

Technical Annex
(version dated 26 December 2022)

**Updated Appendix 3 of the
WHO Global NCD Action Plan 2013-2030**

What is appendix 3

The global action plan for the prevention and control of noncommunicable diseases 2013-2020¹ was endorsed by the Sixty-sixth World Health Assembly² in 2013 with an Appendix containing a menu of policy options and cost-effective interventions for prevention and control of major noncommunicable diseases (known as “Appendix 3”). The purpose of Appendix 3 is to support Member States in implementing, as appropriate for national context (without prejudice to the sovereign rights of nations to determine taxation among other policies), actions to achieve the nine voluntary global targets for NCD prevention and control through the six objectives of the WHO global NCD action plan 2013–2030. The first update of Appendix 3 in 2017, endorsed by the Seventieth World Health Assembly,³ contained very cost-effective and affordable interventions, as well as other cost-effective interventions for the prevention and control of NCDs. The list of interventions contained in Appendix 3 is not exhaustive but is intended to provide information and guidance on cost-effectiveness of population-based and individual interventions based on current evidence. It also aims to act as the basis for future work to develop and expand the evidence base, taking into consideration overarching/enabling policy actions as well as non-financial considerations.

The current updates to Appendix 3, formulated in response to decisions WHA72(11) (2019) and WHA75(11) (2022), complement existing global strategies and action plans and several new technical products that support the implementation road map 2023–2030 for the global action plan for the prevention and control of noncommunicable diseases 2013–2030,⁴ including the WHO menu of cost-effectiveness interventions for mental health,⁵ the recommended interventions to address the health impact of air pollution^{6,7} and the menu of cost-effective interventions for oral health.⁸

¹ WHO. Global Action Plan for the Prevention and Control of NCDs 2013-2020/ Geneva: World Health Organization; 2013. (<https://www.who.int/publications/i/item/9789241506236>)

² See document WHA66/2013/REC/1, resolution WHA66.10.

³ See document WHA70/2017/REC/1, resolution WHA70.11.

⁴ Document A75/10 Add.8; noted by the Health Assembly, see also document WHA75/REC/3, summary records of first meeting, section 3, fifth meeting, section 2, and sixth meeting of Committee A.

⁵ WHO. WHO menu of cost-effective interventions for mental health. Geneva: World Health Organization; 2021 (<https://apps.who.int/iris/handle/10665/343074>, accessed 1 December 2022).

⁶ WHO. Compendium of WHO and other UN guidance on health and the environment, 2022 update. Geneva: World Health Organization; 2022 (<https://apps.who.int/iris/handle/10665/352844>, accessed 1 December 2022).

⁷ WHO. WHO global air quality guidelines: particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Geneva: World Health Organization; 2021 (<https://apps.who.int/iris/handle/10665/345329>, accessed 1 December 2022)

⁸ See document WHA74/2021/REC/1, resolution WHA74.5.

Why update appendix 3

The Appendix 3 has been updated in order to accelerate progress towards meeting the nine voluntary global NCD targets and Sustainable Development Goal 3 target 3.4 and to support the implementation road map 2023–2030 with its new acceleration plan to support Member States in implementing the recommendations for the prevention and management of obesity over the life course , by:

- (a) considering interventions from new WHO normative and standard-setting products since the adoption of the WHO global NCD action plan 2013–2020;
- (b) refining the existing formulation of some interventions based on lessons learned from the use of the previous two versions and reflecting WHO’s new guidance;
- (c) updating and adding interventions on the basis of agreed criteria and new and available scientific evidence of impact.

The area of Appendix 3 where this is most relevant is under Objective 3 (risk factors) and Objective 4 (health systems). All of the “very cost-effective and affordable interventions for all Member States” interventions in the original Appendices were listed under Objectives 3 and 4, and this remains the case in the updated version.

What has changed?

There has been no change to the menu of options listed for Objectives 1 (raising the priority of prevention and control of NCDs), 2 (strengthening leadership and governance), 5 (promote research and development) and 6 (monitoring and evaluation) which are process-related recommendations. The Appendix 3 is related to Objective 3 (risk factors) and 4 (health systems).

Within Objectives 3 and 4, in the 2017 appendix there were 16 interventions considered with a cost-effectiveness ratio \leq \$100 per DALY averted⁹ in low -and middle-income countries (referred to as the “best buys”) and 20 interventions with a cost-effectiveness ratio $>$ \$100/DALY (previously referred to as “good buys”). In addition, 36 interventions without CEA but are part of WHO guidance were also provided. In the 2022 updated Appendix 3, there are now a total of 90 interventions and 22 overarching/enabling actions, representing an expansion from the original list of 88 interventions (including overarching/enabling actions) (Table 1). In the current update, the cost-effectiveness was examined for 58 interventions out of the 90 interventions using WHO’s Choosing interventions that are cost-effective (WHO-CHOICE) methodology¹⁰, which was also used in 2017. The increase in the number of interventions between the 2017 and 2022 updates is due to the availability of new scientific evidence or WHO recommendations as proposed by as proposed by the Secretariat’s technical units and/or expert groups linked to the global NCD action plan.

⁹ The international dollar is a hypothetical unit of currency that has the same purchasing power parity that the U.S. dollar had in the United States at a given point in time.

¹⁰ <https://www.who.int/teams/health-systems-governance-and-financing/economic-analysis/health-technology-assessment-and-benefit-package-design/generalized-cost-effectiveness-analysis>

Out of the 58 interventions, 28 are considered to be the most cost-effective and feasible for implementation¹¹. In addition, 32 interventions that are part of WHO's guidance were also included but without WHO-CHOICE analysis. The absence of cost-effectiveness does not mean that the intervention is not cost-effective, affordable or feasible but that the WHO-CHOICE analysis could not be completed in the 2022 update due to methodological or capacity reasons.

Table 1: Overarching/enabling actions and interventions included in the 2022 update of Appendix 3

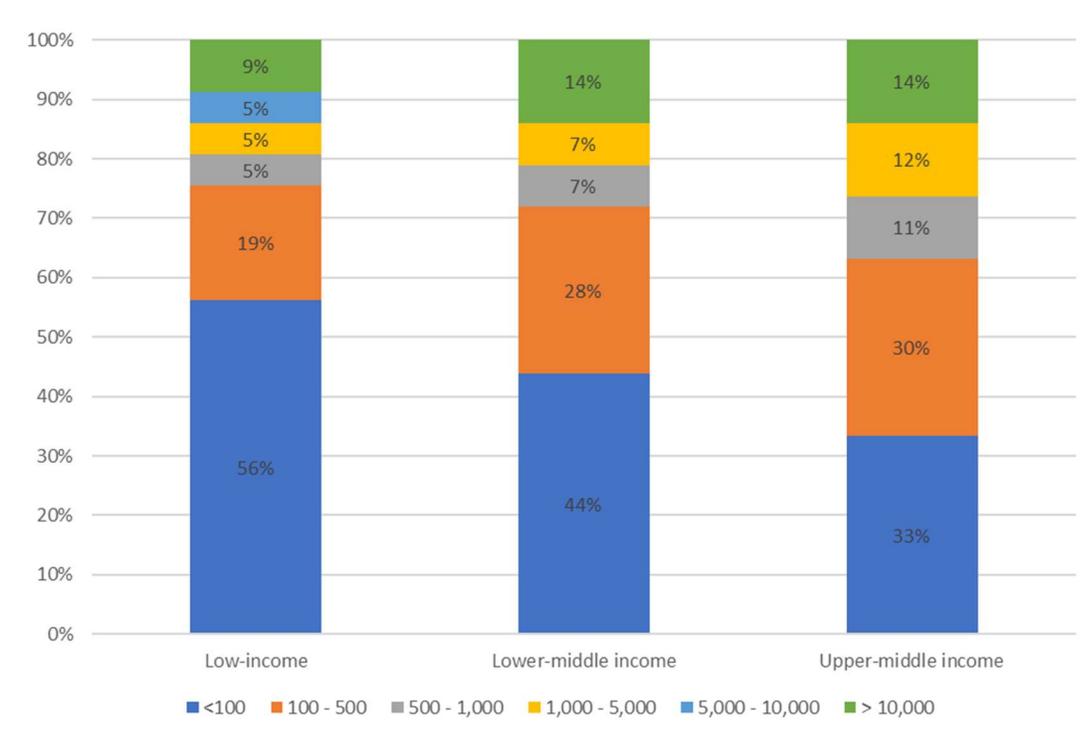
Interventions	Overarching/enabling actions	Interventions with WHO-CHOICE analysis	Interventions without WHO-CHOICE analysis
Objective 3			
Tobacco	3	7	2
Harmful use of alcohol	4	5	6
Unhealthy diet	2	7	4
Physical inactivity	5	2	5
Objective 4			
Cardio-vascular diseases	8	13	7
Diabetes		6	2
Chronic respiratory diseases		4	4
Cancer		14	2
Total	22	58	32

How to use this information

Figure 1 presents the percentage of interventions for which we conducted WHO-CHOICE analysis falling within each band of cost-effectiveness ratio for low-income, lower-middle income and upper-middle income countries. The cost-effectiveness threshold represents the maximum amount one is willing to pay per health outcome. The threshold is generally used to identify interventions that represent good value for money and will be different depending on the national context. The figure shows that with a threshold of $\leq \\$100$ per healthy life year gained 56%, 44% and 33% of the interventions are considered very good value-for-money in low-income, lower-middle income and upper-middle income countries respectively. As this threshold increases, the proportion of interventions considered good value-for-money increases too. If the national cost-effectiveness threshold chosen by a low-income country is Int\$ 1000 per healthy life year gained, then 82% of the proposed 58 interventions in the 2022 update would represent good value for money in that country.

