention strategy, specifically, the effects of a tobacco price increase on smoking-related chronic diseases. It provides policymakers and the public with evidence-based insights to support interventions that create environments supportive of healthy and preventive behaviours.

Table 1. Individual-level and population-based interventions: advantages and disadvantages

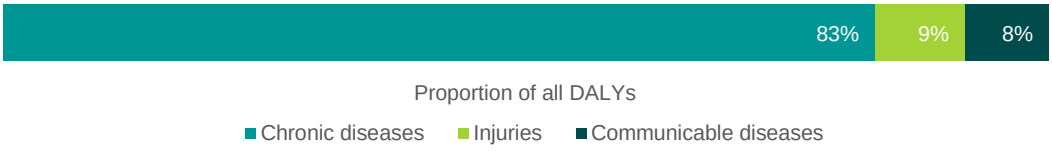
Prevention level	Advantages	Disadvantages
Individual level (e.g. screening, smoking cessation, cholesterol-lowering drugs)	Efficient at the individual level if the absolute risk of disease is high	Need to reach and identify the individuals that would benefit from the intervention
	Personalised to the individual (e.g. tailored strategy for smoking cessation)	Adherence depends on individual capability and resources (i.e. financial and non-monetary resources)
	Congruent with individual motivation (on the individual's initiative and as appropriate)	Limited impact at the population level (i.e. often fails to bring a major change to the prevalence of health behaviours in the population)
	Empowering the individual to actively make healthy choices and being in control of their own health	Needs to be repeated for each individual and in each generation, because it does not tackle the underlying social determinants
	Opportunity of healthcare provider contact for screening	Requires substantial healthcare provider resources
	May have the potential to address several risk factors (e.g. smoking cessation intervention combined with enhancing physical activity)	Can increase health inequalities (due e.g. to the limited resources of disadvantaged populations)
Population-based (e.g. tobacco/sugar taxation, educational interventions, access to healthy food choices)	Target social determinants (i.e. factors in the living environment that influence health behaviours) to reach all strata of the population, and thus offer benefits for the entire population	Is perceived as anti-liberal and against free will, especially when interventions target health behaviours
	Does not depend on individuals' capabilities, resources and cooperation	The benefit at the individual level can be small
	Reaches all age groups, including young populations where prevention is impactful over the life course	If the benefit of the intervention at the individual level is small, it can be outweighed by small harms.
	Reaches disadvantaged populations, which are more difficult to reach with individual-level prevention	May oppose economic interests (e.g. tax revenues from unhealthy products, such as tobacco and alcohol)

Sources: Authors' compilation based on Rose G., Sick Individuals and Sick Populations, 1985; Sniderman, A.D. et al., Sick Individuals and Sick Populations by Geoffrey Rose, 2018; Cardiovascular Prevention Update, 2018; McLaren L., In defense of a population-level approach to prevention: why public health matters today, 2019; Marmot M., Economic and social determinants of disease, 2001.[19–22]

1.1. The burden of chronic diseases in Luxembourg

Chronic diseases are responsible for 83% of the all-cause disease burden (assessed in DALYs) in Luxembourg (Figure 3).

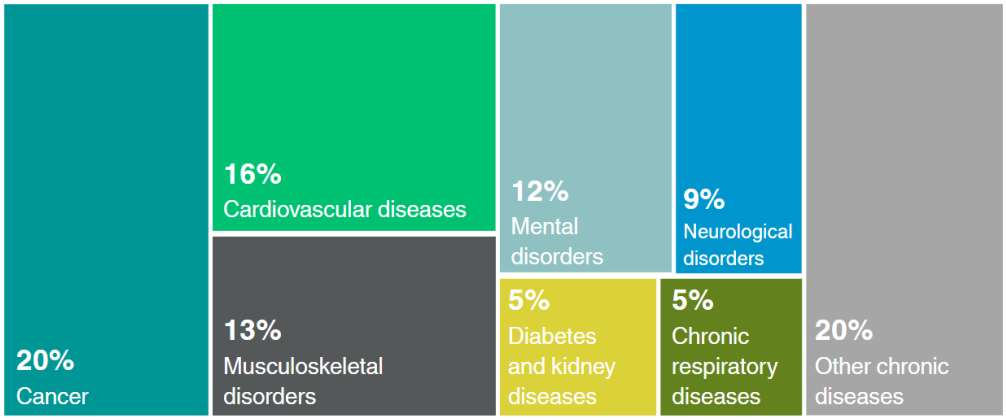
Figure 3. Share of the estimated disease burden (% DALYs), by condition, Luxembourg, from the Global Burden of Diseases (GBD) 2021



Source: Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

According to estimates from the 2021 GBD study, a large proportion of the burden of chronic diseases in Luxembourg is attributable to a few major chronic conditions (Figure 4).

Figure 4. Chronic Disease Burden in Luxembourg. Estimated share (%) of DALYs, by disease category, Luxembourg, from the Global Burden of Diseases (GBD) 2021



Source: Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.
Note: The category 'Other chronic diseases' includes digestive diseases, sense organ diseases, substance use disorders, skin and subcutaneous diseases and various other chronic diseases that do not fall within any of the other categories.

Chronic diseases are also leading causes of death in Luxembourg. In 2023, 73% of all deaths were due to cardiovascular diseases, cancers, respiratory diseases, mental disorders and neurological diseases (Table 2).[23,24]

Table 2. Causes of death expressed as crude mortality rate (per 100 000 habitants), Luxembourg, 2023

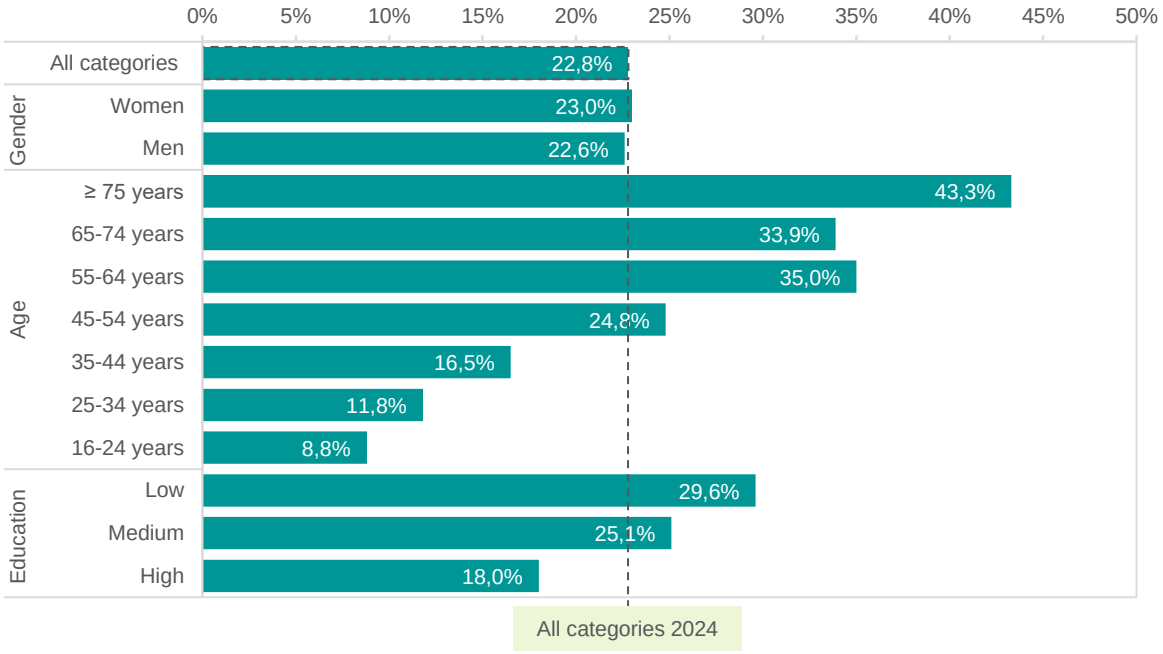
ICD-10 Disease Chapter	Number of deaths per 100 000 habitants in 2023
I00-I99 Cardiovascular diseases	160.9
C00-D48 Cancer	158.2
J00-J99* Respiratory diseases	59.1
F00-F99 Mental and behavioural disorders	40.7
G00-G99 Diseases of the nervous system	32.3
All other disease	166.3
Total for all diseases	**617.5**

*J00-J99 Respiratory diseases include communicable and chronic respiratory diseases
Source: National Register of Causes of Deaths[23]

The high prevalence of obesity is also of public health concern. It is a chronic condition by itself, as well as an underlying cause of the development of type 2 diabetes, cardiovascular diseases, respiratory diseases, musculoskeletal disorders, several types of cancer and depression.[25] In Luxembourg, childhood obesity is common (2022: 6% of children 11 to 18 years old), placing immediate as well as later-life risks on health.[26] Among adults, one in six is obese (16%: EHIS 2019) and obesity is more than twice as common among people with a lower level of education (25%) as among those with a higher level (10%).

Chronic diseases are widespread and unevenly distributed among the population in Luxembourg (Figure 5). In 2024, about one in five people aged 16 years and above, regardless of gender, reported having a chronic condition, with a higher prevalence among older age groups. There is also a clear social gradient, with the prevalence gradually increasing as the level of educational attainment decreases, creating a large gap between those with the lowest (29.6%) and the highest level of education (18.0%).

Figure 5. Prevalence (%) of chronic conditions (defined as having a long-standing illness or health problem) among people aged 16 and above, by gender, age group and educational attainment level, Luxembourg, 2024



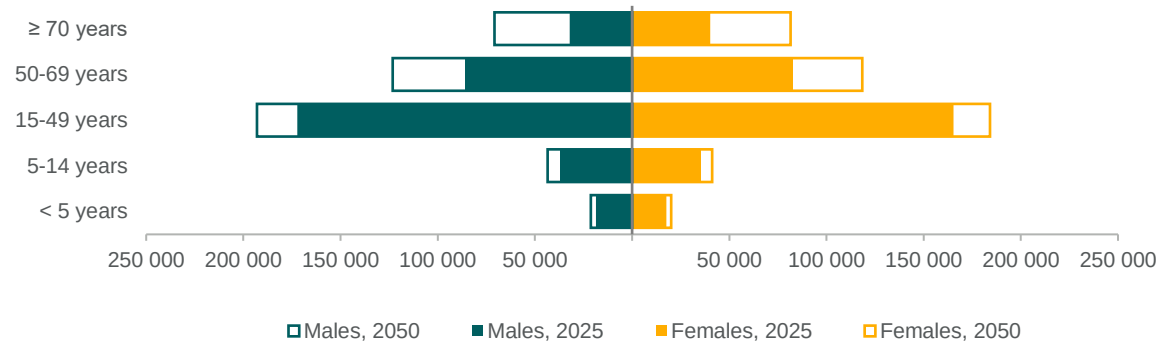
Source: EU-SILC

The coexistence of multiple chronic diseases is common. A recent study in Luxembourg conducted among primary care users shows that among people aged 45 and above, with at least one chronic disease, more than half had multiple chronic conditions.[27] Multimorbidity is of concern, as it is associated with a lower quality of life, greater complexity of disease management, increased use of health services and poorer health outcomes for patients.[28–32]

1.2. Effect of population growth and ageing on the burden of chronic diseases

Luxembourg's population is projected to grow by approximately a third within the next 25 years: from 687 081 in 2025 to circa 897 000 in 2050 (Figure 6). This growth will mainly be in the adult population. Notably, the proportion of the population aged 50 years and above will increase: from 35% of the total population in 2025 to 44% in 2050.

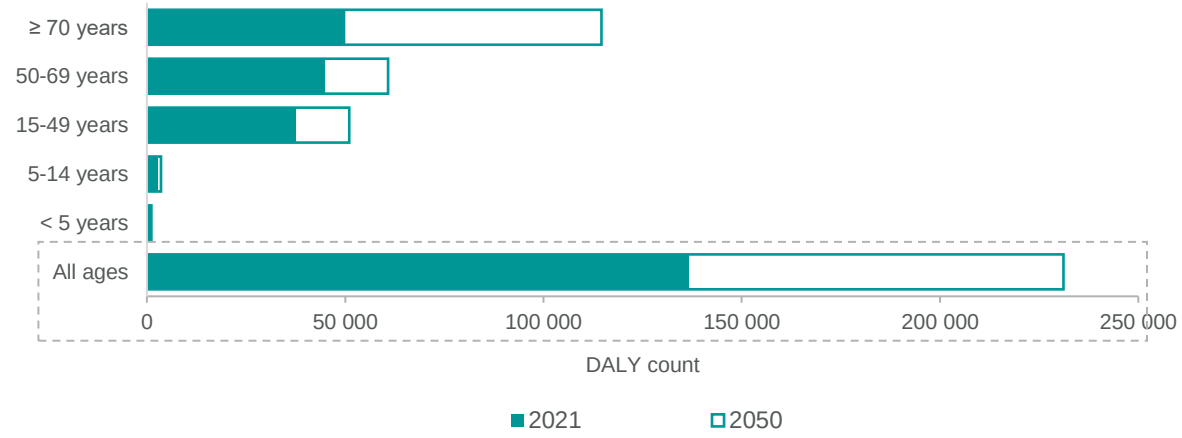
Figure 6. Age pyramids of the population of Luxembourg, 2025 and projection for 2050



Source: Eurostat, Europop 2023, baseline projection

Because older people have more chronic diseases, the growth and ageing of the population will lead to a rise in the absolute burden of chronic diseases (the total DALY count) (Figure 7). Overall, the absolute burden will increase by 70% between 2021 and 2050; the increase will be 130% among people aged 70 years or above, and 35% among people aged 15 to 69. This foresight assumes that future trends of health behaviours will be similar to those in previous years.[33,34] A positive shift in health behaviours could curb the future burden of chronic diseases and mitigate the impact of population ageing by enabling healthier ageing.[35]

Figure 7. Estimate of the absolute burden of disease (total DALY count) due to chronic diseases, by age, Luxembourg, from GBD 2021 and foresight for 2050



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Social and economic consequences of chronic disease

Chronic diseases have major social and economic impact. The direct costs are related to the treatment and care of patients, involving massive human and technical resources and costs. It is estimated that 70–80% of the total healthcare expenditure in the European Union (EU) is spent on managing chronic diseases.[36] Considering the substantial increase in the number of patients with chronic diseases in the years to come, financing and ensuring access to high-quality health services will be a major challenge.[37–39]

Chronic diseases also impose significant economic consequences on individuals and households, by reducing labour market participation, decreasing incomes and increasing health-related costs, leading to losses in savings. Additional indirect costs arise from the impact of chronic diseases on the global economy, including productivity losses, reduced tax revenues and smaller returns on human capital investments. For instance, the direct and indirect costs linked to cardiovascular disease, cancer, chronic

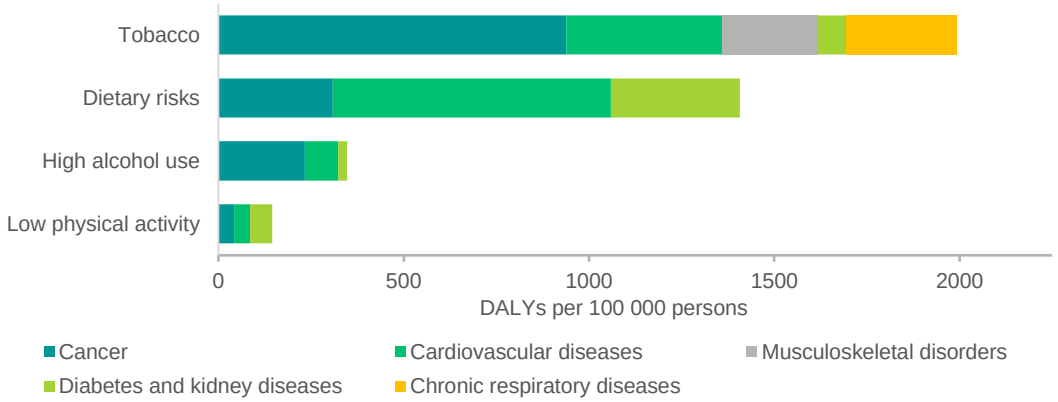
respiratory disease and diabetes produce economic losses estimated to be equal to 2% of the gross domestic product (GDP) of EU member states.[40,41]

The high chronic disease burden also undermines the capacity to cope with global crises. During the COVID-19 pandemic, people with chronic conditions had a higher risk of severe COVID-19 infection, increasing the pressure on the health system.[42–45]

Health behaviours and social determinants of health

Based on the Global Burden of Disease Study 2021 (IHME), it is estimated that tobacco use accounted for 11% of deaths in Luxembourg, unhealthy diet for 10%, alcohol use for 4% and physical inactivity for 1%. These four health behaviours are the cause of a high burden of disease (DALYs/100 000 persons) for cancer, cardiovascular disease, diabetes and kidney disease, chronic respiratory diseases and musculoskeletal disorders (Figure 8).

Figure 8. Estimate of the relative burden (DALYs per 100 000 persons) attributable to the main chronic diseases by type of risk factor, Luxembourg, from GBD 2021



Source: Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.
Note: Data sources for GBD 2021 risk factor 'High alcohol use' for Luxembourg come from national surveys (Eurobarometer and Health Behaviour in School-aged Children, HBSC) and the WHO Global Health and the WHO Global Health Observatory (based on FAO data). Since Luxembourg's sales data does not reflect residents' consumption, its alcohol consumption is estimated as the average of France and Germany.

