Action on salt and hypertension:

reducing cardiovascular disease burden in the WHO European Region

World Health Organization
European Region

Action on salt and hypertension:

reducing cardiovascular disease burden in the WHO European Region

World Health Organization

European Region

Abstract

Raised blood pressure is the main risk factor for death and disability in the WHO European Region, causing almost a quarter of all deaths, and is a leading contributor to cardiovascular disease (CVD). Salt intake is a leading risk factor for hypertension and CVD, and reducing salt intake leads to reduced blood pressure. Rates of hypertension, salt intake and premature mortality from CVD are higher in the more eastern parts of the Region and in men. This background document for the WHO Regional Office for Europe's Signature Initiative to reduce inequalities in CVD burden and high blood pressure prevalence through improving hypertension control in primary care and implementing salt reduction strategies can support countries to achieve global noncommunicable disease targets. It outlines the concept and rationale for an integrated approach, provides an overview of the main issues and a situation analysis, and presents progress made towards global targets for the WHO European Region. Evidence-based interventions for salt reduction strategies and hypertension control are proposed, along with a discussion of barriers to their implementation and potential solutions, concluding with policy considerations. The document is rooted in real-world examples and available evidence, draws on lived experience and signposts to relevant WHO resources.

Keywords

HYPERTENSION; BLOOD PRESSURE; ANTIHYPERTENSIVE AGENTS; RISK FACTORS; SODIUM CHLORIDE, DIETARY; CARDIOVASCULAR DISEASES

ISBN: 978-92-890-6081-3 (PDF)

Suggested citation. Action on salt and hypertension: reducing cardiovascular disease burden in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2024. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

Designed by: Lars Møller

World Health Organization

European Region

Corrigendum

In: Action on salt and hypertension: reducing cardiovascular disease burden in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2024. Licence: CC BY-NC-SA 3.0 IGO (https://iris.who.int/handle/10665/376580).

ISBN: 978-92-890-6081-3 (PDF)

On page 10 in paragraph 3.1.1. Salt intake the following changes were made:
number 51 was changed to number 52;
“3.7 g per day in Luxembourg” was replaced with “4.92 g per day in Malta”.

Updated paragraph reads:

3.1.1 Salt intake
Almost all countries in the WHO European Region (52 of 53) have an average daily salt intake above the WHO recommended maximum level of 5 g per day (Fig. 4). This ranges from 4.92 g per day in Malta to 17.2 g in Kazakhstan and Kyrgyzstan *(47)*. Salt intake is higher in men than women in most countries (*47*).

On page 10, Fig. 4:
- The Y axis labelled: Prevalence (%)

Updated to read:
- Daily mean salt intake (g/day) in adults.

On page 12, Fig.5:
- The date source “Kwong et al. (2022) *(47)*”

Was replaced with
- “Global Health Observatory (2021) *(48)*”.

These corrections were incorporated into the electronic file on 15 May 2024.

Contents

List of figures

List of boxes

Foreword

Let me paint you a picture of Europe and central Asia: a WHO Region where noncommunicable diseases are the leading cause of death.

Cardiovascular diseases are driving the Region's high levels of premature mortality, primarily in men, particularly in the eastern part of our WHO Region. Four million, a staggering figure, is the number of deaths caused by cardiovascular diseases every single year. Causing almost a quarter of all deaths, high blood pressure is a key modifiable risk factor for cardiovascular disease alongside high salt intake – which is well above recommended levels in almost all European Member States. More than one in three adults aged 30–79 years have hypertension, although many of them – 34% – are unaware that they have it.

These are the facts. This is also something we can change.

In 2020, as part of our European Programme of Work that guides the work of the WHO Regional Office for Europe in support of our 53 Member States, I established an Advisory Council on Innovation for Noncommunicable Diseases, with the aim of bringing together health leaders from around the world to provide independent expert advice and guidance.

The Advisory Council and the WHO Secretariat have identified six Signature Initiatives where action would have the most impact, of which one initiative focuses explicitly on cardiovascular disease mortality, salt and hypertension, supported by the remaining five initiatives.

We have the knowledge; we know what works.

But time and time again, we fall short of implementing these evidence-based approaches, resulting in unacceptably high levels of premature mortality.

If we want to reduce premature mortality by 2030 in line with the Sustainable Development Goals and achieve a sustainably healthier Region, we need to do a better job at preventing and managing cardiovascular disease, hypertension in particular.