¹¹ With an average cost-effectiveness ratio of $\leq \$100$ per healthy life year gained in low and lower-middle income countries. The international dollar is a hypothetical unit of currency that has the same purchasing power parity that the U.S. dollar had in the United States at a given point in time.

Figure 1: Percentage of interventions by cost-effectiveness band for the 3 income groups



The importance of non-economic considerations

The economic analyses give an assessment of cost-effectiveness, based on the health impact and the economic cost of the intervention. Although the results provide a set of parameters for consideration by Member States, however it must be emphasised that such global analyses should be accompanied by analyses further tailored to the local context. The OneHealth Tool is available to help individual countries to cost specific interventions in their national context. The Secretariat will also consider the development of an interactive web-based tool for countries to visualize the impact on national NCD targets of prioritizing and scaling up the implementation of a set of cost-effective interventions of the updated Appendix 3 as part of the implementation roadmap for NCDs.

When considering interventions for prevention and management of any disease or condition, including noncommunicable diseases, emphasis should be given to both economic and non-economic criteria, as both will affect the implementation and impact of interventions. Non-economic aspects such as acceptability, feasibility or health system capacity, sustainability, scalability, equity, and ethics¹² are essential to consider as part of the prioritization and implementation of the proposed interventions, based on the specific context of a country. Non-economic considerations that may affect the feasibility of certain interventions in some settings have been included as a separate column in the tables on pages 7 to 24.

¹² WHO. Principles of health benefit packages. Geneva: World Health Organization; 2021 (<https://www.who.int/publications/item/9789240020689>)

Methodological annex

A methodological annex can be found at the end of this document. This annex provides more detailed information about the methodology used to identify and analyse interventions, and includes the assumptions used in the WHO-CHOICE economic modelling. The methodological Annex also contains more detailed economic analyses for each intervention, with summary tables of costs, health impacts and cost-effectiveness ratios in bands for all interventions. Table 2 presents the list of interventions for each of the four risk factors and disease areas for three income categories of countries: low-income countries, lower-middle income countries and upper-middle-income countries. Table 3 ranks all interventions for low and lower-middle income countries by risk factor and disease area, with interventions with an average cost-effectiveness ratio \leq I\$100 per health life year gained (HLYg) considered to be the most cost-effective and feasible for implementation in all countries, i.e. the “Best Buys”. Interventions with an average cost-effectiveness ratio $>$ I\$ 100 are listed next and may be considered depending on the country context.

Objective 1: To raise the priority accorded to the prevention and control of noncommunicable diseases in global, regional and national agendas and internationally agreed development goals, through strengthened international cooperation and advocacy

Overarching/enabling actions

- Raise public and political awareness, understanding and practice about prevention and control of NCDs
- Integrate NCDs into the social and development agenda and poverty alleviation strategies
- Strengthen international cooperation for resource mobilization, capacity-building, health workforce training and exchange of information on lessons learnt and best practices
- Engage and mobilize civil society and the private sector as appropriate and strengthen international cooperation to support implementation of the action plan at global, regional and national levels
- Implement other policy options in objective 1

Objective 2: To strengthen national capacity, leadership, governance, multisectoral action and partnerships to accelerate country response for the prevention and control of noncommunicable diseases

Overarching/enabling actions

- Prioritize and increase, as needed, budgetary allocations for prevention and control of NCDs without prejudice to the sovereign right of nations to determine taxation and other policies
- Assess national capacity for prevention and control of NCDs
- Develop and implement a national multisectoral policy and plan for the prevention and control of NCDs through multi-stakeholder engagement
- Implement other policy options in objective 2 to strengthen national capacity including human and institutional capacity, leadership, governance, multisectoral action and partnerships for prevention and control of noncommunicable diseases

Objective 3: To reduce modifiable risk factors for noncommunicable diseases and underlying social determinants through creation of health-promoting environments

Tobacco use

Overarching/enabling actions

<p>For the Parties to the WHO Framework Convention on Tobacco Control (WHO FCTC):</p> <ul style="list-style-type: none"> Strengthen the effective implementation of the WHO FCTC and its guidelines for implementation, as well as the Protocol to Eliminate Illicit Trade in Tobacco Products, if applicable Establish and operationalize national coordinating mechanisms for the implementation of the WHO FCTC as part of a national tobacco control strategy with specific mandates, responsibilities and resources <p>For the Member States that are not Parties to the WHO FCTC:</p> <ul style="list-style-type: none"> Consider implementing the measures set out in the WHO FCTC and its guidelines for implementation, as well as the Protocol to Eliminate Illicit Trade in Tobacco Products, if applicable, as the foundational instruments in global tobacco control
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Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
T1	Increase excise taxes and prices on tobacco products		The WHO FCTC, its guidelines and its Protocol to Eliminate Illicit Trade in Tobacco Products
T2	Implement large graphic health warnings on all tobacco packages, accompanied by plain/standardized packaging	Requires capacity for implementing and enforcing regulations and legislation	MPOWER policy measures
T3	Enact and enforce comprehensive bans on tobacco advertising, promotion and sponsorship		WHO reports on the global tobacco epidemic (2011, 2013, 2015, 2019)
T4	Eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places and public transport		WHO technical manual on tobacco tax policy and administration (2021)
T5	Implement effective mass media campaigns that educate the public about the harms of smoking/tobacco use and second hand smoke, and encourage behaviour change		IARC handbook on effectiveness of tax and price policies for tobacco control (2011)
T6	Provision of cost-covered effective population-wide support (including	Requires trained providers in	Plain packaging of tobacco products: evidence, design and implementation (2016)

	brief advice, national toll-free quit line services and mCessation) for tobacco cessation to all tobacco users.	sufficient numbers and an effective health system	
T7	Provision of cost-covered effective pharmacological interventions to all tobacco users who want to quit, through the use of nicotine replacement therapy (NRT), Bupropion and Varenicline.		

Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention	
T8	Establish a tracking and tracing system to support the elimination of illicit trade in tobacco products that is in line with Article 8 of the Protocol to Eliminate Illicit Trade in Tobacco Products	
T9	Ban cross-border tobacco advertising, promotion and sponsorship, including those through modern means of communication	

Harmful use of alcohol

Overarching/enabling actions

<ul style="list-style-type: none"> • Implement applicable recommendations in the WHO Global strategy to reduce harmful use of alcohol through multisectoral actions in the recommended target areas¹³ • Implement WHO's global action plan on alcohol 2022-2030 to support and complement policy measures and interventions implemented at the national level in accordance with the 10 areas recommended in the global strategy¹⁴ • Strengthen leadership and increase commitment and capacity to address the harmful use of alcohol • Increase awareness and strengthen the knowledge base on the magnitude and nature of problems caused by harmful use of alcohol by awareness programmes, operational research, improved monitoring and surveillance systems

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
A1	Increase excise taxes on alcoholic beverages	Levying taxes should be combined with other price measures, such as bans on discounts or promotions	The SAFER Technical package (2019) Resource book on alcohol taxation (2017)
A2	Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media)	Requires capacity and infrastructure for implementing and enforcing regulations and legislation	Manual on alcohol taxation (in press)
A3	Enact and enforce restrictions on the physical availability of retailed alcohol (via reduced hours of sale)		Reducing the harm from alcohol – by regulating cross-border alcohol marketing, advertising and promotion: a technical report (2022)
A4	Enact and enforce drink-driving laws and blood alcohol concentration limits via sobriety checkpoints		
A5	Provide brief psychosocial intervention for persons with hazardous and harmful alcohol use	Requires trained providers at all levels of health care	Save lives: a road safety technical package (2017) The WHO ASSIST package for hazardous and harmful substance use (2010)