1.3. Population-based primary prevention and health inequalities

Primary prevention encompasses all interventions aimed at preventing the occurrence of disease, by targeting individuals directly or the population as a whole (Figure 2). The maximum possible sustained impact on and benefit to public health is usually achieved by a coordinated prevention strategy, combining evidence-based effective population-based and individual-level interventions.[46]

The population-based primary prevention of chronic diseases aims to shape health behaviours by addressing the social, economic, environmental, commercial, cultural and political determinants of health that play an important role in influencing health behaviours across a population. These interventions support changes to the population's living context, making healthy choices the default option and the societal norm.[15] By nature, relevant public policies and their implementation mostly lie outside the health sector. Therefore, participation and investment across public and private sectors are crucial, benefiting from the active involvement and actions of civil society.

There is growing recognition of the importance of addressing health disparities in chronic diseases.[12,47,48] Education and income are critical factors contributing to these health disparities. Individuals with lower levels of education or income, or those at risk of poverty or social exclusion, often experience poorer health due to limited opportunities for healthy behaviours, safer and healthier living conditions, and access to care. Acting on these social determinants of health, population-based primary prevention can improve health behaviours across all strata of the population, including disadvantaged and high-risk groups. If well designed, these interventions help decrease health inequity.[12,13,49,50]

2.

The four major health behaviors

Key messages

- Four modifiable health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity—are highly prevalent and responsible for a large share of chronic diseases in Luxembourg.
- Among adolescents aged 17 and 18 years old, two out of five have ever used tobacco.
- The downward trend of the prevalence of daily smoking observed since 2001 came to halt. The prevalence of daily smoking in 2024 is 15%, same as in 2018. Daily smoking is more frequent among people with a lower level of educational attainment.
- A large share of children has used alcohol before the age of 16, which is the current legal age to purchase alcoholic beverages. Over half of the children aged 17 to 18 have already experienced being drunk.
- Among adults, daily alcohol use is frequent, and more so in older age groups compared with younger people; and among people with a lower level of education compared with a higher level.
- Weekly binge drinking is highly prevalent, and slightly less frequent among people with a higher level of educational attainment than among those with a lower level of education.
- About a quarter of children 11 to 18 years meet the recommendations of eating five portions of fruit and vegetables daily. Children from high-affluent families more frequently meet these recommendations than children from less-affluent families.
- The prevalence of eating five or more portions of fruit and vegetables a day is low; and lower among people with a medium or low level of educational attainment than among those with high level.
- While only one in six children meets the recommendations of 60 minutes of physical activity per day, it is more frequent among boys than girls, and among children from more-affluent families than those from less-affluent families.
- Approximately one in five adults engaged weekly aerobic exercise and muscle strengthening as recommended, with a higher proportion among men than among women, and among people from higher socioeconomic backgrounds than those from lower socioeconomic backgrounds.

This chapter examines the prevalence of four major health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity—responsible for a large share of the chronic disease burden in Luxembourg. It analyses how these health behaviours are distributed across different demographic, social and economic groups.

2.1. Tobacco use

Tobacco use is the leading cause of the chronic disease burden in Luxembourg (Figure 8).

Tobacco smoke contains tar, carbon monoxide and thousands of other chemical substances that are harmful to health.[51] Nicotine, a substance that affects the brain's reward system, is highly addictive and leads to difficulties of cessation, even when individuals are aware of the health risks.[52,53]

Any pattern of tobacco consumption is harmful to health, even light or occasional smoking poses serious health risks.[54] Exposure to second-hand smoke increases the risk of many diseases and contributes to the chronic disease burden.[55,56] Tobacco use and exposure to tobacco smoke during pregnancy is linked to an increased risk of foetal death, sudden infant death syndrome and long-term health problems.[57,58] In addition to the harmful effects of second-hand smoke, smoking in public contributes to normalisation of the behaviour.[59,60]

Smoking initiation mostly occurs at an early age. This is of particular concern, as it is associated with a higher level of consumption, an increased risk of addiction and a negative impact on health.[61]

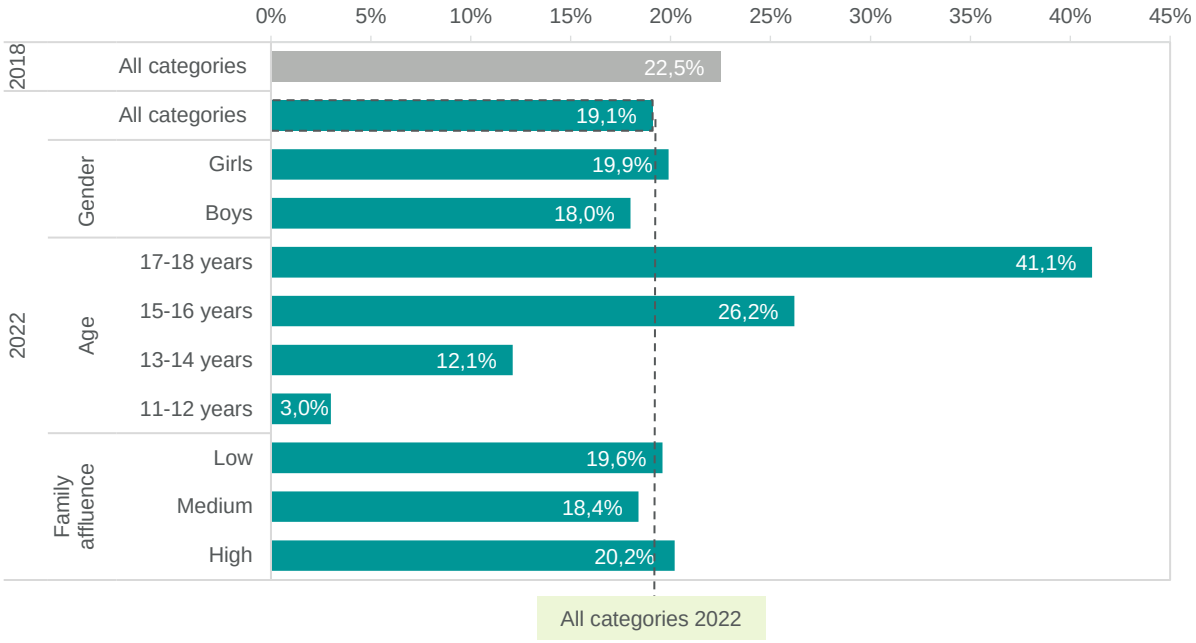
Recommendations in Luxembourg

The national tobacco plan, cancer plan and cardio-neuro-vascular disease plan recommend abstaining from smoking. The national tobacco plan 2016–2020 had the main objective of preventing and reducing tobacco consumption and its associated burden of disease. According to the latest coalition agreement from 2023, the plan would be assessed and, depending on the results, may be continued.[62] Tobacco control remains a priority for the Ministry of Health and Social security, which established working groups to develop interventions across five focus areas: youth, the general population, workplace environments, training and research, and legislation. Since 2017, and aligned with EU regulations, the sale of—and offering free—tobacco products is banned to people under 18 years of age.[63] The governmental plan benefits from the support of *Fondation Cancer*, a civil society organisation that leads the Luxembourg *Génération Sans Tabac*, a public health movement aiming to create a society in which children grow up without being exposed to the dangers of smoking. One of their objectives is to reduce the prevalence of smokers to under 5% by 2040.[64,65] According to a study conducted in 2025, eight out of 10 residents support the measures proposed by *Génération Sans Tabac* to reach this objective.[66]

Use of tobacco among children and adolescents

In 2022, 19.1% of children 11 to 18 years old had ever used tobacco (2018: 22.5%) (Figure 9). This proportion increased with age, reaching 41.1% among those aged 17 to 18.[67] The prevalence was similar among boys and girls and showed no differences by family affluence.

Figure 9. Lifetime prevalence (%) of tobacco use among 11 to 18 year olds, 2018 and 2022. Stratified by gender, age and family affluence, Luxembourg, 2022

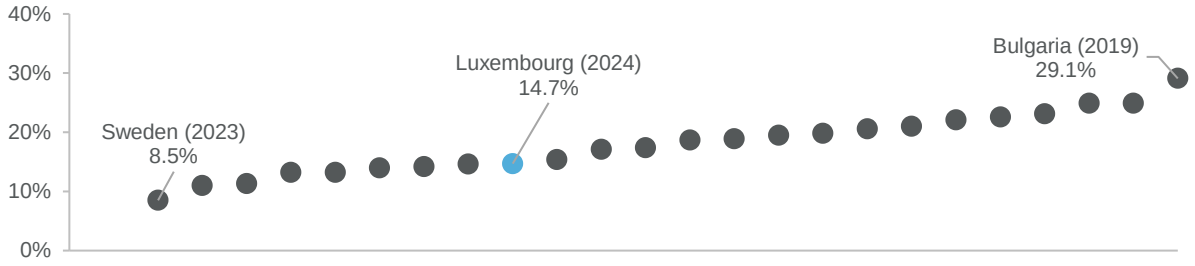


Source: HBSC

Use of tobacco among adults

Among the EU-27 countries with recent data available for the prevalence of daily smokers, Luxembourg (14.7%) was situated in the lower segment of the distribution of all countries, but had a substantially higher prevalence than Sweden (8.5%) (Figure 10).

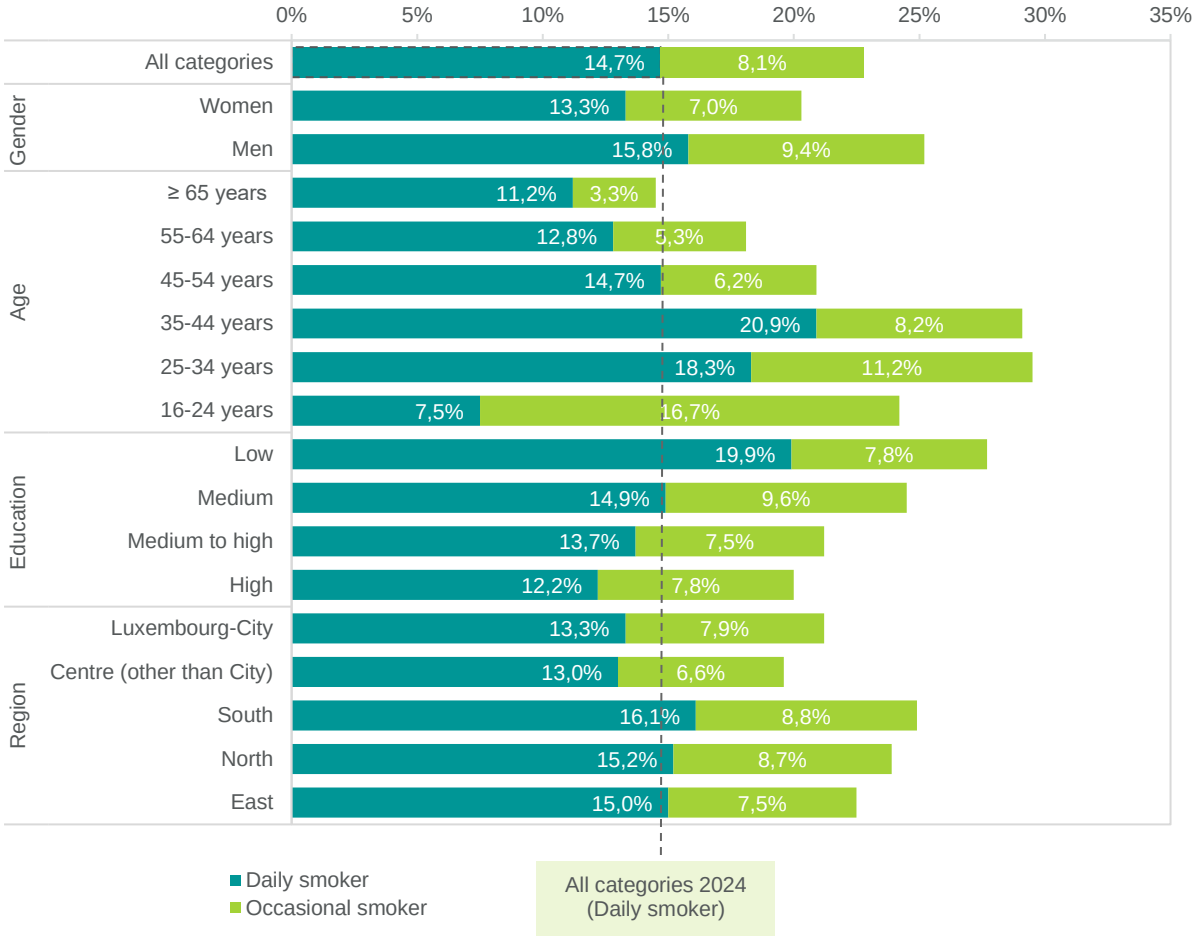
Figure 10. Prevalence (%) of daily smokers among people 15 years and above in the EU-27 countries: Luxembourg, EU-27 lowest and highest, 2024 or latest year available since 2018



Source: Survey on Tobacco use in Luxembourg

In 2024, the prevalence of daily and occasional smokers was lower among women than men (Figure 11). Young adults aged 16–24 had the lowest prevalence of daily smokers, but the highest prevalence of occasional smokers. The prevalence of daily smokers peaked among people 25–44 years of age. People with a low level of educational attainment had a higher prevalence of daily smokers compared with other educational groups. The prevalence of daily and occasional smokers was slightly lower in Luxembourg City and the region of the Centre (other than the city), compared with other regions of the country. In the same survey, three out of four smokers reported having started smoking before the age of 19.[68]

Figure 11. Prevalence (%) of daily or occasional smoking (excluding e-cigarettes) among people 16 years and above, by gender, age, level of educational attainment and region of residence, Luxembourg, 2024



Source: Survey on Tobacco use in Luxembourg

Between 2001 and 2018, the prevalence of daily smokers among adults declined by 11 percentage points, reaching 14.5% in 2018 (Figure 12). However, this downward trend came to a halt, with a prevalence of 14.7% in 2024.

Figure 12. Prevalence (%) of daily smokers (excluding e-cigarettes) among people aged 16 and above, Luxembourg, 2001 to 2024

Source: Survey on Tobacco use in Luxembourg

Note: Data from 2001 to 2017 includes young adults aged 15 years and above. From 2018 onwards, the data includes those aged 16 and above. Since 2019, the data collection mode has been exclusively online, compared with previous years that used both telephone and online interviews.

Between 2011 and 2023, the proportion of daily smokers among young people 16–34 years old remained relatively stable (Figure 13).[a] Among those aged 35 to 44, the proportion increased starting in 2018 and has remained higher compared with the period between 2011 and 2017. A moderate increase was observed among those aged 45 to 54, starting in 2020. The proportion of daily smokers among people aged 55 and above remained relatively stable over the observed years.

Figure 13. Prevalence (%) of daily smokers (excluding e-cigarettes) among people 16 years and above, by age, Luxembourg, 2011 to 2023 (2010–2024 data presented as a 3-year centred moving average)

Source: Survey on Tobacco use in Luxembourg

Note: Data from 2001 to 2017 includes young adults aged 15 years and above. From 2018 onwards, the data includes those aged 16 and above. Since 2019, the data collection mode has been exclusively online, compared with previous years that used both telephone and online interviews.

[a] The prevalence of daily smokers per age group involves smaller numbers, therefore they are sensitive to random fluctuations. To facilitate the analysis of trends by age, we applied 3-year centred moving averages. For example, the prevalence of daily smokers among people aged 16 to 24 in 2020 (presented as a 3-year centred moving average), is the average of the annual prevalence observed in 2019, 2020 and 2021.

Textbox 1. New and Emerging Products

- New and emerging nicotine and tobacco products have not been proven to be safe. These products emit harmful substances. As they are relatively new, long-term evidence is needed to generate insight into their effect on chronic diseases.[69–71]
- There is a link between these products and a higher likelihood of initiation and subsequent smoking among young people. However, novel products can help some cigarette smokers to quit.[69,70,72]
- The marketing of new and emerging products, such as puffs (disposable e-cigarettes) and nicotine pouches in particular, target young people among others through appealing packaging and flavours. Since October 2025, Luxembourg has regulated heated tobacco products and nicotine pouches in the same way as traditional tobacco. This includes mandatory health warnings, restrictions on advertising and sponsorship, a legal minimum purchasing age of 18, and prohibitions on use in youth-frequented areas like schools and playgrounds. Additionally, nicotine pouches are limited to 0.048 mg of nicotine per unit.[73,74]
- In 2024, 4% of the general population (16 years and above) in Luxembourg were using nicotine pouches and 12% were using electronic cigarettes. Among young adults aged 16 to 24, those proportions were as high as 16% for nicotine pouches and 26% for electronic cigarettes. The 2024 reduction in tobacco use among young adults needs to be explored in the context of the rise in emerging and new products.[68]

2.2. Use of alcohol

The consumption of alcohol is a major cause of chronic diseases in Luxembourg (Figure 8).

The lower the amount of alcohol consumed, the lower the risk of developing chronic diseases.[75,76] Since 1988, alcohol has been classified as a carcinogen (as are tobacco, asbestos or radiation) by the International Agency for Research on Cancer and the WHO.[77] Research has shown that even light or moderate drinking increases the risk of specific cancer types, including breast and colorectal cancers.[75,78] Patterns of consumption, such as frequency and binge drinking habits, as well as individual factors, including overall health, age and gender, determine the hazards of alcohol intake.[79,80] At a young age, alcohol use can have particularly harmful effects on cognitive and psychological development. Furthermore, alcohol use during early life increases the risk of alcohol use and related dependency and disorders later in life.[81–83]

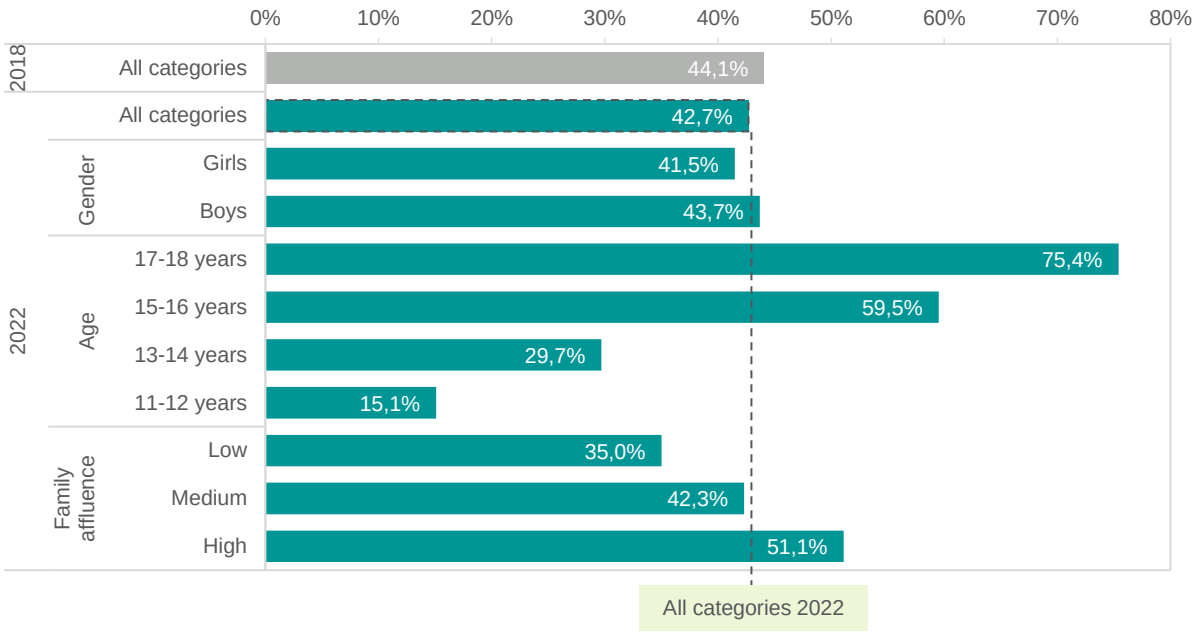
Recommendations in Luxembourg

The Ministry of Health and Social security recommends that women limit alcohol use to no more than one glass of wine (10 cl) or one beer (25 cl), and men to no more than two glasses of wine or two beers per day. In addition, it is recommended to abstain from alcohol at least two to three days per week and to abstain from alcohol during pregnancy. For adolescents aged 18 to 20, it is recommended to consume less than the limits recommended for adults, while for those aged 16 to 18, it is advised to abstain from alcohol entirely or limit consumption to rare occasions.[84] Since 2006, the sale and offering for free of beverages containing alcohol has been banned for minors under 16 years old. The Luxembourg Action Plan against Alcohol Misuse 2020–2024 suggests raising this age limit to 18.[85,86]

Alcohol use among children and adolescents

In 2022, 15.1% of children aged 11 to 12 had consumed alcohol at some point during their life (Figure 14).[67] This proportion reached 75.4% for those aged 17 to 18. The prevalence of lifetime alcohol use was lower among children and adolescents from low affluence families. Also the prevalence of lifetime drunkenness was lower in children from low affluence families compared to those from high affluence families.[67]

Figure 14. Lifetime prevalence (%) of alcohol use among 11 to 18 year olds, 2018 and 2022. Stratified by gender, age and family affluence, Luxembourg, 2022

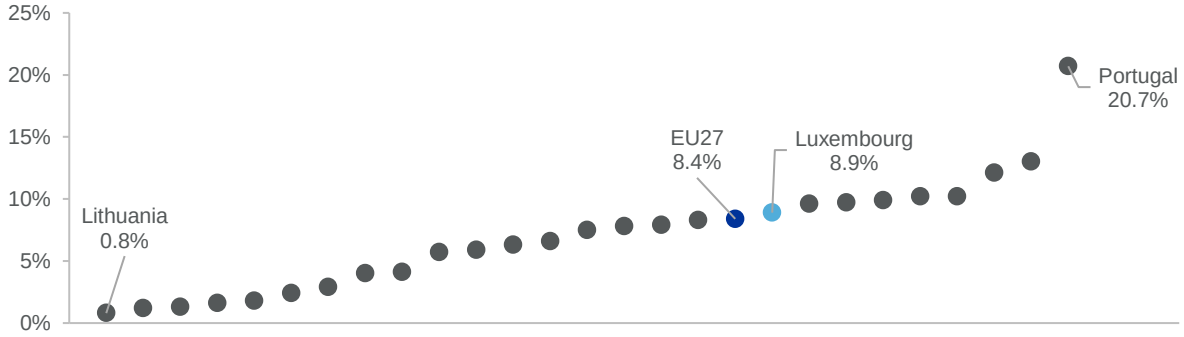


Source: HBSC

Alcohol use among adults

In 2019, the prevalence of daily alcohol use in Luxembourg (8.9%) was higher than in most other EU-27 countries and slightly exceeded the EU-27 average (8.4%) (Figure 15).

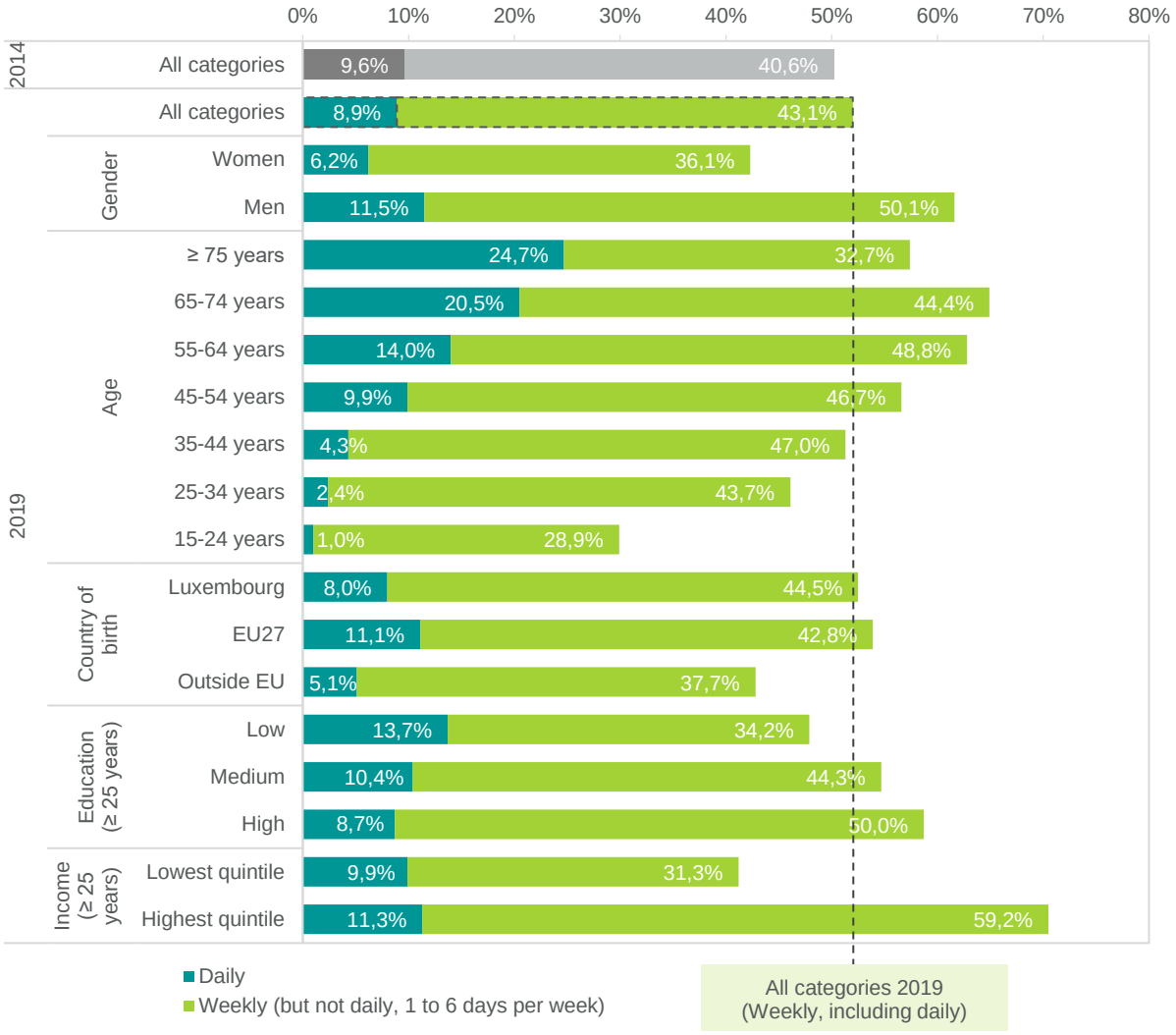
Figure 15. Prevalence (%) of daily alcohol use among people 15 years and above in the EU-27 countries: Luxembourg, EU-27 average, EU-27 lowest and highest, 2019



Source: EHIS

The proportion of people having daily alcohol use was similar in 2019 to that in 2014 (9.6%) and was lower among women than men (Figure 16). The proportion was higher among people with a low level of educational attainment than those with a medium or high level.

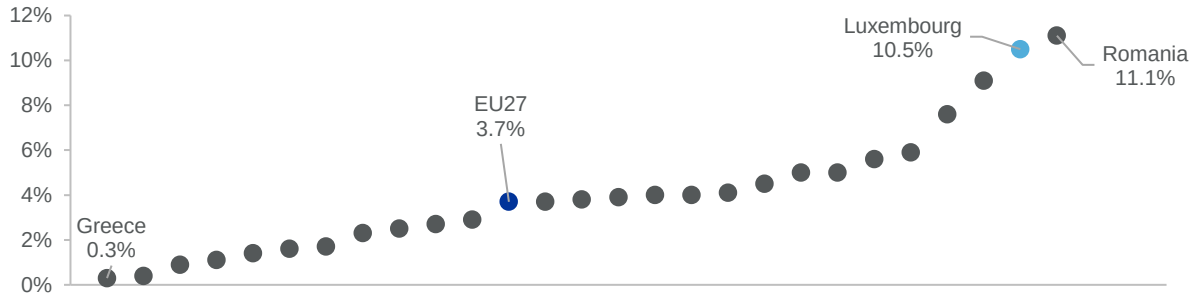
Figure 16. Prevalence (%) of alcohol consumption among people 15 years and above by frequency (daily, and weekly but not daily—i.e. 1 to 6 days per week), 2014 and 2019. Stratified by gender, age, country of birth, level of educational attainment and income (lowest and highest quintiles), Luxembourg, 2019



Source: EHIS

In 2019, the prevalence of weekly binge drinking (defined as consuming five or more drinks on a single occasion) was 10.5%—almost three times the EU-27 average (Figure 17).

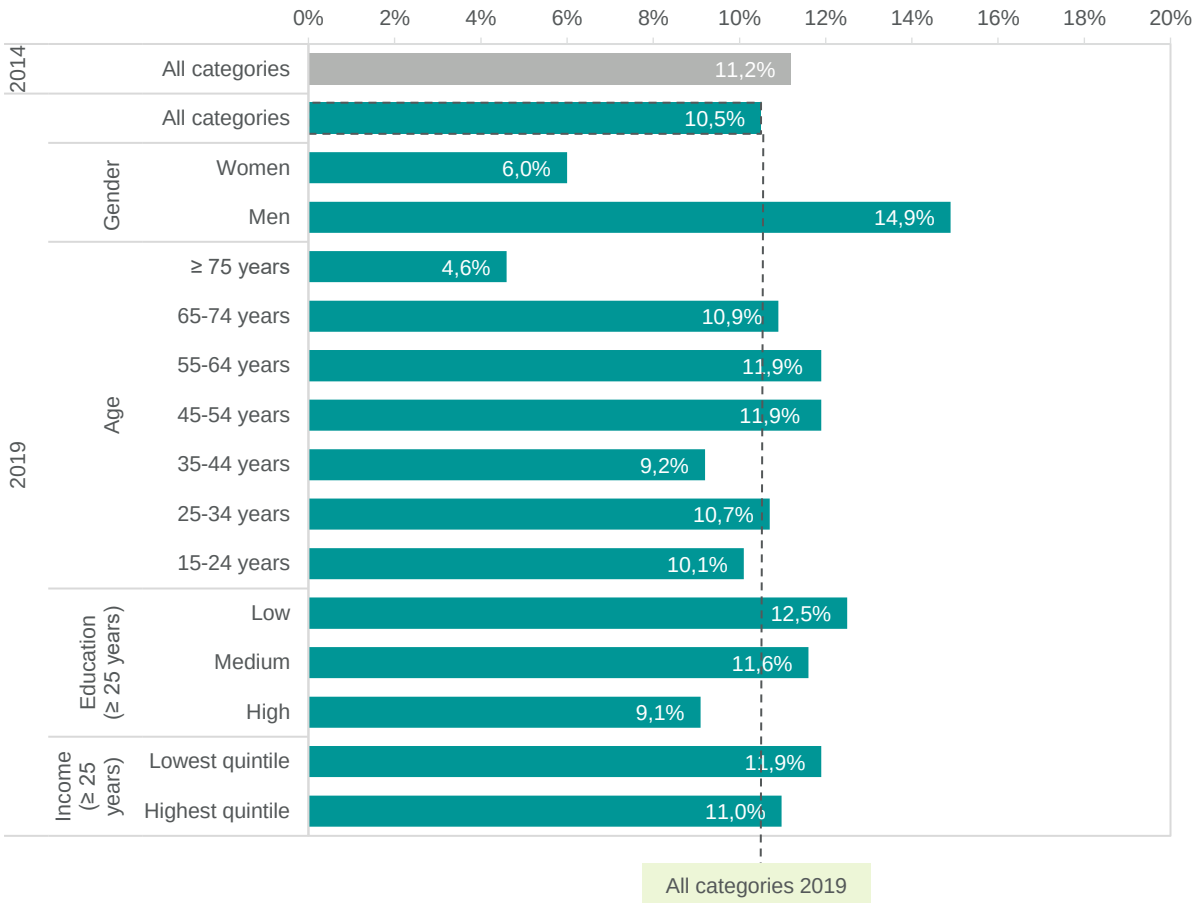
Figure 17. Prevalence (%) of weekly binge drinking among people 15 years and above in EU-27 countries: Luxembourg, EU-27 average, EU-27 lowest and highest, 2019



Source: EHIS

The prevalence of weekly binge drinking was lower among women than among men and did not differ by age (Figure 18). The prevalence of weekly binge drinking was slightly higher among people of low educational level. The prevalence was similar between those in the highest and those in the lowest income quintiles.

Figure 18. Prevalence (%) of weekly binge drinking among people 15 years and above, 2014 and 2019. Stratified by gender, age, level of educational attainment and income (lowest and highest quintiles), Luxembourg, 2019



Source: EHIS

2.3. Unhealthy diet

Unhealthy diet is a major cause of the chronic disease burden in Luxembourg, contributing to the burden due to conditions including cardiovascular disease, diabetes and cancer (Figure 8).