¹³ WHO. Global strategy to reduce the harmful use of alcohol; 2010 (http://www.who.int/substance_abuse/publications/global_strategy_reduce_harmful_use_alcohol/en/)

¹⁴ WHO. Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases. Appendix: Draft action plan (2022-2030) to effectively implement the global strategy to reduce the harmful use of alcohol as a public health priority. Document EB 150/7 add. 1; 2022 (https://apps.who.int/gb/ebwha/pdf_files/EB150/B150_7Add1-en.pdf)

			<p>Brief intervention for hazardous and harmful drinking: a manual for use in primary care (2001)</p> <p>mhGAP intervention guide 2.0 (2016)</p>
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Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention	
A6	Carry out regular reviews of prices in relation to level of inflation and income	
A7	Establish minimum prices for alcohol where applicable	
A8	Enact and enforce an appropriate minimum age for purchase or consumption of alcoholic beverages and reduce density of retail outlets	
A9	Restrict or ban promotions of alcoholic beverages in connection with sponsorships and activities targeting young people	
A10	Provide prevention, treatment and care for alcohol use disorders and comorbid conditions in health and social services	
A11	Provide consumers with information, including labels and health warnings, about content of alcoholic beverages and the harms associated with alcohol consumption	

Unhealthy diet

Overarching/enabling actions

- Implement WHO's Global Strategy on Diet, Physical Activity and Health ¹⁵, the Global strategy for infant and young child feeding jointly developed by WHO and UNICEF ¹⁶ and the WHO Comprehensive implementation plan on maternal, infant and young child nutrition ¹⁷
- Develop and implement national nutrient- and food-based dietary guidelines, as well as nutrient profile models¹⁸ for different applications as appropriate

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
H1	Reformulation policies for healthier food and beverage products (e.g. elimination of <i>trans</i> -fatty acids and/or reduction of saturated fats, free sugars and/or sodium)	Requires multisectoral actions with relevant ministries and support by civil society. Regulatory capacity along with multisectoral action is needed.	<u>Reformulation (H1)</u> <ul style="list-style-type: none"> • WHO policy brief on reformulation of food and beverage products (2022) • WHO global sodium benchmarks for different food categories (2021) • REPLACE technical document on eliminating industrially-produced trans fat from the global food supply (2021) • TFA and sodium country score cards (2012)
H2	Front-of-pack labelling as part of comprehensive nutrition labelling policies for facilitating consumers' understanding and choice of food for healthy diets		<u>Front-of-pack labelling (H2)</u> <ul style="list-style-type: none"> • Policy brief on nutrition labelling (2022) • Codex Alimentarius standards and guidelines on food labelling (2007) • Guiding principles and framework manual for front-of-
H3	Public food procurement and service policies for healthy diets (e.g. to reduce the intake of free sugars, sodium, unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables)		
H4	Behaviour change communication and mass media campaign for healthy diets (e.g. to reduce the intake of energy, free sugars, sodium, unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables)		

¹⁵ WHO. Global strategy on diet, physical activity and health; 2004 (<https://www.who.int/publications/i/item/9241592222>)

¹⁶ WHO/UNICEF. Global strategy for infant and young child feeding; 2003 (<https://www.who.int/publications/i/item/9241562218>)

¹⁷ WHO. Comprehensive implementation plan on maternal, infant and young child nutrition; 2014 (<https://www.who.int/publications/i/item/WHO-NMH-NHD-14.1>)

¹⁸ WHO. Nutrient profile model. Copenhagen: World Health Organization Regional Office for Europe; 2015 (https://www.euro.who.int/data/assets/pdf_file/0005/270716/Nutrient-children_web-new.pdf)

H5	Policies to protect children from the harmful impact of food marketing on diet		<p>pack labelling for promoting healthy diet (2019)</p> <ul style="list-style-type: none"> • Handbook on food labelling to protect consumers (2016)
H6	Protection, promotion and support of optimal breastfeeding practices		<ul style="list-style-type: none"> • Implementing nutrition labelling policies: a review of contextual factors (2021)
H7	Taxation on sugar-sweetened beverages as part of comprehensive fiscal policies to promote healthy diets		<ul style="list-style-type: none"> • Front-of-package labelling as a policy tool for the prevention of NCDs in the Americas (2021) • Health evidence network support synthesis report on effectiveness of FOPL policies in the WHO European region (2018) • Guideline in nutrition labelling policies (forthcoming) <p><u>Public food procurement and service policies (H3)</u></p> <ul style="list-style-type: none"> • Action framework for developing and implementing public food procurement and service policies for a healthy diet (2021) • Implementing school food and nutrition policies: a review of contextual factors (2021) • Guideline school food and nutrition policies (forthcoming) <p><u>Behaviour change (H4)</u></p> <ul style="list-style-type: none"> • SHAKE the salt habit: technical package for salt reduction (2016) <p><u>Marketing restrictions (H5)</u></p> <ul style="list-style-type: none"> • Protecting children from the harmful impact of food marketing: policy brief (2022) • Set of recommendations on the marketing of foods and non-alcoholic beverages to children (2010) • Marketing of food and non-alcoholic beverages to children (2010) • Framework for implementing the set of recommendations

			<p>on the marketing of foods and non-alcoholic beverages to children (2012)</p> <ul style="list-style-type: none"> • Tackling food marketing to children in a digital world: trans-disciplinary perspectives (2021) • Regional action framework on protecting children from the harmful impact of food marketing in WPRO (2020) • WHO guideline on policies to protect children from the harmful impact of food marketing (forthcoming) <p><u>Breastfeeding practices (H6)</u></p> <ul style="list-style-type: none"> • WHO website on breastfeeding • Fact sheet on infant and young child feeding • Implementation manual on ending the inappropriate promotion of foods for infants and young children (2017) • NetCode toolkit for ongoing monitoring and periodic assessment of the Code (2017) • Ten steps to successful breastfeeding • Guideline on counselling of women to improve breastfeeding practices (2018) • Implementation guidance on counselling women to improve breastfeeding practices (2021) • Advocacy guidance brief on enacting paid family leave and workplace breastfeeding policies (2019) • Advocacy brief on breastfeeding and family-friendly policies (2019) • Advocacy brief on increasing funding for breastfeeding (2019)
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			<p><u>SSB taxation (H7)</u></p> <ul style="list-style-type: none"> • Policy brief on fiscal policies to promote healthy diets (2022) • WHO manual on sugar-sweetened beverage taxation policies to promote healthy diets (2022) • Implementing fiscal and pricing policies to promote healthy diets: a review of contextual factors (2021) • Fiscal policies for diet and the prevention of NCDs (2016) • Global database on the Implementation of Nutrition Action (GINA): SSB taxation • Sugar-sweetened beverage taxation in the region of the Americas (2020) • SSB taxes in the WHO European region: success through lessons learned and challenges faced (2022) • Guideline on fiscal policies to promote healthy diets (forthcoming)
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Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention
H8	Subsidies on healthy foods and beverages (e.g. fruits and vegetables) as part of fiscal policies for healthy diets
H9	Menu labelling in food service for healthy diets (e.g. to reduce the intake of energy, free sugars, sodium and/or unhealthy fats)
H10	Limiting portion and package size for healthy diet (e.g. to reduce the intake of energy, free sugars, sodium and/or unhealthy fats)
H11	Nutrition education and counselling for healthy diets in different settings (e.g. in preschools, schools, workplaces and hospitals)

Physical inactivity

Overarching/enabling actions

- WHO's global action plan on physical activity 2018–2030: more active people for a healthier world¹⁹
- ACTIVE: a technical package for increasing physical activity²⁰
- WHO guidelines on physical activity and sedentary behaviour²¹
- Leadership and whole of government commitment to address physical inactivity using a life course approach²²
- Strong advocacy to increase awareness and knowledge on the cross cutting benefits of increasing physical activity, operational research and knowledge translation and improved monitoring and surveillance systems²³

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
P1	Provide physical activity assessment, counselling, and behaviour change support as part of routine primary health care services through the use of a brief intervention	Requires sufficient capacity, and staff with sufficient training in primary care	Global action plan on physical activity 2018–2030: more active people for a healthier world (2018)
P2	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.	Requires multisectoral actions with relevant ministries and support by civil society	Promoting physical activity through primary health care: a toolkit (2021)

Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention	
P3	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	

¹⁹ WHO. Global Action Plan on Physical activity 2018-2030: More active people for a healthier world; 2018 (<https://apps.who.int/iris/bitstream/handle/10665/272722/9789241514187-eng.pdf>)

²⁰ WHO. ACTIVE: a technical package for increasing physical activity; 2018 (<https://apps.who.int/iris/handle/10665/275415>)

²¹ WHO. WHO guidelines on physical activity and sedentary behaviour; 2020 (<https://www.who.int/publications/item/9789240015128>)

²² WHO. Fair play: building a strong physical activity system for more active people; 2021 (<https://apps.who.int/iris/handle/10665/346169>)

²³ WHO. Global status report on physical activity 2022; 2022 (<https://apps.who.int/iris/handle/10665/363607>)

	and cycling and equitable access to safe, quality public open spaces that enable and promote physical activity and active mobility	
P4	Implement whole-of-school programmes that include quality physical education, and adequate facilities, equipment and programs supporting active travel to/from school and support physical activity for all children of all abilities during and after school	Promoting physical activity through schools: a toolkit (2021)
P5	Improve walking and cycling infrastructure ensuring universal and equitable access to enable and promote safe walking, cycling, other forms of micro mobility (e.g. wheelchairs, scooters and skates) by people of all ages and abilities	
P6	Implement multi-component workplace physical activity programmes	
P7	Provide and promote physical activity through provision of community-based (grass roots) sport and recreation programmes and conduct free mass participation events to encourage engagement by people of all ages and abilities	

Objective 4: To strengthen and orient health systems to address the prevention and control of noncommunicable diseases and the underlying social determinants through people-centred primary health care and universal health coverage

Overarching/enabling actions

- Integrate very cost-effective noncommunicable disease interventions into the basic primary health care package with referral systems to all levels of care to advance the universal health coverage agenda
- Explore viable health financing mechanisms and innovative economic tools supported by evidence
- Scale up early detection and coverage, prioritizing very cost-effective high-impact interventions including cost-effective interventions to address behavioural risk factors
- Train the health workforce and strengthen capacity of health system particularly at primary care level to address the prevention and control of noncommunicable diseases
- Improve the availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases, in both public and private facilities
- Implement other cost-effective interventions and policy options in objective 4 to strengthen and orient health systems to address noncommunicable diseases and risk factors through people-centered health care and universal health coverage
- Develop and implement a palliative care policy, including access to opioids analgesics for pain relief, together with training for health workers
- Expand the use of digital technologies to increase health service access and efficacy for NCD prevention, and to reduce the costs in health care delivery

Cardiovascular disease

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
CV1	Pharmacological treatment of hypertension in adults using either of the following: thiazide and thiazide-like agents; angiotensin-converting enzyme inhibitors (ACE-Is)/angiotensin-receptor blocker (ARBs); calcium channel blockers (CCBs).	Feasible to implement in all settings and aligned to latest WHO guidelines (2021) Simple protocols can be followed by non-physician workers depending on the country context	Guideline for the pharmacological treatment of hypertension in adults (2021) Guideline for the pharmacological treatment of hypertension in adults: summary (2022)
CV2a	Drug therapy (treatment with an antihypertensive agent and a statin) to control cardiovascular disease risk using a total risk approach and counselling to individuals who have had a heart attack or stroke and to persons with a high risk ($\geq 20\%$) of a fatal and non-fatal cardiovascular event in the next 10 years using WHO's updated cardiovascular disease risk charts	Feasibility and practicality of implementation needs to be assessed and determined. Glucose control not included in this intervention, but in the diabetes intervention "Control of blood pressure in people with diabetes"	HEARTS technical package for cardiovascular disease management in primary health care: risk based CVD management (2020)
CV2b	Drug therapy (treatment with an antihypertensive agent) to control CVD risk using a total risk approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk ($\geq 10\%$) of a fatal and non-fatal cardiovascular event in the next 10 years using WHO's updated cardiovascular disease risk charts	Feasibility and practicality of implementation needs to be assessed and determined. Glucose control not included in this intervention, but in the diabetes intervention "Control of blood pressure in people with diabetes"	
CV3	Treatment of new cases of acute myocardial infarction with either: acetylsalicylic acid, or acetylsalicylic acid and thrombolysis, or acetylsalicylic acid, thrombolysis and clopidogrel, or primary percutaneous coronary interventions (PCI), with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	Selection of option depends on health system capacity	
CV4a	Treatment of acute ischemic stroke with intravenous thrombolytic therapy	Feasibility and practicality of implementation needs to be assessed and determined	

		according to health systems capacity.	
CV4b	Treatment of acute ischemic stroke with mechanical thrombectomy within an experienced facility	Feasibility and practicality of implementation needs to be assessed and determined according to health systems capacity. Requires a surgical facility with appropriately trained workforce.	
CV5a	Primary prevention of rheumatic fever and rheumatic heart diseases by increasing appropriate treatment of streptococcal pharyngitis at the primary care level		
CV5b	Secondary prevention of rheumatic fever and rheumatic heart disease by developing a register of patients who receive regular prophylactic penicillin		
CV6	Low-dose acetylsalicylic acid within 24 to 48 hours for secondary prevention of ischemic stroke		
CV7	Comprehensive* care of acute stroke patients in stroke units *Comprehensive care includes strategies such as staffing by a specialist stroke multidisciplinary team, access to equipment for monitoring and rehabilitation.	Early multidisciplinary approach to be determined and depending on country context. Composition of rehabilitation workforce as an integral part of multidisciplinary team depends on health system capacity.'	

Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention
CV8	Treatment of congestive cardiac failure with angiotensin-converting-enzyme inhibitor, beta-blocker and diuretic
CV9	Cardiac rehabilitation post myocardial infarction
CV10	Anticoagulation for medium-and high-risk non-valvular atrial fibrillation and for mitral stenosis with atrial fibrillation
CV11	Treatment of hypertension using single pill combination anti-hypertensives
CV12	Secondary prevention of coronary heart disease with a statin, angiotensin-converting-enzyme-inhibitor (ACE-I), beta-blocker and acetylsalicylic acid (low dose)
CV13	Seasonal influenza vaccination for people with cardiovascular diseases
CV14	COVID-19 vaccination for people with cardiovascular diseases

Diabetes

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
D1	Foot care to prevent amputation in people with diabetes (including educational programmes, access to appropriate footwear, multidisciplinary clinics)		HEARTS D: diagnosis and management of type 2 diabetes (2020)
D2	Diabetic retinopathy screening for all diabetes patients and laser photocoagulation for prevention of blindness	Requires health staff capacity for retinal assessment and photocoagulation	Classification of diabetes mellitus (2019) WHO package of essential noncommunicable (PEN) disease interventions for primary health care (2020)
D3	Glycaemic control for people with diabetes, along with standard home glucose monitoring for people treated with insulin to reduce diabetes complications		
D4	Screening of people with diabetes for albuminuria and treatment with angiotensin-converting enzyme inhibitor for the prevention and delay of renal disease		
D5	Control of blood pressure in people with diabetes		
D6	Statin use in people with diabetes > 40years old		

Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention
D7	Seasonal influenza vaccination for people with diabetes
D8	COVID-19 vaccination for people with diabetes

Chronic respiratory diseases

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
CR1	Acute treatment of asthma exacerbations with inhaled bronchodilators and oral steroids	Requires trained providers at all levels of healthcare	WHO package of essential noncommunicable (PEN) disease interventions for primary health care (2020)
CR2	Acute treatment of chronic obstructive pulmonary disease (COPD) exacerbations with inhaled bronchodilators and oral steroids		
CR3	Long-term management of asthma with inhaled bronchodilator and low-dose beclometasone		
CR4	Long-term management of COPD with inhaled bronchodilator		

Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention	
CR5	Seasonal influenza vaccination for people with chronic respiratory diseases	
CR6	Access to improved stoves and cleaner fuels to reduce indoor air pollution	
CR7	Cost-effective interventions to prevent occupational lung diseases, for example, from exposure to silica, asbestos	
CR8	COVID-19 vaccination for people with chronic respiratory diseases	