A healthy and well-balanced diet can help prevent chronic diseases, including obesity.[87,88] The consumption of adequate amounts of fruit and vegetables is central to a healthy diet. Other important components include the consumption of unsaturated fats instead of saturated and trans fats, and limiting the intake of salt and sugar.[89] Major sources of sugar consumption are soft drinks, processed foods and sweets. These foods increase the risk of obesity and dental caries.[90] Healthy dietary habits during childhood are particularly important for supporting optimal physical and cognitive development, as well as for establishing good nutritional habits.[91,92] A healthy diet at young ages can be an important step in reducing the incidence of cardiovascular diseases, diabetes and cancer in the population.[93]

Recommendations in Luxembourg

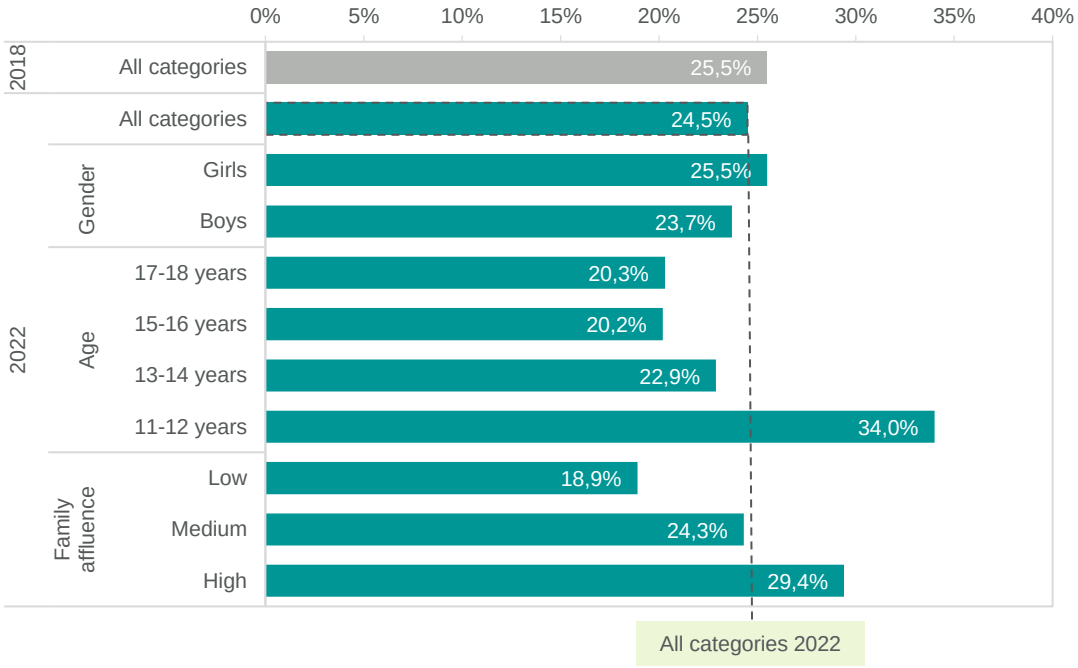
In Luxembourg, the national inter-ministerial framework 'Eat healthy and move more' (Gesond iessen, Méi beweegen: GIMB), recommends eating at least five portions of fruit and vegetables a day, as well as limiting the intake of food and drinks high in sugar to small quantities and only occasionally. For infants, it also promotes exclusive breastfeeding during the first 6 months of life and continued breastfeeding, together with a balanced introduction of complementary foods, up to 2 years of age and beyond.[94,95]

Feeding practices for newborns, and dietary behaviours among children and adolescents

Between 2011 and 2021, the proportion of newborns exclusively breastfed at discharge from hospital after birth decreased from 81% to 73%. During the same period, the mixed feeding of both formula and breastfeeding increased from 8% to 15%. The proportion of newborns exclusively formula fed was 11% in 2021.[96,97]

In 2022, one in four 11 to 18 year olds (24.5%) ate fruit and vegetables daily (Figure 19) (25.5% in 2018). The prevalence of daily fruit and vegetable consumption showed disparities, with about one in three children and adolescents from high affluence families consuming fruit and vegetables daily, compared with fewer than one in five among those from low affluence families.[97–99]

Figure 19. Prevalence (%) of daily fruit and vegetable consumption among 11 to 18 year olds, 2018 and 2022. Stratified by gender, age and family affluence, Luxembourg, 2022



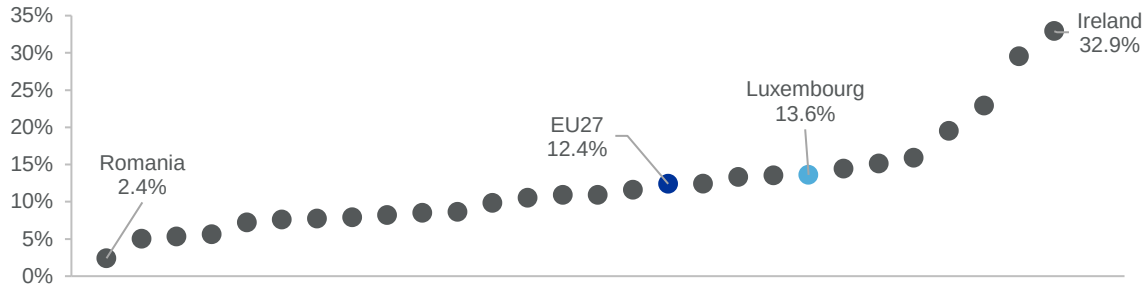
Source: HBSC

One in four (23.7%) 11 to 18 year olds consumed soft drinks daily (2018: 23.9%) (see Annex 1, Figure 26). The proportion was lowest among those aged 11 to 12, compared with older children and adolescents. A lower proportion of children and adolescents from high affluence families consumed soft drinks daily, compared with children and adolescents from less-affluent families.[97,98]

Dietary behaviours in adults

In 2019, 13.6% of people 15 years and above in Luxembourg consumed five or more portions of fruit and vegetables daily. This was close to the EU-27 average, but far lower than Ireland, which reported the highest consumption among the EU-27 countries (Figure 20).

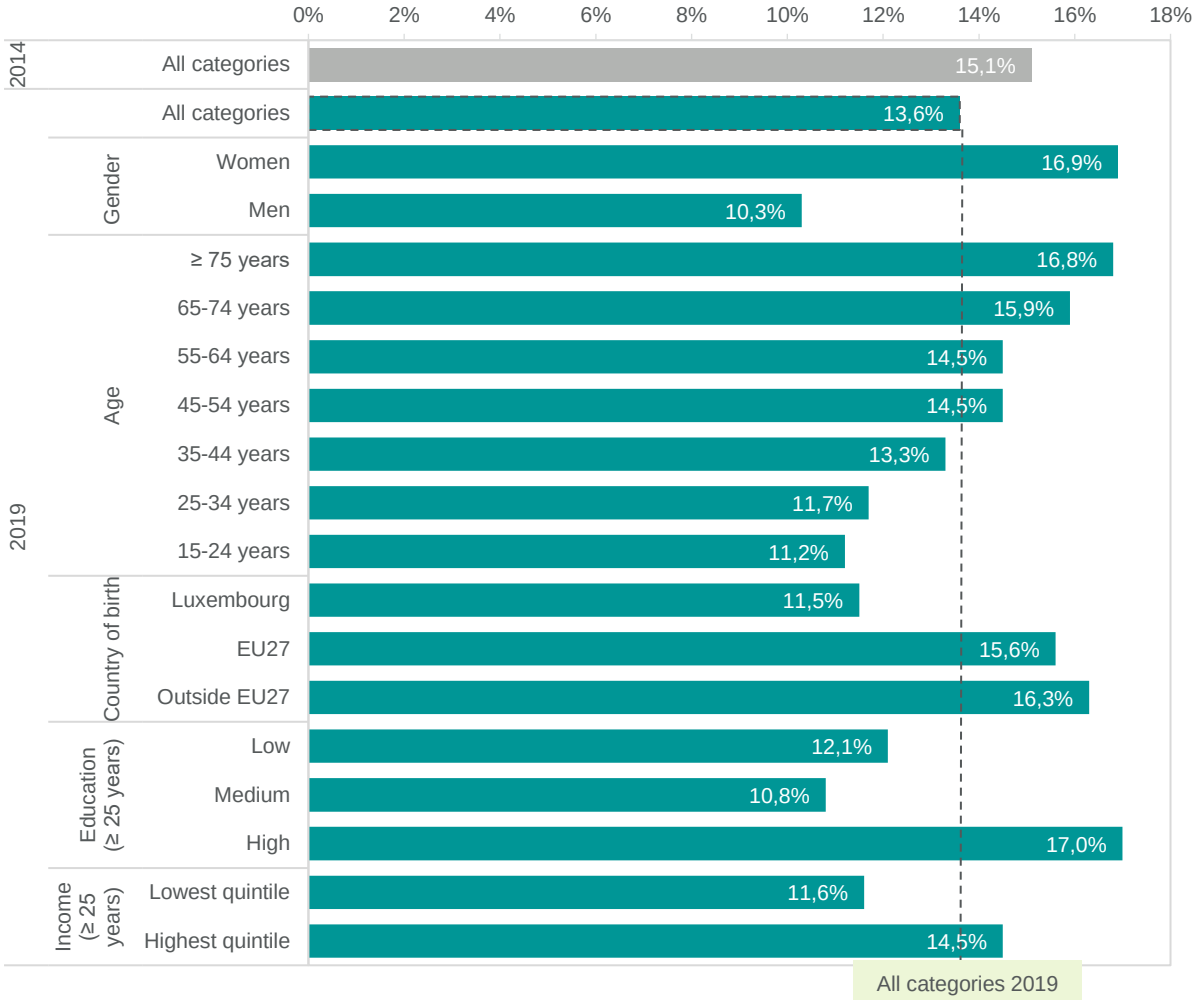
Figure 20. Prevalence (%) of consumption of five or more portions of fruit and vegetables daily among people 15 years and above in EU27 countries: Luxembourg, EU-27 average, EU-27 lowest and highest, 2019



Source: EHIS

In Luxembourg, the prevalence of consuming five or more portions of fruit and vegetables daily was 13.6% in 2019 (2014: 15.1%) (Figure 21). Consumption of five or more portions was more prevalent among women than men, and more prevalent among older adults. These proportions were higher among people with a high level of education than among those with medium and low levels of education. Eating five or more portions of fruit and vegetables daily was more frequent among people born in a foreign country than among those born in Luxembourg.

Figure 21. Prevalence (%) of consumption of five or more portions of fruit and vegetables daily among people 15 years and above, 2014 and 2019. Stratified by gender, age, country of birth, level of educational attainment and income (lowest and highest quintiles), Luxembourg, 2019



Source: EHIS

In 2019, the prevalence of soft drink consumption among people aged 15 years and above was 5.7% for daily consumption and 5.3% for consumption on four to six days per week (see Annex 1, Figure 27). Young adults aged 15 to 24 had the highest consumption of soft drinks compared with older age groups. The prevalence of consuming soft drinks daily was lower among people with a high level of high educational attainment than among those with medium or low levels.

2.4. Physical inactivity and sedentary behaviour

Physical inactivity contributes to the burden of chronic diseases (Figure 8). Physical and mental health, including overall wellbeing at any age, benefit from physical activity.[100,101] Among children, physical activity is important for good bone health, overall fitness and the prevention of chronic diseases in later life. It is also beneficial to children's general wellbeing and has a positive effect on their cognitive development.[91,102] Physical activity can be undertaken recreationally and during leisure time, as is the case for sports, general play and games, or performed as active mobility through walking or cycling, for instance. Manual labour or engaging in household tasks can also be considered physical activity.[103]

Sedentary behaviour refers to time spent sitting or lying with low energy expenditure while awake. Typically, this encompasses screen time (such as desk work, computer use, watching TV, playing video games, etc.), driving a car or reading. High levels of sedentary behaviour are associated with an

increased risk of cardiovascular disease, type 2 diabetes, some types of cancer and all-cause mortality.[104] Research indicates that even small increases in daily footsteps provide health benefits, which continue to grow as step count rises.[105]

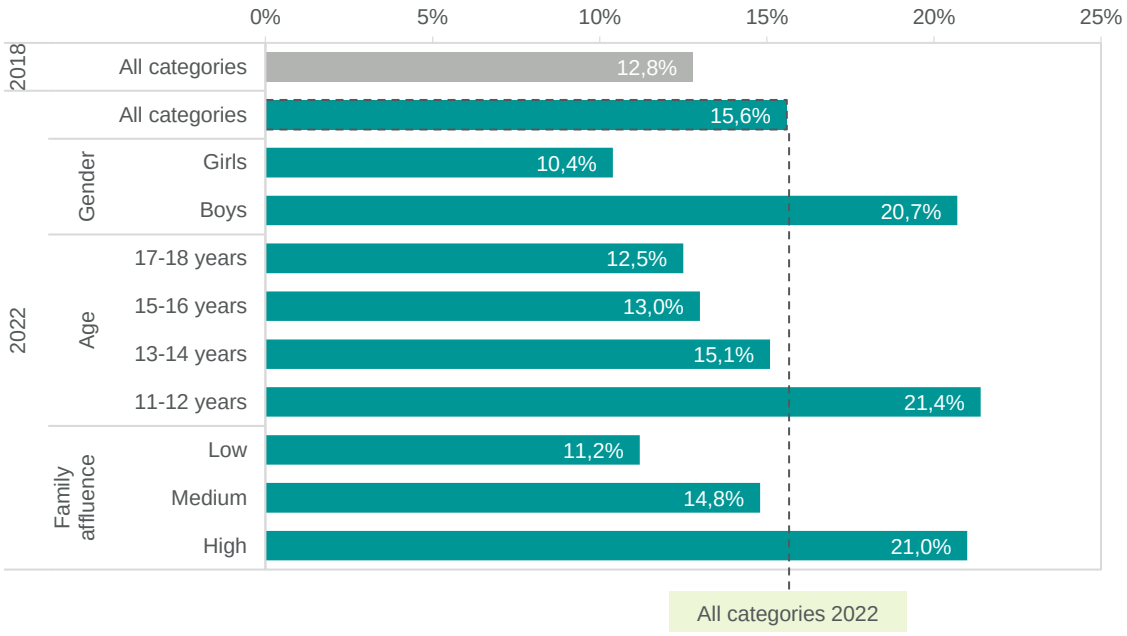
Recommendations in Luxembourg

The national inter-ministerial framework GIMB, aligned with the WHO recommendations on physical activity, recommends daily physical activity (e.g. playtime or sports) lasting at least 60 minutes for children. In addition to the daily 60 minutes, children may add vigorous sporting activities up to three times per week. Adults should aim for a minimum of 150–300 minutes of moderate-intensity physical activity (e.g. walking, cycling and gardening) or at least 75–150 minutes of vigorous-intensity physical activity (e.g. jogging, swimming and aerobics) or an equivalent combination of moderate and vigorous-intensity activity throughout the week. Adults should also perform muscle-strengthening activities. These should involve all major muscle groups and should be engaged in on two or more days a week, as they provide additional health benefits. For older adults, the recommendations remain the same but can be adapted to enhance balance and prevent falls.[106]

Physical inactivity among children and adolescents

In 2022, about one in six 11 to 18 year olds (15.6%) met the minimum recommendation of daily physical activity over the preceding seven days (Figure 22) (2018: 12.8%).[98] The prevalence was twice as high among boys as among girls, and gradually decreased with age. Children from more-affluent families were twice as likely to be physically active every day compared with those from less-affluent families. Similar demographic and social patterns were described for vigorous physical activity. For instance, 68.9% of children from more-affluent families and 47.4% of those from less-affluent families reported vigorous physical activity at least three times a week.[98]

Figure 22. Prevalence (%) of physical activity for at least 60 minutes daily during the previous 7 days, among 11 to 18 year olds, 2018 and 2022. Stratified by gender, age and family affluence, Luxembourg, 2022

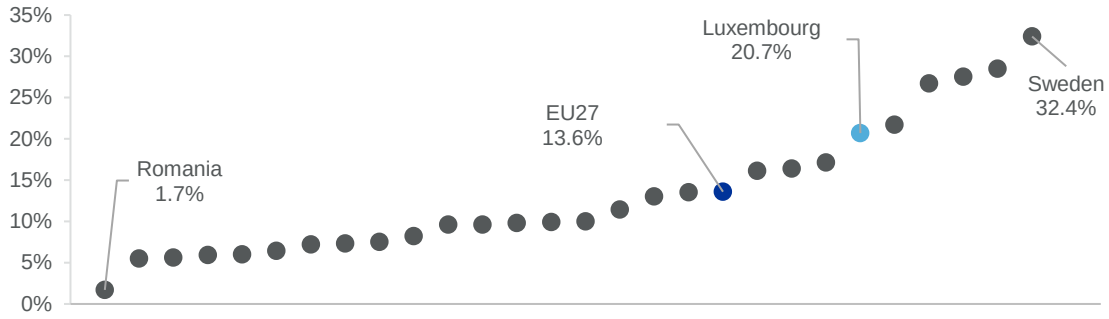


Source: HBSC

Physical inactivity among adults

In 2019, 20.7% of adults in Luxembourg met the recommendations for aerobic and muscle strengthening activity, placing the country within the upper tier of the EU-27 distribution of all countries and above the EU-27 average (13.6%) (Figure 23).

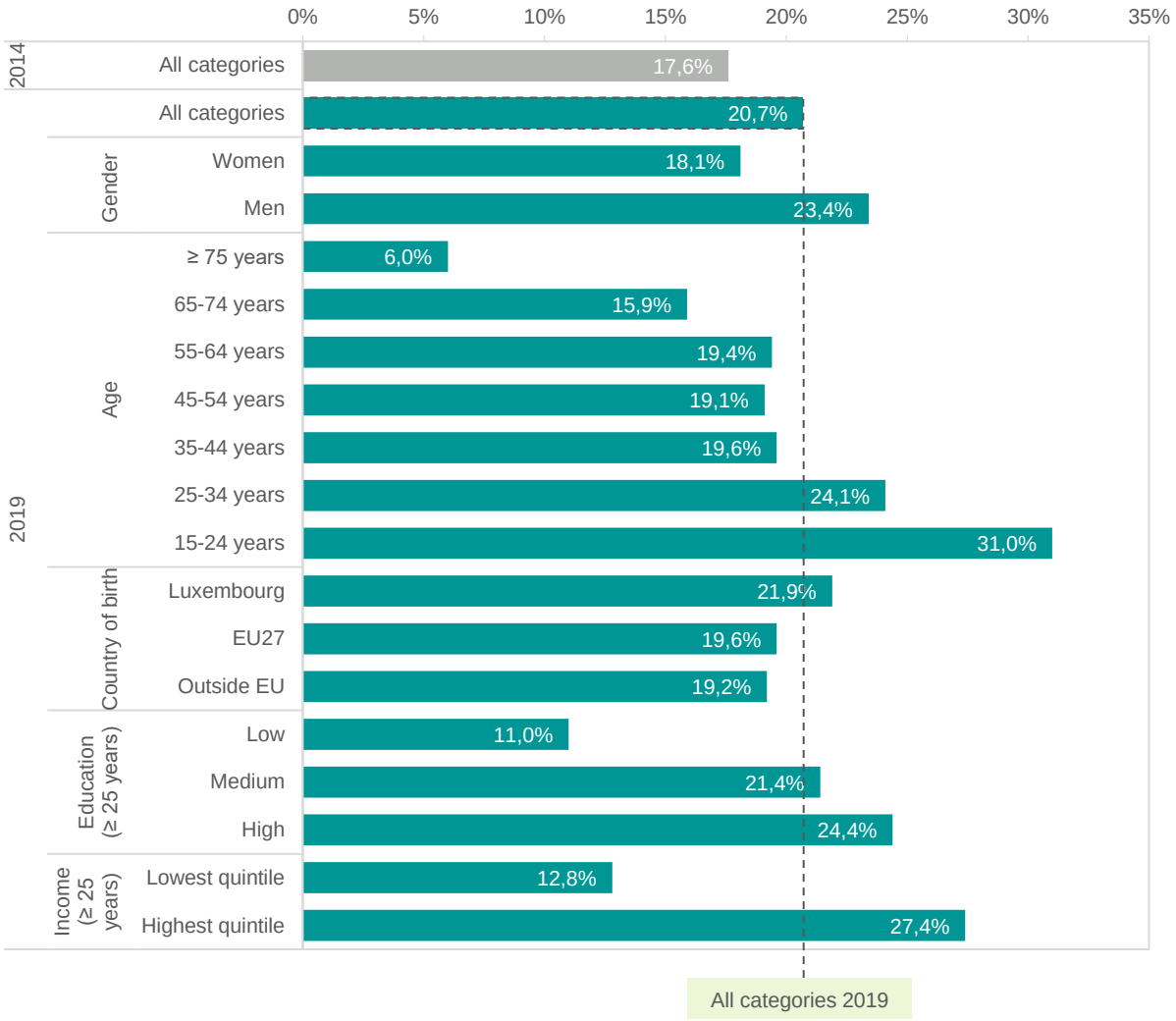
Figure 23. Prevalence (%) of engaging in weekly aerobic (minimum 150 minutes) and muscle strengthening activity (minimum twice per week) among people aged 15 years and above in EU-27 countries: Luxembourg, EU-27 average, EU-27 lowest and highest, 2019



Source: EHIS

The prevalence of meeting the minimum recommendations of physical activity was slightly higher in 2019 (20.7%) than in 2014 (17.6%) (Figure 24). The prevalence was higher among men than among women, and higher among younger age groups than older ones. The prevalence was more than twice as high among those with a higher level of educational attainment compared with those who had a lower level, and among the highest income quintile compared with the lowest.