Cancer

Specific interventions with WHO-CHOICE analysis

N°	Intervention	Non-economic considerations	WHO tools
CA1	Vaccination against human papillomavirus (1-2 doses) of 9–14-year-old girls		<p><u>General</u></p> <ul style="list-style-type: none"> • WHO report on cancer (2020) • Cancer country profiles • Cancer control: six modules (2014) • National cancer control programmes core capacity self-assessment tool (2011) <p><u>Cervical cancer</u></p> <ul style="list-style-type: none"> • Global strategy to accelerate the elimination of cervical cancer as a public health problem (2020) • Human papillomavirus self-sampling as part of cervical cancer screening (2020) • Guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention (2021) • WHO guidelines for the use of thermal ablation for cervical pre-cancer lesions (2019) • Policy brief with recommendations on screening and treatment to prevent cervical cancer among women living with HIV (2021) • Framework for strengthening and scaling-up services for the management of invasive cervical cancer (2020)
CA2	Cervical cancer: HPV DNA screening, starting at the age of 30 years with regular screening every 5 to 10 years (using a screen-and-treat approach or screen, triage and treat approach)		
CA3	Cervical cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment		
CA4	Breast cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment		
CA5	Breast Cancer: screening with mammography (once every 2 years for women aged 50-69 years) linked with timely diagnostic work-up and comprehensive breast cancer treatment in setting where mammographic screening programme is recommended	Requires systems for organised, population-based screening	
CA6	Colorectal cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment		
CA7	Basic palliative care for cancer: home-based and hospital care with multi-disciplinary team and access to opiates and essential supportive medicines	Requires access to controlled medicines for pain relief	
CA8	Liver cancer: prevention of liver cancer through hepatitis B immunization ²⁴		
CA9	Oral cancer: early detection programme of oral cancer, including, as appropriate, targeted screening programme for high-risk groups in selected settings, according to disease burden and health system capacities, linked with comprehensive cancer management	Requires systems for organised, population-based screening	
CA10	Colorectal cancer screening: population-based programme, including through stool-based tests, as appropriate, at age >50	Requires systems for organised,	

²⁴ Cost effectiveness in prevention of liver cancer is optimal in countries with high hepatitis B prevalence and especially with vaccination in early childhood and at birth, taking into account the feasibility and cost of vaccination

	years, linked with timely treatment in settings where screening programme is recommended	population-based screening	<ul style="list-style-type: none"> • Framework for strengthening and scaling-up services for the management of invasive cervical cancer (2020) • WHO Position Paper on HPV vaccines (2022)
CA11	Childhood cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment, focusing on 6 index cancers of WHO Global Initiative for Childhood Cancer		
CA12	Head and neck cancers including oral cancers: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment		<u>Breast cancer</u> <ul style="list-style-type: none"> • WHO position paper on mammography screening (2014)
CA13	Prostate cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment		<u>Childhood cancer</u> <ul style="list-style-type: none"> • Global initiative for childhood cancer (2020) • CureAll framework: WHO global initiative for childhood cancer (2021)
CA14	Early detection and comprehensive treatment of cancer for those living with HIV		<u>Oral cancer</u> <ul style="list-style-type: none"> • IARC Perspective on Oral Cancer Prevention (2022) • Global oral health status report: towards universal health coverage for oral health by 2030 (2022) <u>Other</u> <ul style="list-style-type: none"> • Technical specifications of radiotherapy equipment for cancer treatment (2021) • Guidelines for the pharmacological and radiotherapeutic management of cancer pain in adults and adolescents (2019) • Practices to improve coverage of the hepatitis B birth dose vaccine (2013) • Planning and implementing palliative care services: a guide for programme managers (2016)

			<ul style="list-style-type: none"> • Global atlas of palliative care (2020) • WHO list of Priority Medical Devices for Cancer Management (2017)
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Other interventions from WHO guidance (without WHO-CHOICE analysis)

N°	Intervention
CA15	Seasonal influenza vaccination for people with cancer
CA16	COVID-19 vaccination for people with cancer

Objective 5: To promote and support national capacity for high-quality research and development for the prevention and control of noncommunicable diseases

Overarching/enabling actions

- Develop and implement a prioritized national research agenda for noncommunicable diseases
- Prioritize budgetary allocation for research on noncommunicable disease prevention and control
- Strengthen human resources and institutional capacity for research
- Strengthen research capacity through cooperation with foreign and domestic research institutes
- Implement other policy options in objective 5 to promote and support national capacity for high-quality research, development and innovation

Objective 6: To monitor the trends and determinants of noncommunicable diseases and evaluate progress in their prevention and control

Overarching/enabling actions

- Develop national targets and indicators based on global monitoring framework and linked with a multisectoral policy and plan
- Strengthen human resources and institutional capacity for surveillance and monitoring and evaluation
- Establish and or strengthen a comprehensive noncommunicable disease surveillance system, including reliable registration of deaths by cause, cancer registration, periodic data collection on risk factors and monitoring national response
- Integrate noncommunicable disease surveillance and monitoring into national health information systems
- Implement other policy options in objective 6 to monitor trends and determinants of noncommunicable diseases and evaluate progress in their prevention and control

Methodological annex to Appendix 3

Detailed methodological information

Identification of interventions

The following criteria used for identifying interventions in 2017 were applied for the 2022 update:

- (a) an intervention must have a demonstrated and quantifiable effect size, established in at least one published study in a peer-reviewed journal;
- (b) an intervention must have a clear link to one of the global NCD targets.

Additional interventions were considered using the same criteria as above. The proposed menu of interventions for the newly updated Appendix 3 comprises the following (all the interventions presented in the 2017 update have been re-analysed):

- (a) interventions that have been unchanged from the last updated version (2017);
- (b) interventions from the 2017 update that have been reworded or revised to reflect updates in WHO policy or scientific evidence;
- (c) interventions included in the 2017 update that had no analysis carried out at the time and for which cost-effectiveness analysis has now been done for the 2022 update;
- (d) new interventions deriving from WHO's new guidance and technical products (Table 4).

Table 4: List of interventions for 2022 update and comparison with 2017 update

Interventions	Update of original 2017 interventions (i)	Revised 2017 interventions (ii)	2017 intervention with new CEA (iii)	New interventions with CEA (iv)
Objective 3				
Tobacco	6			1
Harmful use of alcohol	5			
Unhealthy diet	1	4	2	
Physical inactivity	2			
Objective 4				
Cardio-vascular diseases	7	2	2	2
Diabetes	3		1	2
Chronic respiratory diseases		3		1
Cancer	7		3	4
Total	31	9	8	10

CEA: cost-effectiveness analysis

Choice of economic parameters

Economic parameters are listed below:

1. A menu of interventions for NCDs based on WHO-CHOICE methodology (see below) and presented as a ratio of international dollars (I\$) per healthy life year gained (HLYg)²⁵.
 - a. Cost-effectiveness ratios are presented in bands, ranging from < I\$100/HLYg to >I\$50,000/HLYg²⁶. The decision to band cost-effectiveness was based on the consensus that the data represent global estimates, therefore banding cost-effectiveness emphasises the relative magnitude of cost-effectiveness rather than a specific amount.
2. Size of health gain: the expected size of population health impact for each intervention was calculated based on total HLY gained per year in a standardized²⁷ population of 1 million people. HLY gained due to an intervention are calculated over a 100-year time frame and evaluated at 95% coverage.
3. Economic cost of implementation: The total cost required per year to implement each intervention was estimated, based on cost in I\$ millions to implement in a standardized population of 1 million people (i.e. I\$ per capita)

While the same methodology has been used for the assessment of the cost-effectiveness of the interventions ensuring comparability of results across areas, different modelling frameworks and assumptions have been used for the modelling of each risk factor and disease. Detailed information on methods, the evidence and assumptions underlying the interventions by disease and risk factor area are provided in separate technical briefs. The evidence used for the modelling of interventions will be periodically revised and updated, and changes in the estimates may occur in the future.

Country selection

Economic parameters were assessed for 3 country income-groups: low-income countries, lower-middle income countries and upper-middle income countries and this is different compared to the 2017 update where results were presented for 2 country income groups (low -and lower middle-income countries as one group and upper-middle- and high-income countries as the second group). The current update includes selected low -and middle-income countries (LMICs) only since the results from the updated Appendix 3 are most relevant for these countries. Countries were selected so that a significant proportion of the total population and health burden would be represented.

Sixty-two countries were considered in the analysis and listed in Table 5 below²⁸. The list of countries included all low-income countries, the 20 most populous lower-middle-income countries and the 20 most populous upper-middle-income countries. Combined, they represent nearly 80% of the total population and 80% of the global burden of disease. For some type of interventions (e.g. harmful use of alcohol), the analysis was based on a smaller subset of countries.

Table 5: Classification of countries by World Bank income level (2019)

²⁵ The HLY is the equivalent of the Disability Adjusted Life Years (DALYs) used in the 2017 update but framed in a positive way. DALYs are averted while HLY are gained.

²⁶ Cost-effectiveness bands (in I\$) are: <100, 100-\$500, 500-1,000, 1,000-5,000, 5,000-10,000, 10,000-20,000, 20,000-50,000, >50,000.

²⁷ Standardized over the total population of the analysed countries per income grouping

²⁸ The 2017 update included 20 countries.

Low-income countries	Lower middle-income countries	Upper middle-income countries ²⁹
Afghanistan	Algeria	Argentina
Burkina Faso	Angola	Brazil
Burundi	Bangladesh	China
Central African Republic	Cameroon	Colombia
Chad	Côte d'Ivoire	Dominican Republic
Democratic Republic of the Congo	Egypt	Ecuador
Eritrea	Ghana	Guatemala
Ethiopia	India	Indonesia
Gambia	Kenya	Iran (Islamic Republic of)
Guinea	Morocco	Iraq
Guinea-Bissau	Myanmar	Jordan
Haiti	Nepal	Kazakhstan
Madagascar	Nigeria	Malaysia
Malawi	Pakistan	Mexico
Mali	Philippines	Peru
Mozambique	Sri Lanka	Russian Federation
Niger	Ukraine	South Africa
Rwanda	United Republic of Tanzania	Thailand
Sierra Leone	Uzbekistan	Turkey
Sudan	Viet Nam	
Tajikistan		
Togo		
Uganda		

WHO-CHOICE: A brief methodological overview

General approach

Value for money and efficiency are fundamental considerations guiding investment in health, and WHO-CHOICE provides a way to measure them. This is true in settings where lack of finance is no longer the greatest barrier to achieving better health outcomes; it is also true in less well-resourced settings, where inefficiency is measured in lives lost and human suffering. Cost-effectiveness analysis supports priority setting by defining areas of action where the greatest health gains can be achieved.

Generalized cost-effectiveness analysis (WHO-CHOICE) also allows the definition of an optimal set of interventions, taking into account setting-specific factors such as the burden of disease, health system practice, and economic conditions. Tools to facilitate country-level cost-effectiveness analysis of a wide

²⁹ One upper-middle income country was excluded during analysis due to lack of data

range of health activities are available. In parallel, WHO-CHOICE publishes and disseminates online a knowledge base of regional-level cost-effectiveness information³⁰.

The use of cost-effectiveness analysis within decision making processes in health is increasingly common globally. However, a series of methodological shortcomings may limit the practical application of cost-effectiveness analysis results. Two examples of this are methodological differences between studies that limit comparability, and use of the current practice as a comparator, which implicitly assumes current resource use is efficient. Generalized Cost-Effectiveness Analysis (GCEA) was developed to overcome such shortcomings of traditional cost-effectiveness analysis.

The GCEA approach enables both existing and new interventions to be evaluated simultaneously. The comparator used in GCEA is a hypothetical “null” scenario, where the impacts of all currently implemented interventions are removed. Uniquely, this method allows existing and new interventions to be analysed at the same time.

Previous cost-effectiveness analyses have been restricted to assessing the efficiency of adding a single new intervention to the existing set or replacing one existing intervention with an alternative. Using WHO-CHOICE, the analyst is no longer constrained by what is already being done, and policymakers can revisit and revise past choices if necessary and feasible. They will have a rational basis for deciding to reallocate resources between interventions to achieve social objectives.

WHO-CHOICE:

- Uses a standardized method for cost-effectiveness analysis that can be applied to all interventions in different settings
- All interventions are evaluated compared to the “null”, a scenario in which we model the absence of health care interventions
- Impact models are developed using a population-based approach, and healthy life years gained due to an intervention are calculated over a 100-year time frame. Health impacts are not discounted.
- Costs for each intervention are developed using an ingredient based economic costing methodology. Costs are expressed in international dollars (I\$) to ensure comparability across countries and country income groups. Costs are calculated over a 100-year time frame and discounted at 3% per year.
- All interventions are evaluated at 95% coverage.

³⁰ World Health Organization Choosing Interventions that are Cost-Effective (WHO-CHOICE) programme: <https://www.who.int/teams/health-systems-governance-and-financing/economic-analysis>

Table 2: Summary of WHO-CHOICE economic analyses for interventions for NCD prevention and control

Notes: The tables below list all interventions for which WHO-CHOICE economic analysis is available. In this example, separate tables are provided for each of the four main risk factors and four main diseases covered by Objectives 3 and 4 of the WHO Global NCD Action Plan. The intervention name contains more exact detail about the intervention that was modelled -note that these may differ slightly from the wording of the WHO recommended interventions. This Annex is provided for background scientific information only and should not be used as a specific menu for implementation.

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)
Tobacco use										
T1	Increase excise taxes and prices on tobacco products	<100	1,717	<0.01	<100	2,674	0.01	<100	3,093	0.01
T2	Implement large graphic health warnings on all tobacco packages, accompanied by plain/standardized packaging	<100	1,212	<0.01	<100	2,181	0.01	<100	2,319	0.01
T3	Enact and enforce comprehensive bans on tobacco advertising, promotion and sponsorship	<100	933	<0.01	<100	1,490	0.01	<100	1,535	0.01
T4	Eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places, public transport	<100	1,475	<0.01	<100	2,845	0.01	<100	3,077	0.02
T5	Implement effective mass media campaigns that educate the public about the harms of smoking/tobacco use and second hand smoke, and encourage behaviour change	<100	1,345	0.01	<100	2,516	0.03	<100	2,701	0.10
T6	Provision of cost-covered effective population-wide support (including brief advice, national toll-free quit line services and mCessation) for tobacco cessation to all tobacco users.	<100	1,028	0.02	<100	1,724	0.05	<100	1,800	0.09
T7	Provision of cost-covered effective pharmacological interventions to all tobacco users who want to quit,	<100	1,761	0.08	100 – 500	3,583	0.71	100 – 500	3,924	1.32

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
	through the use of nicotine replacement therapy (NRT), Bupropion and Varenicline.									
Harmful use of alcohol										
A1	Increase excise taxes on alcoholic beverages	<100	155	0.01	<100	445	0.02	<100	797	0.04
A2	Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media)	<100	121	<0.01	<100	377	0.01	100 - 500	158	0.03
A3	Enact and enforce restrictions on the physical availability of retailed alcohol (via reduced hours of sale)	<100	132	0.01	<100	383	0.03	100 - 500	190	0.05
A4	Enact and enforce drink-driving laws and blood alcohol concentration limits via sobriety checkpoints	100 - 500	104	0.01	100 - 500	321	0.04	1,000 - 5,000	44	0.11
A5	Provide brief psychosocial intervention for persons with hazardous and harmful alcohol use	<100	244	0.02	100 - 500	647	0.07	100 - 500	691	0.29
Unhealthy diet										
H1	Reformulation policies for healthier food and beverage products (e.g. elimination of <i>trans</i> -fatty acids and/or reduction of saturated fats, free sugars and/or sodium)	<100	2,449	0.01	<100	4,038	0.02	<100	4,704	0.06
H2	Front-of-pack labelling as part of comprehensive nutrition labelling policies for facilitating consumers' understanding and choice of food for healthy diets	<100	4,042	<0.01	<100	7,441	0.01	<100	9,069	0.02
H3	Public food procurement and service policies for healthy diets (e.g. to reduce the intake of free sugars, sodium, unhealthy fats, and to increase the consumption of	<100	449	0.01	<100	472	0.02	<100	441	0.04

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
	legumes, wholegrains, fruits and vegetables)									
H4	Behaviour change communication and mass media campaign for healthy diets (e.g. to reduce the intake of energy, free sugars, sodium, unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables)	<100	2,257	0.01	<100	3,152	0.03	<100	3,506	0.12
H5	Policies to protect children from the harmful impact of food marketing on diet	<100	297	<0.01	<100	446	0.01	<100	610	0.02
H6	Protection, promotion and support of optimal breastfeeding practices	<100	2,052	0.07	<100	3,049	0.11	<100	2,964	0.16
H7	Taxation on sugar-sweetened beverages as part of fiscal policies for healthy diets	100 - 500	7	<0.01	100 - 500	12	<0.01	100 - 500	41	<0.01
Physical inactivity										
P1	Brief counselling intervention on physical activity in primary health care	100 - 500	246	0.07	100 - 500	732	0.30	1,000 - 5,000	296	0.90
P2	Physical activity public education and awareness campaign	<100	185	<0.01	<100	617	0.01	100 - 500	162	0.04
Cardiovascular diseases										
CV1	Pharmacological treatment of hypertension in adults using either of the following: thiazide and thiazide-like agents; angiotensin-converting enzyme inhibitors (ACE-Is)/angiotensin-receptor blocker (ARBs); calcium channel blockers (CCBs).	100 - 500	5,281	2.12	500 - 1,000	1,435	0.78	500 - 1,000	3,002	1.97
CV2a	Drug therapy (treatment with an antihypertensive and statin) to	100 - 500	435	0.21	1,000 - 5,000	274	0.29	500 - 1,000	1,166	0.82