Figure 24. Prevalence (%) of engaging in weekly aerobic (minimum 150 minutes) and muscle strengthening activity (minimum twice per week) among people aged 15 years and above, 2014 and 2019. Stratified by gender, age, country of birth, level of educational attainment and income (lowest and highest quintiles), Luxembourg, 2019



Source: EHIS

Active mobility here refers to walking or cycling for at least 10 minutes continuously to get to and from places and is an indicator of a non-sedentary lifestyle. In 2019, 89.6% of people reported walking and 17.2% reported cycling in a typical week (2014: 88.6% and 17.4%, respectively). Engaging in active mobility was more frequent among people with a high level of educational attainment and with higher income (see Annex 1, Table 8).

Textbox 2. Health behaviours clustering

Health behaviours tend to cluster, with certain behaviours more likely to occur together.[107,108] For example, low fruit and vegetable intake clusters with low physical activity or smoking.[109] This clustering of multiple health behaviours is strongly associated with social and economic determinants, and this can already be shown during childhood.[99,109] The risk of developing chronic diseases is amplified when these health behaviours co-occur, and at times the risk is higher than the sum of the effect of each behaviour due to the interplay of the determinants.[110–112]

3.
Prevention of chronic diseases

Key messages

Population-based interventions targeting the four major health behaviours are effective for the primary prevention of chronic diseases.[8] Many of those interventions have proven measurable public health impact within five years after their implementation.[10]

Tobacco

- Price increase is one of the most effective interventions to reduce tobacco consumption. The impact of increasing the tobacco price on the prevalence of chronic diseases would be significant and rapid in Luxembourg, with larger price increases resulting in substantially higher reductions in disease prevalence than smaller ones. Reductions in the burden of chronic diseases would be measurable within the first five years of implementation, or even sooner.
- In Luxembourg the price of tobacco products remains low, making them very affordable.
- Comprehensive mass media campaigns to raise awareness of the dangers of tobacco use and second-hand smoking are not currently in place.
- Several 'best buy' measures related to tobacco product packaging and advertising have been implemented; however, these measures are not comprehensive. For instance, there is no legal requirement for the use of plain packaging for tobacco products.

Alcohol

- Price increases are among the most effective measures to reduce alcohol consumption. Luxembourg has not implemented recommended pricing policies, making alcohol relatively inexpensive.
- Alcohol remains widely available, with no significant restrictions on its sale.
- Marketing regulations for alcohol are minimal, allowing wide promotion and advertising.

Nutrition

- Luxembourg has public food procurement policies in schools and childcare settings, ensuring access to balanced and sustainable meals; however, the legal guidelines could be more precise by setting clear, mandatory nutritional standards.
- Luxembourg promotes healthy lifestyles through inclusive public communication strategies that reach all age groups and settings. National campaigns, school programmes, workplace initiatives and outreach to older adults ensure the wide dissemination of dietary recommendations.
- Nutrition labelling is voluntary, limiting its reach and impact on consumer choices.
- No legal restrictions specifically designed to shield children from the marketing of products high in sugar, salt and fat are currently in place.

Physical inactivity

- Nationwide communication campaigns in Luxembourg actively promote physical activity.
- Active mobility is embedded in the National Mobility Plan 2035, and communication campaigns could strengthen awareness and understanding of its health benefits.
- Schools, communities, and national events actively foster participation, reinforced by the GIMB action plan promoting integrated healthy lifestyles.

This chapter delves into evidence-based, population-based interventions for the primary prevention of chronic diseases (Figure 2) and describes their implementation in Luxembourg.

Luxembourg demonstrates a strong commitment to managing and preventing chronic diseases and promoting overall health and healthy ageing through several international agreements. It endorses the WHO Global Action Plan for the Prevention and Control of Noncommunicable Diseases (NCDs), originally adopted for the period 2013–2020. This plan was later extended to 2030 to align with the United Nations Sustainable Development Goals (SDGs), particularly Target 3.4, which aims to reduce premature mortality from NCDs by one third by 2030. A major milestone of this plan was the 2025 target of a 25% relative reduction in premature mortality from cardiovascular diseases, cancer, diabetes and chronic respiratory diseases—a goal that Luxembourg has achieved.[113] The plan outlines a comprehensive set of policy actions and targets to reduce the global burden of NCDs. Luxembourg also supports the WHO Framework Convention on Tobacco Control (FCTC), which seeks to reduce tobacco use and its harmful effects, and the Global Strategy to Reduce the Harmful Use of Alcohol, which focuses on minimising alcohol-related harm.[114–116] Furthermore, Luxembourg is committed to the broader SDG agenda, encompassing a wide range of objectives, including health, well-being and sustainable development.[117,118]

In Luxembourg, the Ministry of Health and Social Security, through its Health Directorate, is responsible for developing and implementing health policies, including disease prevention and health promotion.[119] At the national level, several action plans and programmes address chronic diseases and health behaviours. These include the National Cancer Plan 2020–2026, the Luxembourg National Plan for Tobacco Control (PNLT) 2016–2020, the Luxembourg Action Plan against Alcohol Misuse (PALMA) 2020–2024 and the national inter-ministerial framework ‘Eat healthy, move more’ (Gesond iessen, Méi beweegen: GIMB). The National Health Plan published in 2023 (Plan National Santé) outlines strategic and operational priorities to improve population health, emphasising prevention, health promotion and equitable access to care. Additionally, the National Plan for Cardio-Neuro-Vascular Diseases (PN MCNV) 2023–2027 targets one of the leading causes of death in Luxembourg through coordinated efforts in governance, data collection, prevention and screening. A national prevention plan that consolidates prevention measures from different national action plans and programmes is currently being developed. It also proposes additional measures including population-based primary prevention that builds on cross sectoral approach to prevention and intersectoral investment. These initiatives are further supported by the Coalition Agreement 2023–2028, which reinforces the government’s commitment to public health and the prevention of chronic disease.[62,86,106,120–122]

3.1. Evidence-based primary prevention interventions

In 2010, the WHO developed a list of cost-effective policy options and recommended interventions that effectively address noncommunicable diseases (NCDs)—referred to as chronic diseases in this report. The interventions that have proven the most cost-effective are commonly referred to as the WHO ‘NCD best buys’. They form a key component of the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020, which was later extended to 2030. Acting at the individual and population level, the ‘NCD best buys’ target the leading health determinants of chronic diseases (Chapters 1 and 2).[8] They serve as a practical implementation roadmap for countries, offering evidence-based, cost-effective strategies to reduce the prevalence and impact of chronic diseases.[8,123]

This chapter is written from a public health perspective and focuses on primary prevention through population-based ‘NCD best buys’ interventions. These interventions target the four major modifiable health behaviours, with many having demonstrated a measurable public health impact within five years.[10] While population-based strategies are emphasised in this report, individual-level interventions can also be cost-effective, affordable and feasible, and they should be seen as complementary (see Chapter 1,Table 1).

Some effective interventions are not included in the 'NCD best buys' due to the absence of cost-effectiveness analyses. However, they remain relevant and are still highly recommended by the WHO. For instance, minimum age restrictions for the purchase or use of tobacco and alcohol are effective measures to protect children and adolescents, and are part of the WHO-formulated Framework Convention on Tobacco Control (FCTC) and SAFER initiative on alcohol.[116,124]

Table 3. Population-based primary prevention interventions within WHO 'NCD best buys'

Health behaviour	'NCD best buys' addressed
Tobacco use	■ Tax
	■ Graphic warnings / plain packaging
	■ Advertising bans
	■ Smoke-free policies
	■ Mass media campaigns
Alcohol use	■ Tax
	■ Advertising bans
	■ Restrictions on availability
Unhealthy diet	■ Reformulation policies
	■ Front-of-pack labelling
	■ Public food procurement
	■ Mass media campaigns
	■ Protect children from harmful food marketing
	■ Optimal breastfeeding practices
Physical inactivity	■ Communication campaigns

Source: Authors' compilation based on WHO (2024)[8]; Galea et al. (2025)[10]

Decisions regarding the implementation of population-based primary prevention interventions are ideally informed by evidence and context-specific considerations. Most measures target the social determinants of health (Chapter 1) and involve complex trade-offs, including potential positive and negative impacts on the economy and labour market, as well as social equity. Furthermore, effective implementation typically requires multisectoral action, involving collaboration across relevant public and private sectors—e.g. from health, finance, education, agriculture or trade—and active support from civil society. Strong regulatory capacity is also essential to ensure that policies are enforced and sustained over time. The EU-supported Joint Action to Prevent Noncommunicable Diseases (JA PreventNCD) has a dedicated work package to enhance fiscal and regulative measures targeting the four major health behaviours.[50]

3.2. Implementation of evidence-based primary prevention interventions in Luxembourg

This section examines each of the WHO population-based 'NCD best buys', describing the underlying goals of each intervention and the current level of implementation of each in Luxembourg.

Prevention efforts against tobacco use

In 2003, the WHO formulated the Framework Convention on Tobacco Control (FCTC).[116] Under this framework, Luxembourg, as a WHO member country, is legally bound to implement and enforce the agreed policies on tobacco control. 'Tobacco control' comprises a set of policies to reduce the supply of and demand for tobacco and to foster harm reduction, in order to improve the population's health by eliminating or reducing the exposure to tobacco. Tobacco prevention works best via a combination of policy measures, and there are several interventions that reduce tobacco consumption quickly and in a cost-effective manner.[10]

These interventions make up the WHO MPOWER package. This stands for 'Monitoring tobacco use and prevention policies; Protecting people from tobacco smoke; Offering help to quit tobacco use; Enforcing tobacco advertising, promotion, and sponsorship bans; Warnings about the dangers of tobacco; and Raising taxes on tobacco'.[125] All the MPOWER interventions are recognised as 'NCD best-buys'. Most of the recommended interventions have demonstrated an impact on population health within five years or less of their implementation, mainly by causing rapid reductions in tobacco use.[10]

Table 4. WHO 'best buys' for tobacco use prevention

Intervention	Population-based primary prevention intervention	Measurable impact within five years
■ Increase excise taxes and prices for tobacco products	Yes	Yes
■ Implement large graphic health warnings on all tobacco packages, accompanied by plain/standardised packaging	Yes	Yes
■ Enact and enforce comprehensive bans on tobacco advertising, promotion and sponsorship	Yes	Yes
■ Eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places and public transport	Yes	Yes
■ Implement effective mass media campaigns that educate the public about the harms of smoking/tobacco use and second-hand smoke	Yes	No
■ Provision of cost-covered effective population-wide support (including brief advice, national toll-free quit line services and cessation help) for tobacco cessation to all tobacco users	No	No
■ Provision of cost-covered, effective pharmacological interventions to all tobacco users who want to quit	No	Yes

Source: Authors' compilation based on WHO (2024)[8]; Galea et al. (2025)[10]

■ Increase excise taxes and prices for tobacco products

Increasing taxes on tobacco products leads to price rises, thereby reducing affordability for consumers. As a result, consumption of tobacco products drops and fewer people start using them.[126] This intervention is highly effective in reducing smoking prevalence, overall tobacco use and tobacco sales, and improving cessation rates.[127] The current scientific evidence suggests that a price increase of 10% through higher tobacco taxation reduces consumption by 4% in high-income countries.[126,128–130]

Furthermore, this effect is likely to be greater for people with lower incomes; in particular young people, as well as poorer segments of the population.[126]

Situation in Luxembourg

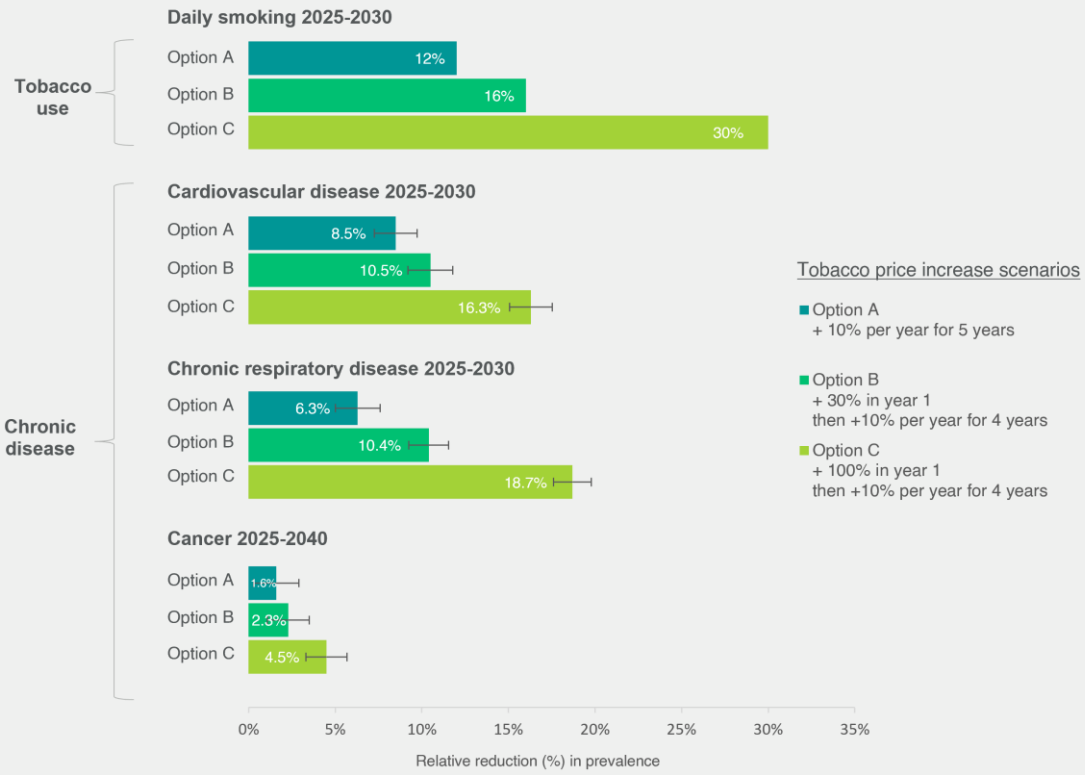
Tobacco products in Luxembourg are currently very affordable compared with the situation in other European countries, as a result of relatively low prices.[131,132] The low prices in Luxembourg are mainly linked to the low excise tax. For example, the excise tax for a pack of 20 cigarettes was €2.86 in Luxembourg in 2024, compared with €3.63 in Germany, €6.22 in Belgium and €7.45 in France.[133] Increasing tobacco prices is considered essential from a public health perspective in order to strengthen tobacco control in Luxembourg. Such a measure is supported by the Ministry of Health and Social Security but requires alignment with other sectors, such as public finance and the economy. In 2025, the Court of Auditors notes in its annual opinion on the State's budget that Luxembourg's tobacco tax revenues exert too much influence on budgetary considerations.[134] In addition, according to a survey conducted in 2025, more than seven out of 10 residents are in favour of increasing the price of all tobacco products.[66]

Textbox 3. Impact of increased prices on tobacco products in Luxembourg: a modelling study

For Luxembourg, modelling-based estimates indicate that a tobacco price increase could significantly reduce the burden of chronic disease over the coming years.[39,135] A 10% increase in price is predicted to lead to a reduction in smoking prevalence of around 3%.[136–139] The impact on the burden of disease among people aged 50 and above was examined for three tobacco price increase options between 2026 and 2030. Option A is a 10% increase each year over five years, option B is an initial 30% increase in the first year followed by a 10% increase per year for the next four years, and option C is an initial 100% increase in the first year, followed by a 10% increase per year for the next four years. All options show measurable effects within five years of implementation (Figure 25). The option with the largest price increase (option C), results in a two to three-fold greater reduction of three main chronic diseases—cardiovascular disease, chronic respiratory disease and cancer—compared with the lowest increase option (option A).