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)
	control CVD risk using a total risk* approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk ($\geq 20\%$) of a fatal and non-fatal cardiovascular event in the next 10 years using the updated WHO CVD risk charts									
CV2b	Drug therapy (treatment with an antihypertensive) to control CVD risk using a total risk* approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk ($\geq 10\%$) of a fatal and non-fatal cardiovascular event in the next 10 years using the updated WHO CVD risk charts	500 - 1,000	2,389	1.24	500 - 1,000	762	0.64	500 - 1,000	2,107	1.79
CV3a	Treatment new cases of acute myocardial infarction with acetylsalicylic acid initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	10,000 - 15,000	7.9	0.08	15,000 - 20,000	2.7	0.04	20,000 - 50,000	3.9	0.08
CV3b	Treatment new cases of acute myocardial infarction with acetylsalicylic acid and thrombolysis, with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	5,000 - 10,000	13.0	0.13	15,000 - 20,000	3.7	0.06	15,000 - 20,000	6.1	0.12
CV3c	Treatment of new cases of acute myocardial infarction with acetylsalicylic acid, thrombolysis and clopidogrel, with patients initially treated in a hospital setting with follow up carried out through	5,000 - 10,000	15.4	0.14	15,000 - 20,000	4.2	0.06	15,000 - 20,000	7.2	0.12

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
	primary health care facilities at a 95% coverage rate									
CV3d	Treatment of new cases of myocardial infarction with primary percutaneous coronary interventions (PCI), acetylsalicylic acid and clopidogrel, with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	>50,000	7.8	1.00	>50,000	2.6	0.24	>50,000	3.9	0.56
CV4a	Treatment of acute ischemic stroke with intravenous thrombolytic therapy	5,000 - 10,000	18.3	0.17	10,000 - 15,000	5.3	0.07	15,000 - 20,000	16.9	0.27
CV4b	Treatment of acute ischemic stroke with mechanical thrombectomy within an experienced facility	20,000 - 50,000	8.0	0.40	20,000 - 50,000	2.9	0.10	>50,000	7.6	0.48
CV5a	Primary prevention of rheumatic fever and rheumatic heart diseases by increasing appropriate treatment of streptococcal pharyngitis at the primary care level	100 - 500	3,430.0	0.44	100 - 500	989.0	0.14	100 - 500	622.4	0.28
CV5b	Secondary prevention of rheumatic fever and rheumatic heart disease by developing a register of patients who receive regular prophylactic penicillin	<100	722.2	0.03	<100	200.0	0.01	<100	121.9	0.01
CV6	Low-dose acetylsalicylic acid within 24 to 48 hours for secondary prevention of ischemic stroke	20,000 - 50,000	0.8	0.03	10,000 - 15,000	1.2	0.02	>50,000	1.0	0.06
CV7	Comprehensive care of acute stroke patients in stroke units	>50,000	1.6	0.22	>50,000	1.4	0.11	>50,000	1.8	0.39
Diabetes										
D1	Foot care to prevent amputation in people with diabetes (including educational programmes, access to	100 - 500	80	0.03	1,000 - 5,000	99	0.10	1,000 - 5,000	176	0.20

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
	appropriate footwear, multidisciplinary clinics)									
D2	Diabetic retinopathy screening for all diabetes patients and laser photocoagulation for prevention of blindness	1,000 - 5,000	32	0.04	1,000 - 5,000	48	0.17	1,000 - 5,000	133	0.34
D3	Glycaemic control for people with diabetes, along with standard home glucose monitoring for people treated with insulin to reduce diabetes complications	500 - 1,000	1,091	0.75	1,000 - 5,000	1,996	2.51	1,000 - 5,000	2,784	3.96
D4	Screening of people with diabetes for albuminuria and treatment with angiotensin-converting enzyme inhibitor for the prevention and delay of renal disease	100 - 500	526	0.12	100 - 500	1,012	0.44	500 - 1,000	1,192	0.78
D5	Control of blood pressure in people with diabetes	100 - 500	274	0.04	100 - 500	532	0.17	500 - 1,000	824	0.50
D6	Statin use in people with diabetes > 40years old	<100	515	0.05	100 - 500	1,271	0.22	100 - 500	1,559	0.61
Chronic Respiratory Diseases										
CR1	Acute treatment of asthma exacerbations with inhaled bronchodilators and oral steroids	<100	1,220	0.05	100 - 500	1,051	0.13	500 - 1,000	828	0.43
CR2	Acute treatment of COPD exacerbations with inhaled bronchodilators and oral steroids	<100	183	<0.01	100 - 500	378	0.04	100 - 500	389	0.16
CR3	Long-term management of asthma with inhaled bronchodilator and low-dose beclometasone	<100	1,204	0.10	100 - 500	1,123	0.16	100 - 500	733	0.32
CR4	Long-term management of COPD with inhaled bronchodilator	<100	920	0.03	<100	1,811	0.16	100 - 500	1,723	0.39

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
Cancer										
CA1	Vaccination against human papillomavirus (1-2 doses) of 9–14 year old girls	<100	2,170	0.04	<100	1,878	0.05	<100	2,524	0.05
CA2	Cervical cancer: HPV DNA screening, starting at the age of 30 years with regular screening every 5 to 10 years (using a screen-and-treat approach or screen, triage and treat approach)	<100	1,012	0.02	<100	940	0.05	<100	1,686	0.14
CA3	Cervical cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	<100	621	0.02	<100	605	0.02	<100	578	0.03
CA4	Breast cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	<100	929	0.05	<100	1,405	0.11	100 - 500	2,721	0.30
CA5	Breast Cancer: Screening with mammography (once every 2 years for women aged 50-69 years) linked with timely diagnostic work-up and comprehensive breast cancer treatment in setting where mammographic screening programme is recommended	100 - 500	990	0.17	100 - 500	1,492	0.39	100 - 500	2,900	0.94
CA6	Colorectal cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	<100	356	0.02	<100	643	0.04	100 - 500	2,877	0.34
CA7	Basic palliative care for cancer: home-based and hospital care with multi-disciplinary team and access			<0.01			<0.01			0.02

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
	to opiates and essential supportive medicines ³¹									
CA8	Prevention of liver cancer through hepatitis B immunization ³²	<100	213	0.01	100 - 500	175	0.02	<100	684	0.01
CA9	Oral cancer: early detection programme of oral cancer, including, as appropriate, targeted screening programme for high-risk groups in selected settings, according to disease burden and health system capacities, linked with comprehensive cancer management	1,000 - 5,000	43	0.12	100 - 500	1,371	0.38	1,000 - 5,000	227	0.90
CA10	Colorectal cancer screening: population-based programme, including through stool-based tests, as appropriate, at age >50 years, linked with timely treatment in settings where screening programme is recommended	100 - 500	564	0.11	100 - 500	1,036	0.29	100 - 500	4,613	1.13
CA11	Childhood cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment, focusing on 6 index cancers of WHO Global Initiative for Childhood Cancer	<100	262	0.02	<100	1,148	0.10	<100	354	0.03
CA12	Head and neck cancers including oral cancers: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	500 - 1,000	18	0.01	500 - 1,000	102	0.08	1,000 - 5,000	47	0.05

³¹ Impact model not available for palliative care

³² Cost effectiveness in prevention of liver cancer is optimal in countries with high hepatitis B prevalence and especially with vaccination in early childhood and at birth, taking into account the feasibility and cost of vaccination

N°	Intervention	Low-income			Lower-middle-income			Upper-middle-income		
		Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (\$ in millions per 1 million)
CA13	Prostate cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	100 - 500	224	0.03	100 - 500	272	0.05	100 - 500	1,040	0.19
CA14	Early detection and comprehensive treatment of cancer for those living with HIV	<100	247	0.01	<100	84	<0.01	100 - 500	34	<0.01

Table 3: Ranking of interventions by average cost-effectiveness ratio for NCD risk factors and non-communicable diseases based on analysis in low and lower-middle income countries