For more information on the model and its results see 'Case study: Increasing tobacco price to reduce the burden of chronic diseases in Luxembourg'.

Figure 25. Estimated relative reduction (%) in the prevalence of daily smoking, cardiovascular and chronic respiratory diseases between 2025 and 2030, and of cancer between 2025 and 2040 among people 50 years and above in Luxembourg



Source: SHARE; Survey on Tobacco use in Luxembourg; Case study: Increasing tobacco price to reduce the burden of chronic diseases in Luxembourg

Note: Tobacco price increase related reductions in daily smoking are calculated using published consensus estimates. Estimated reductions of the prevalence of chronic diseases are an outcome of the model. Cardiovascular disease refers to heart attack, including myocardial infarction, coronary thrombosis or any other heart problem, including congestive heart failure. Chronic respiratory disease refers to chronic lung disease, such as chronic bronchitis or emphysema. Cancer includes all types of cancer excluding minor skin cancer.

Implement large graphic health warnings on all tobacco packages, accompanied by plain/standardised packaging

Standardised packaging aims to reduce the promotional appeal of tobacco packs. It is defined as packaging with a uniform colour (and in some cases shape and size) with no logos or branding, and the brand name in a prescribed uniform font, colour and size.[140] Graphic health warnings on tobacco packaging aim to raise awareness among tobacco consumers of the harmful effects of tobacco consumption. These consist of text-based messages as well as pictorial displays of the risks of tobacco

consumption and the benefits of cessation.[140] Pictorial health warnings are more effective in changing behaviours compared with text only, and should take up at least 50% of any tobacco pack size.[141] The implementation of this intervention is relatively straightforward and low cost.[127]

Situation in Luxembourg

In Luxembourg, current legislation does not require plain packaging of tobacco products.[142] In line with EU legislation graphic health warnings are implemented on tobacco smoking products, and since January 2026 extended to heated tobacco products, nicotine pouches and new nicotine products.[74,143] For cigarettes, rolling tobacco and heated tobacco products, an image from the EU picture library, a health warning message and information on stop-smoking services must be on product packaging. The warnings must cover 65% of the front and back of packages. [143,144]

Enact and enforce comprehensive bans on tobacco advertising, promotion and sponsorship

Tobacco advertising, promotion and sponsorship (TAPS) bans are effective methods to reduce tobacco consumption.[145] Tobacco advertising and promotion refers to ‘any form of commercial communication, recommendation or action with the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly’.

Sponsorship of cigarette products is ‘any form of contribution to any event, activity or individual with the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly’. Direct TAPS largely includes the use of television, radio, social media platforms, print publications, billboards and point-of-sale retail outlets, while indirect TAPS includes (but is not limited to) promotional discounts, free distribution of products, brand sharing, brand stretching (using an existing well-known brand name to market a new product or enter new markets) and the sponsorship of music and sports events.[145]

The most recent systematic review finds that TAPS bans are highly effective in preventing smoking initiation, while the evidence for smoking cessation is less strong. TAPS bans have been shown to lead to a relative reduction in smoking prevalence of approximately 23%.[145]

Situation in Luxembourg

In Luxembourg, TAPS bans have been largely implemented by banning direct advertising through media such as television and radio, print publications and the internet. However, tobacco products can still be advertised at the point of sale. Also, tobacco products can still appear in television programmes or films, and no anti-tobacco ads are required for visual entertainment products that show tobacco products. Sponsorships with the aim to promote tobacco products are banned (this ban does not extend to patronage), as are the product placement of specific tobacco brands on television, promotional discounts on tobacco products and the free distribution of tobacco products via mail or other means.[146,147]

Eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places and public transport

Second-hand smoking, caused by the inhalation of smoke that is emitted between puffs of burning tobacco as well as exhaled by smokers, has been widely recognised as a major health risk.[55,56] Smoking bans in all indoor workplaces, public places and public transport help non-smokers to reduce their involuntary exposure to second-hand smoke, de-normalise tobacco use and help smokers to quit by providing a more supportive environment.[148] Smoking bans have been shown to reduce the prevalence of smoking by almost 19%.[127,148,149]

Situation in Luxembourg

Tobacco use, as well as the use of electronic cigarettes, is prohibited in Luxembourg in all enclosed public places, including hospitals, schools (including their premises), museums, public transport, inside restaurants, and sport facilities, among other places. At the workplace, employers must ensure that non-smokers are not exposed to second-hand smoke. Since 2014, tobacco use has been banned on playgrounds, any sport facilities that are used by children below the age of 16 and in private vehicles in the presence of children below the age of 12.[150] Smoking is still permitted in designated areas outside the premises of hospitals and on the outdoor terraces of restaurants and bars where food and beverages are served. Bars and restaurants also have the option to designate a separate room in the establishment where smoking is allowed, but no services can be provided.[150]

- **Implement effective mass media campaigns that educate the public about the harms of smoking/tobacco use and second-hand smoke, and encourage behaviour change**

Mass media campaigns target large audiences via television and radio broadcasts, print and digital media, as well as through billboards and at the point of sale. Their goal typically is to reduce smoking initiation among young people, increase cessation rates or educate the public about the harms of tobacco use and second-hand smoke.[151] The latest systematic review has found convincing evidence that mass media campaigns improve smoking behaviours. They increase quitting, reduce overall tobacco usage and reduce the prevalence of smoking by 15%.[127]

Situation in Luxembourg

In Luxembourg, there has been no mass media campaign targeting large audiences by means of a range of communication means in order to reduce tobacco use in the last five years.[152] The National Plan for Tobacco Control (2016–2020) included efforts to reach the population with information about the dangers of tobacco use, via the use of media channels.[153] On the occasion of World No Tobacco Day, celebrated annually on May 31, the Ministry of Health and Social Security launched communication campaigns targeting young people in 2022 and 2025. Also, the results of the national survey on tobacco use are systematically presented on this day. The Cancer Foundation supports the World No Tobacco Day through public awareness activities focused on tobacco control.

Success stories in smoking prevention

Several countries have made great gains in reducing smoking prevalence through the implementation of the policies recommended as ‘best buys’. Most recently, the Netherlands joined Mauritius, Brazil and Turkey as the fourth country to adopt all six best buy measures to the highest intensity, including the five population-based measures discussed above. During this time, the prevalence of smoking decreased from 25.7% in 2014 to 20.6% in 2021 in the Netherlands.[125]

France implemented a policy package between 2016 and 2020 to reduce smoking initiation and increase smoking cessation. The package included the best buys listed above, in particular, a gradual increase in the price of tobacco products (a 41% relative increase in the price of the most sold cigarette pack), plain packaging, a yearly cessation campaign and the reimbursement of nicotine replacement products. During the period, smoking prevalence declined from 35% to 31%.[154] The current national anti-tobacco plan (2023-2027) in France further intensifies tobacco control policies with the objective that children born since 2014 will become the first generation of adults who do not smoke (< 5% smokers).[155]

Prevention efforts against alcohol use

The WHO 'NCD best buy' interventions, supported by cost-effectiveness evidence for reducing alcohol use, are listed in Table 5. This section presents interventions that align with the population-based preventive scope of the report, focusing on measures that influence the affordability and availability of alcohol, as well as restrictions on exposure to alcohol advertising. All the interventions discussed here have demonstrated a measurable impact in high-income countries within five years of their implementation. The following subsections provide a more detailed discussion of these population-based interventions, including their level of implementation in Luxembourg.

Table 5. WHO 'best buys' for alcohol use prevention

Intervention	Population-based primary prevention intervention	Measurable impact within five years
Increase excise taxes on alcoholic beverages	Yes	Yes
Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media)	Yes	Yes
Enact and enforce restrictions on the physical availability of retailed alcohol (via reduced hours of sale)	Yes	Yes
Enact and enforce drink-driving laws and blood alcohol concentration limits via sobriety checkpoints	No	No
Provide brief psychosocial intervention for people with hazardous and harmful alcohol use	No	Yes

Source: Authors' compilation based on WHO (2024)[8]; Galea et al. (2025)[10]

Increase excise taxes and prices on alcohol products

Increasing the price of alcohol can lead to a quick reduction in alcohol use within the population. This can be achieved by adjusting alcohol pricing through two main approaches: taxes and minimum alcohol pricing tools. Alcohol excise taxes can be categorised into unitary, volumetric (specific) and *ad valorem* taxes. A unitary tax, based on the size of a beverage, applies a fixed rate per unit regardless of alcohol content or value. By comparison, a volumetric tax targets the ethanol content, imposing higher taxes on beverages with greater alcohol content. The *ad valorem* tax, based on the value of the beverage, is proportional to the price, thereby affecting mostly the use of luxury alcohol products. Volumetric taxes are particularly effective, because they target the harmful ingredient (ethanol), thus encouraging low-alcohol beverages.

A Minimum Unit Price (MUP) sets a floor price for alcohol, targeting cheap alcohol to prevent excessive drinking among young people and people with excessive consumption.[156] A beer price increase of 10% would lead to a relative decrease of 3.5% in beer consumption; the corresponding figures are 6.8% for wine and 9.8% for spirits.[157,158] Additional measures include bans on selling alcohol for less than it costs to produce, restrictions on promotions that encourage bulk buying and rules that require sellers to add a fixed percentage to the cost of alcohol before selling it, thereby raising the final price.[156]

Regularly reviewing prices in relation to inflation and income is essential to maintain the effectiveness of these measures. Combining these pricing methods helps to regulate alcohol use and address public health concerns.[10,159]

Situation in Luxembourg

In 2023, the prices of alcoholic beverages in Luxembourg were slightly above the EU average.[131] Nevertheless, alcohol has become more affordable in Luxembourg since 2000.[156,160]

No minimum alcohol pricing policies are currently in place in Luxembourg (2025). The type of excise tax on alcohol and the amount applicable vary depending on the category and alcoholic content of the beverage. While a combination of volumetric tax and VAT applies to beer and spirits, wine (<15° alcohol) is not subject to a volumetric tax and general VAT is lower (14% vs 17% for other alcoholic beverages). At 17%, Luxembourg levies the lowest standard VAT in the EU. A surtax for premixed alcoholic drinks ('alcopops') was introduced in 2005.[161]

In 2025, Luxembourg ranked 26 out of 28 countries for excise duty per 330 ml bottle of beer at €0.03 (by comparison, Finland levies €0.60 for the same amount).[162]

Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising

Policies aimed at restricting alcohol marketing reduce the intake of alcohol.[156,163] This 'best buy' intervention is recommended across multiple types of media—traditional (e.g. radio, print media and television) and new digital media platforms (e.g. social media)—as well as sports sponsorship. It requires the capacity and infrastructure for regulation and legislation implementation and enforcement.[8] Marketing bans or restrictions for traditional media platforms can take different forms, including statutory bans on any form of advertising or statutory partial restrictions (e.g. on time of day, place or content). Industry can also define voluntary or self-imposed restrictions.

Situation in Luxembourg

In Luxembourg, the law on electronic media stipulates that 'Audiovisual commercial communications for alcoholic beverages shall not be aimed specifically at minors and shall not encourage immoderate consumption of such beverages'.[164] A 2001 grand-ducal regulation sets strict rules for television advertising and teleshopping of alcoholic beverages, prohibiting targeting minors, associating alcohol with physical performance, driving, social or sexual success, therapeutic properties or encouraging immoderate use. On-demand audiovisual media services must adhere to these criteria, except for sponsorship and product placement.[165]

Luxembourg does not place restrictions on social media advertising. There are also no regulations governing the sponsorship of sports events by alcoholic beverage companies.

The Luxembourg Action Plan against Alcohol Misuse 2020–2024 aims as part of its activities to 'Improve the regulation of advertising and marketing of alcoholic products, to make it a real tool for communication and prevention' (Action 1.2.2).[86]

Enact and enforce restrictions on the physical availability of retailed alcohol

A cost-effective 'best buy' intervention to reduce alcohol use is the enactment and enforcement of restrictions on the physical availability of alcohol for retail sale, primarily through reducing selling hours. Notably, this has demonstrated a measurable impact on public health immediately following its implementation.[8,10] Limiting the physical availability of alcohol curtails the opportunities for purchasing and consumption, by reducing opening hours or by designating specific days within the week when alcohol sales are prohibited. These measures apply to both on-premises establishments, such as restaurants and bars, and off-premises locations, including shops and liquor stores.[156]

Situation in Luxembourg

In Luxembourg, alcohol can be purchased off-premises without restrictions at supermarkets, liquor stores, and gas stations. The density of on-premises establishments is generally limited to no more

than one per 500 inhabitants.[166] No restrictions currently apply regarding hours of sale for either type of premises. The alteration of restrictions on the physical availability of retailed alcohol via selling hours in Luxembourg is not explicitly mentioned in the coalition agreement and action plans.

Success stories of alcohol intake prevention

Between 2000 and 2020, the three Baltic countries (Estonia, Latvia and Lithuania) implemented the WHO 'best buy' policies to reduce alcohol-attributable chronic diseases and mortality. During this period, 20 major policies were enacted, including increasing taxation, restricting the availability of alcoholic beverages and introducing measures to limit advertising and marketing. These measures have been shown to reduce alcohol use and reduce alcohol-attributable harm. In Lithuania, for instance, the proportion of the population who consumed hazardous amounts of alcohol decreased from 56% in 2014 to 38% in 2019.[167] Studies in these countries have demonstrated that increases in taxation (which affect affordability) and restrictions on off-premises selling hours are associated with decreases in both all-cause and alcohol-attributable mortality.[168–170]

Prevention efforts against an unhealthy diet

The WHO 'NCD best buys' recommended interventions with cost-effectiveness evidence to reduce unhealthy diet are listed in Table 6. A measurable impact in high-income countries within five years has been confirmed for some interventions presented in this section. The following section provides more insight into the population-level interventions, as well as their level of implementation in Luxembourg.

Table 6. WHO 'best buys' for prevention efforts against an unhealthy diet

Intervention	Population-based primary prevention intervention	Measurable impact within five years
Reformulation policies for healthier food and beverage products (e.g. elimination of trans-fatty acids or reduction of saturated fats, free sugars or sodium)	Yes	Yes
Front-of-pack labelling as part of comprehensive nutrition labelling policies to facilitate consumers' understanding and choice of food for a healthy diet	Yes	Yes
Public food procurement and service policies for a healthy diet (e.g. to reduce the intake of free sugars, sodium and unhealthy fats, and to increase the consumption of legumes, wholegrains, fruit and vegetables)	Yes	Not assessed
Behaviour change communication and mass media campaign for a healthy diet (e.g. to reduce the intake of energy, free sugars, sodium and unhealthy fats, and to increase the consumption of legumes, wholegrains, fruit and vegetables)	Yes	Yes
Policies to protect children from harmful impacts of food marketing	Yes	No
Protection, promotion and support of optimal breastfeeding practices	Yes	No

Source: Authors' compilation based on WHO (2024)[8]; *Galea et al. (2025).*[10]

Reformulation policies for healthier food and beverage products

Food reformulation refers to modifying the composition or processing of food and beverages to enhance their nutritional quality or reduce harmful ingredients. It plays a key role in improving access to safe, nutritious food and supporting the transition to a healthier, more sustainable diet. Measures can help to eliminate industrially-produced trans-fatty acids from the food supply, reduce the energy content per portion and lower the levels of saturated fats, sugars and salt or sodium in food.[25,171,172]

Situation in Luxembourg

The European Commission Regulation (EU) 2019/649 sets a legal limit on industrially produced trans fats in foods intended for final consumption, restricting them to maximum of 2 grams per 100 grams of fat. Similarly, a group of the largest global food and non-alcoholic beverage companies (IFBA) has committed to limit industrially processed trans fats globally to 2 grams per 100 grams of fat by 2023.[25,173] The EU regulation 1169/2011 ensures transparency by requiring salt to be listed in grams per 100 g or 100 ml, thereby supporting informed consumer choices and harmonising labelling standards across EU member states, including Luxembourg. Apart from these international and EU-level measures, no additional national regulations specific to trans fats, free sugar and salt are currently in place in Luxembourg. The GIMB is Luxembourg's national framework aimed at promoting a balanced diet and regular physical activity. It includes targeted measures to improve the nutritional quality of foods through reformulation. Several measures outlined in the GIMB framework address the reformulation of food, targeting sugary foods and beverages, salt levels in foods and unhealthy fats.[106]

Front-of-pack labelling as part of comprehensive nutrition labelling policies to facilitate consumers' understanding and choice of food for a healthy diet

Labels on pre-packaged foods are designed to help consumers understand the nutritional content of what they eat. These labels can take the form of detailed nutrient lists, often found on the back of packaging, or simplified formats placed on the front to make the information easier to interpret. Front-of-pack labels may also serve to draw attention to ingredients that are best consumed in moderation, such as salt, sugar and saturated fats, or to highlight beneficial nutrients such as dietary fibre.[25,174,175]

Situation in Luxembourg

Under EU Regulation 1169/2011 on the provision of food information to consumers, since 2016 most pre-packaged foods have been required to include back-of-pack nutrition labelling. This labelling must display the energy value and the amounts of fat, saturates, carbohydrates, sugars, protein and salt.