N°	Intervention	Banded cost-effectiveness ratio	Health impact per year (HLY gained per 1 million)	Economic cost per year (I\$ in millions per 1 million)
Tobacco use				
T1	Increase excise taxes and prices on tobacco products	<100	2,400	0.01
T2	Implement large graphic health warnings on all tobacco packages, accompanied by plain/standardized packaging	<100	1,904	0.01
T3	Enact and enforce comprehensive bans on tobacco advertising, promotion and sponsorship	<100	1,331	0.01
T4	Eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places, public transport	<100	2,453	0.01
T5	Implement effective mass media campaigns that educate the public about the harms of smoking/tobacco use and second hand smoke, and encourage behaviour change	<100	2,182	0.02
T6	Provision of cost-covered effective population-wide support (including brief advice, national toll-free quit line services and mCessation) for tobacco cessation to all tobacco users.	<100	1,525	0.04
T7	Provision of cost-covered effective pharmacological interventions to all tobacco users who want to quit, through the use of nicotine replacement therapy (NRT), Bupropion and Varenicline.	100 - 500	3,062	0.53
Harmful use of alcohol				
A1	Increase excise taxes on alcoholic beverages	<100	362	0.02
A2	Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media)	<100	304	0.01
A3	Enact and enforce restrictions on the physical availability of retailed alcohol (via reduced hours of sale)	<100	311	0.02
A4	Enact and enforce drink-driving laws and blood alcohol concentration limits via sobriety checkpoints	100 - 500	259	0.03
A5	Provide brief psychosocial intervention for persons with hazardous and harmful alcohol use	100 – 500	532	0.05

Unhealthy diet				
H1	Reformulation policies for healthier food and beverage products (e.g. elimination of <i>trans</i> -fatty acids and/or reduction of saturated fats, free sugars and/or sodium)	<100	3,584	0.02
H2	Front-of-pack labelling as part of comprehensive nutrition labelling policies for facilitating consumers' understanding and choice of food for healthy diets	<100	6,470	0.01
H3	Public food procurement and service policies for healthy diets (e.g. to reduce the intake of free sugars, sodium, unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables)	<100	465	0.02
H4	Behaviour change communication and mass media campaign for healthy diets (e.g. to reduce the intake of energy, free sugars, sodium, unhealthy fats, and to increase the consumption of legumes, wholegrains, fruits and vegetables)	<100	2,897	0.03
H5	Policies to protect children from the harmful impact of food marketing on diet	<100	403	0.01
H6	Protection, promotion and support of optimal breastfeeding practices	<100	2,764	0.10
H7	Taxation on sugar-sweetened beverages as part of fiscal policies for healthy diets	100 - 500	11	<0.01
Physical inactivity				
P2	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.	<100	451	0.01
P1	Provide physical activity assessment, counselling, and behaviour change support as part of routine primary health care services through the use of a brief intervention	500 - 1,000	573	0.38
Cardiovascular diseases				
CV5b	Secondary prevention of rheumatic fever and rheumatic heart disease by developing a register of patients who receive regular prophylactic penicillin	<100	349	0.01
CV1	Pharmacological treatment of hypertension in adults using either of the following: thiazide and thiazide-like agents; angiotensin-converting enzyme inhibitors (ACE-Is)/angiotensin-receptor blocker (ARBs); calcium channel blockers (CCBs).	100 - 500	2,535	1.16
CV5a	Primary prevention of rheumatic fever and rheumatic heart diseases by increasing appropriate treatment of streptococcal pharyngitis at the primary care level	100 - 500	1,687	0.23
CV2a	Drug therapy (treatment with an antihypertensive and statin) to control CVD risk using a total risk approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk ($\geq 20\%$) of a fatal and non-fatal cardiovascular event in the next 10 years using the updated WHO CVD risk charts	500 - 1,000	320	0.27

CV2b	Drug therapy (treatment with an antihypertensive) to control CVD risk using a total risk approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk ($\geq 10\%$) of a fatal and non-fatal cardiovascular event in the next 10 years using the updated WHO CVD risk charts	500 - 1,000	1,227	0.81
CV3a	Treatment new cases of acute myocardial infarction with acetylsalicylic acid, initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	10,000 - 15,000	4	0.05
CV3b	Treatment of new cases of acute myocardial infarction with acetylsalicylic acid and thrombolysis, with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	10,000 - 15,000	6	0.08
CV3c	Treatment of new cases of acute myocardial infarction with acetylsalicylic acid, thrombolysis and clopidogrel, with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	10,000 - 15,000	7	0.09
CV4a	Treatment of acute ischemic stroke with intravenous thrombolytic therapy	10,000 - 15,000	9	0.10
CV6	Low-dose acetylsalicylic acid within 24 to 48 hours for secondary prevention of ischemic stroke	15,000 - 20,000	1	0.02
CV4b	Treatment of acute ischemic stroke with mechanical thrombectomy within an experienced facility	20,000 - 50,000	4	0.19
CV3d	Treatment of new cases of myocardial infarction with primary percutaneous coronary interventions (PCI), acetylsalicylic acid and clopidogrel, with patients initially treated in a hospital setting with follow up carried out through primary health care facilities at a 95% coverage rate	>50,000	4	0.46
CV7	Comprehensive care of acute stroke patients in stroke units	>50,000	1	0.14
Diabetes				
D4	Screening of people with diabetes for albuminuria and treatment with angiotensin-converting enzyme inhibitor for the prevention and delay of renal disease	100 - 500	873	0.35
D5	Control of blood pressure in people with diabetes	100 - 500	459	0.14
D6	Statin use in people with diabetes > 40years old	100 - 500	1,055	0.17
D1	Foot care to prevent amputation in people with diabetes (including educational programmes, access to appropriate footwear, multidisciplinary clinics)	500 - 1,000	93	0.08
D2	Diabetic retinopathy screening for all diabetes patients and laser photocoagulation for prevention of blindness	1,000 - 5,000	44	0.13

D3	Glycaemic control for people with diabetes, along with standard home glucose monitoring for people treated with insulin to reduce diabetes complications	1,000 - 5,000	1,737	2.01
Chronic respiratory diseases				
CR1	Acute treatment of asthma exacerbations with inhaled bronchodilators and oral steroids	<100	1,100	0.11
CR2	Acute treatment of COPD exacerbations with inhaled bronchodilators and oral steroids	<100	322	0.03
CR4	Long-term management of COPD with inhaled bronchodilator	<100	1,556	0.12
CR3	Long-term management of asthma with inhaled bronchodilator and low-dose beclometasone	100 - 500	1,146	0.14
Cancer				
CA1	Vaccination against human papillomavirus (1-2 doses) of 9–14 year old girls	<100	1,962	0.05
CA2	Cervical cancer: HPV DNA screening, starting at the age of 30 years with regular screening every 5 to 10 years (using a screen-and-treat approach or screen, triage and treat approach)	<100	961	0.04
CA3	Cervical cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	<100	610	0.02
CA4	Breast cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	<100	1,269	0.09
CA6	Colorectal cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	<100	561	0.04
CA8	Prevention of liver cancer through hepatitis B immunization ³³	<100	186	0.02
CA11	Childhood cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment, focusing on 6 index cancers of WHO Global Initiative for Childhood Cancer	<100	895	0.08
CA14	Early detection and comprehensive treatment of cancer for those living with HIV	<100	131	<0.01
CA5	Breast Cancer: Screening with mammography (once every 2 years for women aged 50-69 years) linked with timely diagnostic work-up and comprehensive breast cancer treatment in setting where mammographic screening programme is recommended	100 - 500	1,349	0.33

³³ Cost effectiveness in prevention of liver cancer is optimal in countries with high hepatitis B prevalence and especially with vaccination in early childhood and at birth, taking into account the feasibility and cost of vaccination

CA9	Oral cancer: early detection programme of oral cancer, including, as appropriate, targeted screening programme for high-risk groups in selected settings, according to disease burden and health system capacities, linked with comprehensive cancer management	100 - 500	991	0.31
CA13	Prostate cancer: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	100 - 500	258	0.04
CA10	Colorectal cancer screening: population-based programme, including through stool-based tests, as appropriate, at age >50 years, linked with timely treatment in settings where screening programme is recommended	100 - 500	901	0.24
CA12	Head and neck cancers including oral cancers: early diagnosis programs linked with timely diagnostic work-up and comprehensive cancer treatment	500 - 1,000	78	0.06
CA7	Basic palliative care for cancer: home-based and hospital care with multi-disciplinary team and access to opiates and essential supportive medicines ³⁴			<0.01

³⁴ Impact model not available for palliative care