Since 2021, the Nutri-Score label has been voluntarily applied in Luxembourg by food manufacturers, retailers, bulk food sellers and canteen operators, in accordance with standards set by Santé publique France. This helps consumers quickly gain an understanding of the nutritional quality of food and support healthier choices. In 2023, Luxembourg updated its regulations to align with new French rules. The updated framework allows pilot projects to test Nutri-Score on bulk foods and in collective catering settings, such as schools or workplace canteens. In these pilots, participating establishments must display the Nutri-Score on each dish. The system is overseen by the Luxembourg Veterinary and Food Administration.[176,177] Additionally, the national plan on cardio-neuro-vascular diseases includes an action to strengthen public understanding of nutrition labelling among the general population and particularly individuals with cardio-neurovascular diseases.[122]

Public food procurement and service policies for a healthy diet

Public food procurement and service policies for a healthy diet refer to government-led strategies that set nutritional standards for food purchased, provided or served in public institutions such as schools, hospitals, childcare centres and government offices. These policies aim to improve the nutritional quality of food environments by increasing the availability of healthy foods—such as fruit, vegetables, legumes and whole grains—and reducing the presence of foods high in sugar, sodium and unhealthy fats.[25,178]

According to the WHO, such policies are designed to align public food provision with national dietary guidelines and public health goals. They typically involve mandatory nutrition criteria that guide what foods can be purchased or served using public funds. These criteria may include limits on salt, sugar and fat content, as well as requirements to include nutrient-dense foods.[179]

Situation in Luxembourg

Luxembourg implements the policy initiative on public food procurement and service policies for a healthy diet through a combination of national programmes, institutional practices and legal frameworks that govern food provision in public settings.

In early childhood and after-school care settings, such as 'crèches' and 'maisons relais', food provision is regulated through the approval (*agrément*) process managed by the Ministry of Education. To be recognised as a childcare and education service, any facility must provide certain services, including balanced meals. A guide on balanced nutrition for children aged from 3 months to 4 years in childcare and education services is currently being developed. Existing publications include the recommendations for balanced nutrition for children aged 4 to 12 years in such services, as well as a guide of good practices for food hygiene in childcare and education services. Cooks preparing meals for children must have completed training in child nutrition.[180,181]

Other examples are the programmes of School Milk and School Fruit distribution (« Schouluebstprogramm ») coordinated by the Ministry of Agriculture in partnership with the Ministry of

Education, and co-financed by the EU and the national government. These initiatives aim to foster lifelong healthy habits and support children's wellbeing through improved access to balanced food options.[182]

The *Loi du 20 juillet 2023* formally established Restopolis as the public administration responsible for collective catering in educational institutions (secondary schools and university). The law mandates that meals served in these establishments must be nutritionally balanced, safe and sustainable, and that procurement practices should prioritise local, seasonal and organic products. It also emphasises the educational role of food services in promoting healthy eating habits and environmental awareness.[183,184]

There are currently no fixed or compulsory nutritional values defined by law. Instead, institutions are guided by non-binding recommendations and general principles aimed at promoting healthy eating.

Behaviour change communication and mass media campaigns for a healthy diet

Mass media campaigns that promote healthy diet can reach large audiences through both traditional and digital platforms. These campaigns are often part of broader policy initiatives.[25,185]

Situation in Luxembourg

A wide range of initiatives have been implemented within the GIMB framework, under Objective 2 of Axis 2 (which focuses on improving the skills necessary to adopt healthy lifestyles) and specifically under Measure 1 (which aims to improve the skills needed to adopt a balanced diet and regular, appropriate physical activity). These align with the policy measure of behaviour change communication and mass media campaigns for a healthy diet.

These initiatives involve the development of long-term communication strategies, targeted awareness efforts for specific population groups and activities that encourage intergenerational exchange and the involvement of social networks. They also include the dissemination of dietary recommendations and the integration of relevant educational content into school curricula, all aimed at supporting the dissemination of information and the development of knowledge and skills related to healthy eating and physical activity. Among the key actions are the GIMB Label and annual GIMB Days, which promote balanced nutrition and physical activity. These platforms also serve to disseminate national messages and give significant visibility and importance to these themes. Over the years, GIMB has conducted several campaigns, including the promotion of a balanced breakfast for children and the creation of healthy lunchbox options. More recently, in 2024 and 2025, a national visibility campaign was launched across various media channels and in collaboration with multiple partners to raise awareness about reducing added sugar consumption.[106]

Policies to protect children from harmful impacts of food marketing

Children are especially vulnerable to food marketing, because they are still developing the ability to understand and critically assess advertising. This makes them more likely to be influenced by promotions for unhealthy foods high in sugar, salt and fat. Research shows that such marketing directly affects children’s food preferences, purchase requests, and eating habits, contributing to a poor diet and rising rates of childhood obesity.[25,186,187]

Situation in Luxembourg

There are currently no specific obligations for audiovisual media service providers in terms of policies aimed at protecting children from the harmful effects of food marketing. The GIMB outlines strategic actions to promote healthier lifestyles and regulate food marketing. These include promoting transparent and responsible food marketing (Measure 5), restricting the advertising of unhealthy foods—particularly to children—and ensuring compliance with the Code of Marketing of Breastmilk Substitutes to support informed choices and protect infant nutrition (Measure 6, Activities 6.1 and 6.2).[106]

Protection, promotion and support of optimal breastfeeding practices

Breastfeeding is recognised as a WHO 'NCD best buy' for healthy nutrition, because it delivers health, economic and developmental benefits. It provides infants with essential nutrients in optimal proportions, strengthens their immune systems and supports cognitive development. Moreover, some evidence shows that it may help reduce the risk of obesity, diabetes and cardiovascular disease later in life.[188,189] Economically, it reduces healthcare costs and environmental impact, making it a highly cost-effective and sustainable public health intervention.[188–191]

Situation in Luxembourg

Luxembourg actively supports the WHO recommendations to protect, promote and support optimal breastfeeding through a range of coordinated initiatives and policies. Luxembourg has established a National Committee for the Protection, Promotion and Support of Breastfeeding. Public awareness is fostered through information brochures, hospital-based resources and contact points with associations that provide guidance and support to parents. The country also celebrates the international *Semaine de l'allaitement* (breastfeeding week), with a national campaign aimed at raising awareness and normalising breastfeeding in public, the workplace and private life.[192–194] Further, the GIMB promotes exclusive breastfeeding during the first 6 months of life and continued breastfeeding, together with a balanced introduction of complementary foods, up to 2 years of age and beyond.[94,95]

To empower mothers, Luxembourg offers practical tools such as the *Allaitement: Checklist pour mamans* and has published a new book to help parents understand infant nutrition. Legal protections are in place to support breastfeeding in the workplace: breastfeeding breaks are calculated in proportion to the hours worked. Women working full-time are entitled to two 45-minute breastfeeding breaks per day, on written request to their employer. Additionally, informational material for employers helps to create a supportive work environment for breastfeeding mothers.[195–197]

Success stories for the promotion of healthy diet

In Finland, some positive trends in dietary habits have been observed in recent years. Salt intake has declined significantly, supported by long-standing reformulation initiatives and public education campaigns. Additionally, fruit and vegetable consumption has increased, particularly among children and adolescents, aided by school-based programmes and national awareness efforts. These improvements have occurred alongside a broad set of nutrition-related policies. Finland provides free school meals that must meet national nutrition criteria, applies voluntary front-of-pack labelling through its 'Heart Symbol' and promotes food-based dietary guidelines. The country has also introduced measures to limit the marketing of unhealthy foods to children, especially in digital media. Despite these efforts, challenges remain. Obesity rates have continued to rise, with approximately 24% of adults classified as obese. Socioeconomic disparities in diet quality persist, with lower-income groups being more likely to consume processed foods and less fruit and vegetables. Average intakes of saturated fats and sugars also remain above recommended levels for a significant proportion of the population.[198–200]

Prevention efforts against physical inactivity

One intervention classifies as a WHO best buy to prevent physical inactivity (Table 7), but its impact within the first five years has not been examined.[8,10]

Table 7. WHO 'best buys' for prevention of physical inactivity

Intervention	Population-based primary prevention intervention	Measurable impact within five years
■ Implement sustained, population wide, best practice communication campaigns to promote physical activity, with links to community-based programmes and environmental improvements to enable and support behaviour change.	Yes	Not assessed

Source: Authors' compilation based on WHO (2024)[8]; *Galea et al. (2025).*[10]

This 'best buy' intervention implicitly builds on other recommended interventions from the WHO guidance, but for which cost-effectiveness analysis was not available. These recommendations are the following[8]:

- Implement urban and transport planning and urban design, at all levels of government, to provide compact neighbourhoods providing mixed land-use and connected networks for walking and cycling and equitable access to safe, quality public open spaces that enable and promote physical activity and active mobility.
- Implement whole-of-school programmes that include quality physical education, and adequate facilities, equipment and programmes to support active travel to/from school and support physical activity for all children of all abilities during and after school.
- Improve the walking and cycling infrastructure, ensuring universal and equitable access to enable and promote safe walking, cycling and other forms of micro-mobility (e.g. wheelchairs, scooters and skates) by people of all ages and abilities.
- Implement multi-component workplace physical activity programmes.
- Provide and promote physical activity through the provision of community-based (grassroots) sport and recreation programmes and conduct free mass-participation events to encourage engagement by people of all ages and abilities.

■ Population-wide campaigns to promote physical activity, with links to community-based programmes and environmental improvements to enable and support behaviour change

National communication campaigns aimed at promoting physical activity can play a significant role in shaping public understanding, attitudes and behaviours. Well-designed, they help disseminate information of the benefits of physical activity, raise people's motivation, and contribute to the normalisation of active lifestyles across the population. When sustained and population wide, they can reach diverse demographic groups and gain broad social support.[25,201–203]

Communication campaigns promoting physical activity are most effective when they connect people to opportunities for physical activity, such as community-based sport initiatives, school or workplace programmes.[203–205] To further increase physical activity, it should be integrated into the settings in which people live, work and play. This requires "active" environments that support physical activities and active lifestyles, including quality safe open spaces, well connected neighbourhoods enabling and promoting active mobility (i.e. walking and cycling), in addition to infrastructure for recreation.[204,205]

Communication campaigns increase knowledge and enhance shifts of social norms, they create a more supportive context for individuals to engage in physical activity, but need to be paired with accessible

opportunities and enabling environments.[201,205] Successfully increasing physical activity and active lifestyles requires multisectoral engagement of relevant ministries, local authorities and civil society.[205]

Situation in Luxembourg

Luxembourg is actively aligning with the WHO 'NCD best buys' recommendation by implementing sustained, population-wide communication campaigns to promote physical activity. Through the integrated concept of Luxembourg Olympic and Sports Committee (*Comité olympique et sportif luxembourgeois*–COSL–the central sports body in the country that brings together all sports federations) and the national programme *Lëtzebuerg lieft Sport*, the country emphasises the importance of developing a communication strategy, capable of reaching diverse population groups.[206,207] The vision of *Lëtzebuerg lieft Sport* has the potential to evolve into a national promotional campaign, uniting local initiatives under a common label and fostering a strong sports culture. Local municipalities play a key role by promoting the provision of community-based physical activity and encouraging citizen participation.

Links to community-based programmes and environmental interventions to enable and support behaviour change:

- Active mobility is integrated within the National Mobility Plan 2035 through its infrastructure and mobility policy.[208] The plan provides a future-oriented vision and objectives, including walking and cycling as attractive and safe options particularly for short and medium-length trips. Since 2020, public transport has been free of charge to all users. It supports active lifestyle by encouraging walking and climbing stairs to access public transport.[208] Communication to raise awareness of the link between public transport, active mobility and health can further support their adoption.
- Weekly sports classes are integrated in the school curricula. In 2025 the Ministry of Education, Children and Youth launched the campaign "Screen-Life-Balance, *manner Écran – méi beweegen, entdecken, erliewen*" to reduce screentime and expand 'active' offers in after-school care.[209] In recent years, a growing number of communes support 'walking bus', the so-called *Pedibus*, to facilitate children travelling to and from schools by foot.
- Further, various national events—such as *Wibbel an Dribbel*, *Nuit du Sport*, *Semaine européenne du sport*, *Schoulsportdag*, *gogo VELO* and *Olympiadag*—mobilise the general population and specific target groups, while communal programmes such as *Sport pour Tous* and holiday activities further support behaviour change at the grassroots level.
- In addition, the national framework *GIMB*—previously mentioned and supported by four founding ministries (Health, Sports, Education and Family)—encourages initiatives for both healthy eating and physical activity. GIMB aims to shift general attitudes through its national framework plan, reinforcing Luxembourg's commitment to integrated, population-wide health promotion.[106]

Success stories of the prevention of physical inactivity

In Portugal, two complementary national initiatives have demonstrated how sustained, evidence-based communication can effectively promote physical activity. The 'Follow the Whistle' campaign, developed by the Directorate-General of Health, aimed to increase adult physical activity by enhancing capability, opportunity and motivation. Using a multi-strategy approach across media and community outreach, it delivered clear, actionable messages encouraging daily activity. Formal evaluation showed increased awareness and positive shifts in motivation and self-reported behaviour.[210] The European Week of Sport (#BeActive), coordinated by the Instituto Português do Desporto e Juventude, is held annually from 23 to 30 September. It promotes sport and physical activity for all, regardless of age, background or fitness level. Supported by a dedicated platform, the initiative connects people to local events and resources in schools, workplaces and public spaces. While these efforts have broadened engagement, challenges remain in sustaining long-term behaviour change and addressing disparities in access to physical activity opportunities.[211,212]

4.

Key messages and policy implications

Chronic diseases are the leading causes of the disease burden in Luxembourg. Four modifiable health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity—are identified as major contributors. Most of these behaviours exhibit social disparities. The focus of this report is on population-based primary prevention strategies to improve these health behaviours. We take stock of the extent to which Luxembourg has adopted interventions aligned with the WHO recommended set of cost-effective primary prevention interventions: the so-called WHO 'NCD best buys'. The report emphasises that evidence-based and population-based, primary prevention interventions are essential to achieve a sizable reduction in the burden of chronic diseases in Luxembourg.

1. **Chronic diseases, including cancer, cardiovascular disease, musculoskeletal disorders, depression, dementia, obesity, diabetes and chronic respiratory diseases, account for 83% of the burden of disease in Luxembourg. These are preventable through population-based, primary prevention interventions.**

Chronic diseases are preventable in Luxembourg through a reduction of tobacco use, alcohol use, unhealthy diet, and physical inactivity. Population-based, primary prevention interventions modify the living context to facilitate healthy choices and improve health behaviours. As these interventions cover all population strata and shape social norms, they can bring substantial and lasting shifts in health behaviours and have a measurable public health impact.

2. **Population ageing and growth will lead to a substantial rise in chronic diseases.**

Luxembourg's population growth in the coming years is projected to be greatest among the older age groups—in which chronic diseases are common. As a result, the overall chronic disease burden is expected to rise significantly, with estimates from the Global Burden of Disease (GBD) 2021 study projecting a 70% increase by 2050. This rise will affect the economic and social costs associated with chronic diseases, calling to invest in population-based interventions that support health throughout the life course and foster healthy ageing.

3. **The chronic disease burden in Luxembourg is fuelled by the high prevalence of four health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity.**

Progress in reducing daily smoking rates has stalled. In 2024, one in seven people smoked daily, a level similar to that observed in 2014. Alcohol consumption is deeply embedded in society and often begins before the age of 16. One in ten adults engages weekly in binge drinking. Fruit and vegetable consumption, along with physical activity, remain below the recommended levels for most children, adolescents and adults.

4. **Social disparities exist across the four main health behaviours. People with a lower level of education more frequently use tobacco, engage in binge drinking, have an unhealthy diet and lack physical activity, compared with those who have a higher level of education.**

Health behaviours are worse among people from groups of low socio-economic status. Children and adolescents from less-affluent families are less likely to meet dietary and physical activity recommendations compared with their peers from more-affluent families. Similarly, adults with a lower level of educational attainment are less likely to consume five portions of fruit and vegetables daily and to engage in physical activity. Daily smoking, daily alcohol use and weekly binge drinking were more frequent among individuals with a low level of educational attainment.

5. Interventions addressing the affordability and availability of tobacco and alcohol, and regulatory measures enhancing a nutritious diet, are effective, but have not been comprehensively implemented in Luxembourg. Increasing tobacco prices in Luxembourg would reduce the burden of chronic diseases. Although, Luxembourg has implemented some of the WHO 'NCD best buys', opportunities remain to align with these evidence-based recommendations.

- In Luxembourg, the low taxation rates for tobacco products make them highly affordable. The estimated effect of increasing tobacco prices in Luxembourg would be rapid and would result in significant relative reductions in the prevalence of chronic diseases.
- Low excise taxes on alcohol, no minimum price, and limited restrictions on availability and marketing contribute to widespread and low-cost access to alcoholic beverages.
- Luxembourg has made progress in promoting a healthy and sustainable diet, particularly through public food procurement in schools and childcare settings, where balanced meals are prioritised. However, legal guidelines lack mandatory nutritional standards, limiting their enforceability. While public awareness and education campaigns are well-developed, nutrition labelling remains voluntary and regulatory measures to protect children from unhealthy food marketing have not been implemented.
- Luxembourg is promoting physical activity by diverse communication campaigns linked to national community and school-based programmes, with the potential to scale into a joint national campaign. Further integrating and promoting active mobility, such as walking, cycling and using public transport, into daily travel and across all population groups could generate significant health benefits.

6. Most of the population-based and evidence-based interventions from the 'NCD best buys' would improve health behaviours and reduce chronic disease burden quickly, with a measurable impact within five years of their implementation and beyond.

Improvements in health behaviours and reduction in chronic disease burden have been measured for many 'NCD best buys' within five years of implementation. For instance, an intervention that leads to a reduction in smoking prevalence can lead to a measurable decrease in cardiovascular incidents within a short period, although the effect on cancer rates will take longer to become evident.

7. Population-based interventions that facilitate healthy choices have the potential to reduce inequalities in the burden of chronic diseases, as they also reach socioeconomically disadvantaged people and foster healthy ageing for the whole population.

Population-based interventions modify social contexts to make healthy choices easy and improve overall population health. They also impact disadvantaged groups that face the greatest barriers to healthy living and are difficult to reach by individual-level interventions that rely on people's agency. By narrowing the gap between the most and the least vulnerable population groups, population-based interventions can support health equity through the life course.

More broadly, stronger investment in population-based primary prevention could effectively mitigate the chronic disease burden, and its related financial and social consequences in Luxembourg. Implementation of the WHO 'NCD best buys', which offer carefully selected population-based interventions, requires different sectors working together, coordinated investment across ministries and leadership. As per Objective 2 of the WHO Global action plan on the prevention and control of noncommunicable diseases 2013-2030 'To strengthen national capacity, leadership, governance, multisectoral action and partnership to accelerate country response for the prevention and control of noncommunicable diseases', this investment is critical and must be sustained and underpinned by robust regulatory capacity and active engagement from civil society.

National development strategies that prioritise prevention lay the foundations for comprehensive and cohesive responses to the chronic disease burden. They can facilitate strong collaboration across ministries and adequate resourcing for multi-sectoral action.

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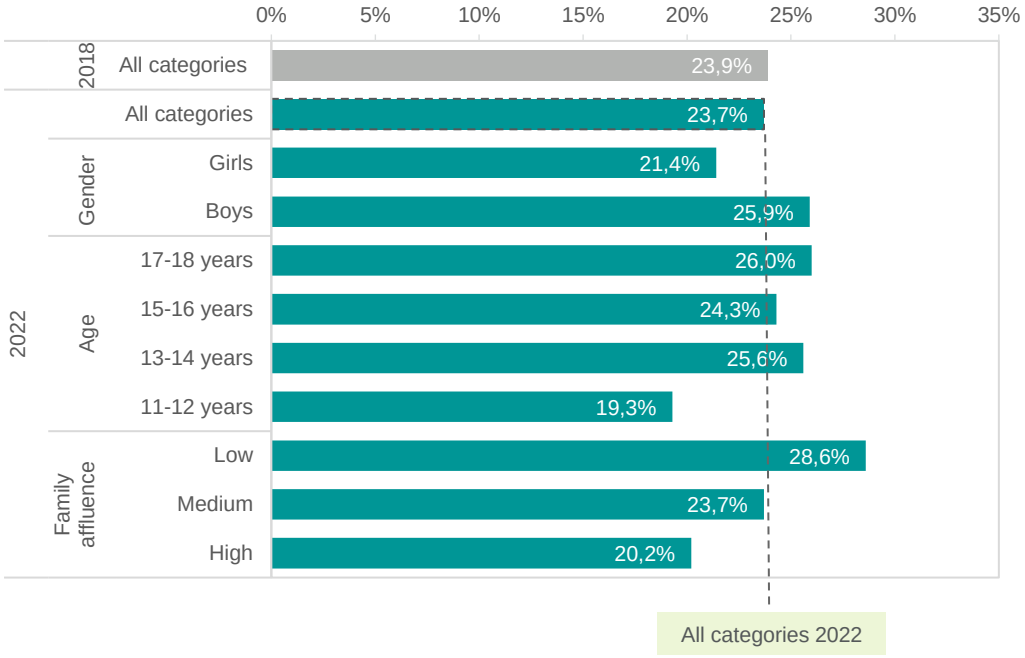
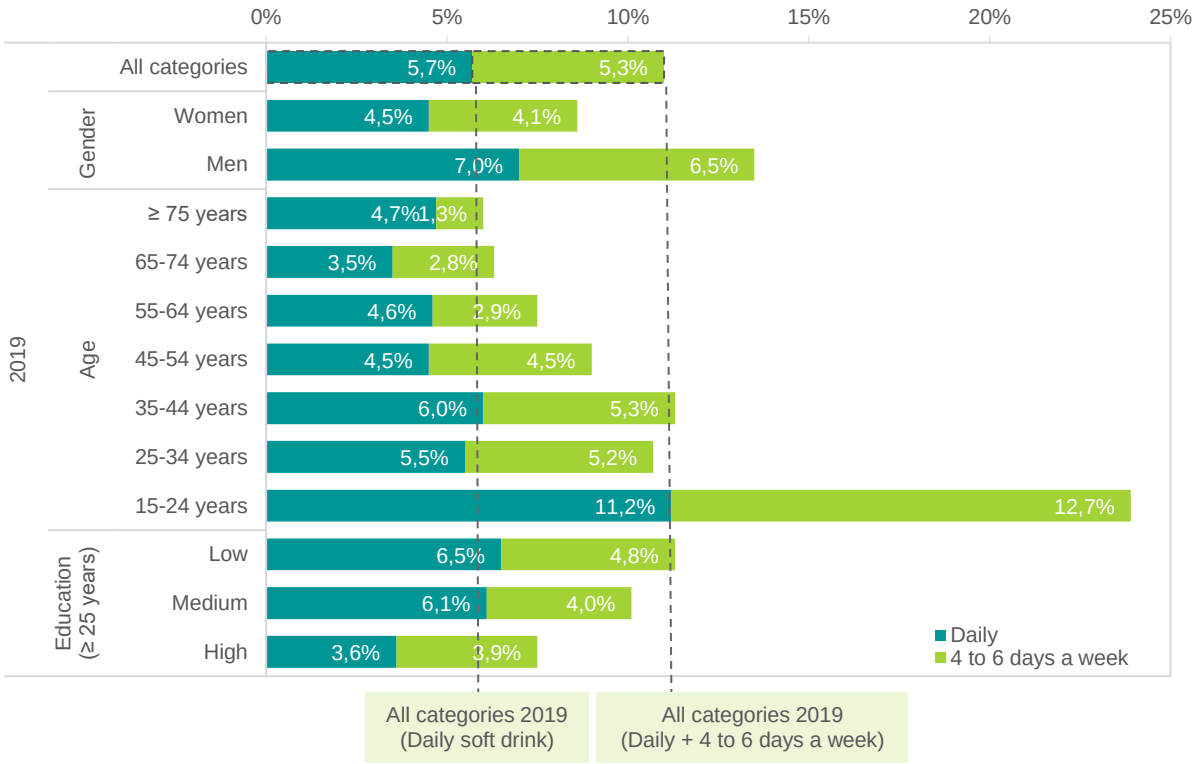
Annex 1. Additional risk factors

Figure 26. Prevalence (%) of daily soft drink consumption among 11 to 18 year olds, 2018 and 2022. Stratified by gender, age and family affluence, Luxembourg, 2022



Source: HBSC

Figure 27. Prevalence (%) of soft drink consumption among people aged 15 years and above, by frequency (daily and at least four to six times a week), 2014 and 2019. Stratified by demographic and socioeconomic factors, Luxembourg, 2019



Source: EHIS

Table 8. Prevalence (%) of engaging in active mobility (minimum 10 minutes) at least once a week among people aged 15 years and above, by type of activity, 2019. Stratified by gender, age, level of educational attainment and income (lowest and highest quintiles), Luxembourg, 2019

			Cycling to get to and from a place	Walking to get to and from a place
2019		Total 2014	17.4	88.6
		Total 2019	17.2	89.6
	Gender	Women	11.2	89.4
		Men	22.9	89.9
	Age	15-24 years	22.9	94.9
		25-34 years	18.1	89.5
		35-44 years	16.6	88.9
		45-54 years	16.5	87.7
		55-64 years	17.1	90.8
		65-74 years	13.8	90.8
		>75 years	9.5	78.5
	Education (25+)	Low	10.3	83.5
		Medium	13.6	88.8
		High	19.8	90.9
	Income (25+)	Lowest quintile	14.2	86.8
		Highest quintile	23.3	91.9

Source: EHIS

Note: Cell colour indicates relative values using Excel's colour scale: green represents higher values, red represents lower values and yellow indicates mid-range values.

Annex 2. Sources and methods

The data used to describe the four major health behaviours (tobacco use, alcohol use, unhealthy diet and physical inactivity) in Luxembourg was drawn from existing nationally representative surveys. These surveys include residents only and rely on self-reported information.

Each of the health behaviours specifies the survey from which the data was sourced. All the indicators were calculated by the data providers, and most of them were extracted from publicly accessible databases. Indicators are presented systematically by age groups, gender (based on binary sex information) and socioeconomic status (highest level of educational attainment, income and family affluence). Comparisons are provided between the results from the latest available survey with those from the previous survey. Annual results were available for tobacco use, which allowed us to present a time series of the prevalence of daily smokers from 2001 to 2024. For international comparisons, data from all EU27 countries (the 27 EU member states as of 2020), as well as the EU27 average were used, based on availability.

Definitions of outcomes and covariables for stratifications can be read under the respective data sources.

HBSC - Health Behaviour in School-aged Children

Data from the Health Behaviour in School-aged Children (HBSC) survey were used to describe the health behaviours of children and adolescents.[213] The survey is conducted every four years and is based on a nationally representative sample of 11 to 18 year olds attending public schools.[214] In the most recent survey conducted in 2022, private schools following the national curricula in Luxembourg were also included. The final sample in 2022 consisted of 7893 participants. The survey follows an internationally standardised paper-based questionnaire, along with established methodology and statistical procedures. The results were weighted by educational tracks and grades to reflect the distribution in the population of 11 to 18 year olds as a whole. The survey provides information on the health and wellbeing of children and adolescents and their health behaviours, as well as demographics and socioeconomic characteristics. In Luxembourg, the HBSC survey is organised by the University of Luxembourg, the Ministry of Health and Social Security/Health Directorate and the Ministry of Education, Children and Youth. It is part of the international HBSC study. The data presented in this report was extracted from two reports on the Luxembourg HBSC Survey 2022 ‘Risk behaviours of school-aged children in Luxembourg’ and ‘Health behaviours of school-aged children in Luxembourg’, and from the Luxembourg study dashboard (https://hbsc.uni.lu/de-dashboard/).[26,67,98]

Definitions of health behaviours and other variables, HBSC:

- Lifetime tobacco use: defined as having ever smoked cigarettes. This excludes e-cigarettes and is based on children and adolescents in secondary school.
- Lifetime alcohol use: defined as having ever consumed alcohol. It is based on children and adolescents in secondary school.
- Fruit and vegetable consumption: defined as consuming fruits and (plus) vegetables once or more than once daily.
- Consumption of soft drinks: defined as the consumption of sugary soft drinks.
- Physical activity for at least 60 minutes daily: defined as any moderate or vigorous physical activity that increases the heart rate and makes the person get out of breath some of the time (e.g. playing with friends or walking to school, as well as sports activities).
- Family affluence: assessed using a six-item scale to measure family material assets as a proxy for the socioeconomic context of children and adolescents. ‘Low family affluence’ is defined as

the group representing the lowest 20%, 'High family affluence' as the highest 20% and 'Medium family affluence' as the group in the middle 60%.

Survey on Tobacco use in Luxembourg

The Survey on Tobacco use in Luxembourg, conducted annually for over 20 years has been used to describe tobacco use.[68] The survey is based on a representative sample of the resident population aged 16 years and above. Prior to 2018, the minimum age for inclusion was 15. The survey sample is drawn from a panel of approximately 17 000 volunteers and is representative of the resident population. Since 2018, the survey has been conducted exclusively online, whereas it previously used a combination of online and telephone interviews. The aggregated results are adjusted for age, gender, nationality (Luxembourg or foreign), professional activity and region of residence. In 2024, the survey had 3036 participants. It focuses on tobacco use and nicotine products, and collects social variables such as the highest level of educational attainment.

The survey is operationalised by ILRES, a survey and market research institute in Luxembourg, and hosted by the Luxembourg Cancer Foundation. Since 2023, it has been co-hosted by the Directorate of Health/Ministry of Health and Social Security. The results presented in this report were extracted from the publicly accessible OECD data base (https://data-explorer.oecd.org/). Stratified results of the 2024 survey were provided by the data owners, Fondation Cancer and the Directorate of Health/Ministry of Health and Social Security.

Definitions of health behaviours and other variables, Survey on the Tobacco use in Luxembourg:

- Tobacco use: assessed current tobacco use using the term 'smoker'. The definition includes Shisha use but excludes electronic cigarettes. Participants self-identify as current smokers based on their own perception.
- Education: refers to the highest educational attainment level and is categorised as follows: 'Low' corresponds to the national Secondaire 1er Cycle; 'Medium' corresponds to the Secondaire 2ème Cycle; 'Medium to high' corresponds to the Enseignement supérieur Bac +2 à 3; 'High' corresponds to Enseignement supérieur Bac +4 or higher.
    - The group of 'Very low' corresponding to the École primaire, includes a small number of participants (*n*=69), and is therefore not included in the interpretation of the results.
- Region: refers to the participants' residence, categorised by the electoral regions. The central region is subdivided to distinguish the capital city from other areas within the central region.

EHIS - European Health Interview Survey

The European Health Interview Survey (EHIS) data were used to describe the health behaviours of the general population.[215,216] The survey is conducted every five to six years (2014 and 2019; a new survey wave was being rolled out at the time of this report's development in 2025) and is mandatory for all EU member states. In Luxemburg, the survey is based on a nationally representative sample of residents aged 15 years and above, and living in private households. The 2019 survey results are based on information for 4504 survey participants. The survey follows an internationally standardised questionnaire (in 2019 in Luxembourg, online and paper-based options were made available), along with an established methodology and statistical procedures. Aggregated results are adjusted for age, gender and district of residence. The survey provides information on health and wellbeing, health behaviours and aspects of healthcare access, as well as socioeconomic characteristics.

The Luxembourg Institute of Health (LIH) is mandated by the Ministry of Health and Social Security to conduct the survey. The EHIS results were extracted from the publicly accessible Eurostat database (https://ec.europa.eu/eurostat/web/main/data/database). The stratification of the indicators by educational attainment and income is limited to participants aged 25 years and above, and provided by

the Directorate of Health and the LIH to ObSanté for this report. The results of EU27 averages are standardised to the European Standard Population by Eurostat.

Definitions of health behaviours and other variables, EHIS:

- Alcohol use: defined as the consumption of any type of alcoholic drink. The survey assesses alcohol use during the preceding 12 months.
- Binge drinking: defined as heavy episodic drinking, involving the consumption of five or more alcoholic drinks (equivalent of 60 g of pure ethanol or more) on a single occasion. Other countries than Luxembourg use a threshold of six or more drinks. The survey assesses binge drinking behaviours during the preceding 12 months.
- Consumption of five or more portions of fruit and vegetables. The definition includes all types of fruits and vegetables and salad. All types of juices are excluded, as are potatoes and any food products that include ingredients other than vegetables (or fruit), such as vegetable pies, soups or any other cooked meals with vegetables.
- Soft drink consumption: defined as the consumption of sugary soft drinks.
- Engaging in weekly aerobic (for a minimum of 150 minutes) and muscle strengthening (minimum of twice per week) activities. These include health-enhancing physical activities and are outside of work-related physical activities. Aerobic activities are recreational leisure physical activities, such as sports and fitness that cause at least a small increase in the breathing or heart rate. Muscle strengthening activities are specifically designed to strengthen muscles, for example resistance training, strength exercises, push-ups, etc.
- Education: refers to the highest level of educational attainment and is categorised according to the International Standard Classification of Education (ISCED) version of 2011 (wave 2). ‘Low’ corresponds to any education up to the national Secondaire 1er Cycle; ‘Medium’ corresponds to the Enseignement post-secondaire non-supérieur; ‘High’ corresponds to educational attainment of Enseignement supérieur and higher.
- Income: defined as the equivalised disposable income attributed to each member of the household. The outcome is categorised in quintiles. The report illustrates the outcome for participants aged 25 and above in the first quintile group, which represents 20% of participants with lowest income, and the fifth quintile group, which represents 20% of participants with the highest income.

Population-based prevention interventions

The update of Appendix 3 of the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2030 was endorsed by the World Health Assembly in 2023 and published in 2024 under the title ‘Tackling NCDs: Best Buys and Other Recommended Interventions for the Prevention and Control of Noncommunicable Diseases’.[8,205] Those interventions considered most cost-effective and feasible for implementation are referred to as ‘NCD Best Buys’ in Appendix 3.[9] We selected the ones that are primary prevention interventions and target health behaviours—tobacco use, alcohol use, unhealthy diet and physical inactivity—and act at the population level. [15 217]

Each selected intervention was contextualised through background research and an assessment of the current situation in Luxembourg, combining scientific literature with national expert consultations. This was further complemented by an analysis of relevant policy documents, including national action plans and strategies, as well as legislation.

Annex 3. List of figures and tables

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OBSERVATOIRE
NATIONAL DE LA SANTÉ

Impressum

Publisher
Observatoire national de la santé

Layout
Linda Kefi

Cover
VOUS Agency

January 2026

Please cite as follows:
Ducomble T, Rausch K, Seuring T, Urbain M, Chiolero A, Observatoire national de la santé (2026). *Gesond Gesellschaft duerch Präventioun. Reducing the Burden of Chronic Diseases in Luxembourg: Assessing Major Health Determinants to Inform Primary Prevention Interventions.*

OBSERVATOIRE
NATIONAL DE LA SANTÉ

January 2026

ISBN : 978-99987-796-1-7

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