This report assists countries in doing just that.

It lists key interventions for comprehensive salt reduction and improved detection, treatment and control of hypertension. It discusses barriers and how to overcome them – and then shares examples from countries and practitioners.

These approaches can be further supported by achieving universal health coverage and preparing for long-term generational shifts that will make the WHO European Region more resilient to noncommunicable diseases in the face of commercial influences and emergencies, of which there is no scarcity in the times we live in.

We can bring about change.

I firmly believe that by working with stakeholders – ranging from governments to civil society – guided by data and with our eyes on the goal, we can make great advances in tackling cardiovascular diseases in a relatively short time, contributing to the health and well-being of millions in our Region, for generations to come.

Hans Henri P. Kluge
Director
WHO Regional Office for Europe

Acknowledgements

The core writing team for this report is duly acknowledged: Jill Farrington (WHO Regional Office for Europe) for concept and technical development, Stefanie Gissing (Consultant to the WHO Regional Office for Europe) for writing the report, and Clare Farrand (WHO Regional Office for Europe) for drafting specific inputs and technical review. Thanks are also given to Kremlin Wickramasinghe (WHO Regional Office for Europe) for support with concept development.

The WHO Regional Office for Europe would like to thank the members of the Cardiovascular Disease Working Group of the WHO Regional Director for Europe's Advisory Council on Innovation for Noncommunicable Diseases for shaping the concept, scope and purpose of the report and driving forward this work. Specific contributions were received from the following members of the Council: Birgit Berger (European Heart Network), Sergei Boytsov (National Medical Research Center of Cardiology named after Academician E.I. Chazov, Russian Federation), Paul Dendale (European Society of Cardiology), Amiran Gamkrelidze (University of Georgia) and Stefano Del Prato (European Diabetes Forum).

In addition, the WHO Regional Office for Europe is grateful to the following individuals for reviewing and commenting on drafts of the report and/or specific contributions: Simon Capewell (University of Liverpool, United Kingdom), Francesco Cappuccio (University of Warwick, United Kingdom), Zlatko Fras (University of Ljubljana, Slovenia), Sue Cohen (Independent, United Kingdom), Renu Garg (Resolve to Save Lives), Bojan Jelaković (University of Zagreb, Croatia), Alexandra Konradi and Oxana Rotar (WHO Collaborating Centre on Cardiovascular Diseases, eHealth and Value-based Care, Russian Federation), Lara Lehoranta and Tiina Laatikainen (WHO Collaborating Centre for Noncommunicable Disease Prevention, Health Promotion and Monitoring, Finland), Francesca Romana Pezzella (European Stroke Organisation) and Lela Sturua (National Center for Disease Control and Public Health, Georgia).

The technical support of WHO colleagues in reviewing and commenting on drafts of the report and/or specific contributions is also gratefully acknowledged: Sergei Bychkov, Katrine Habersaat, Tifenn Humbert, Ivo Rakovac and Elena Tsoy from WHO Regional Office for Europe, and Francesco Branca, Luz Maria De-Regil, Kaia Engesveen and Taskeen Khan from WHO headquarters.

Special thanks are also due to people with lived experience and service users who contributed their experience and allowed us to use their quotes.

This work was financially supported by unrestricted grants from the governments of Denmark, Germany and the Russian Federation.

Abbreviations

COVID-19	coronavirus disease
CVDs	cardiovascular diseases
EHN	European Heart Network
ESAN	European Salt Action Network
ESC	European Society of Cardiology
FOPL	front-of-pack labelling
HEN	Health Evidence Network
NCDs	noncommunicable diseases
PEN	WHO Package of Essential Noncommunicable Diseases Interventions
SDG	Sustainable Development Goal
STEPS	WHO STEPwise approach to surveillance


IHME-INKIVÄÄRI
INKIVÄÄRI
Tuoreen inkiväärin maku on voimakas ja raikkaan aromikas. Inkiväärä kuoritaan ennen käyttöä veitsellä ja sen jälkeen joko raastetaan tai paloitellaan. Inkiväärä sopii hyvin itämaisiin kasvis-, kala- ja liharuokiin sekä erilaisiin leivonnaisiin ja jälkiruokiin. Raasta inkivääriä vokkiin, porkkanasosekeittoon tai vaikkapa pikkuleipätaikinan joukkoon, valmista raikasta inkivääräijuomaa tai kokeile inkivääriä tofun marinointiin.
Katso resepti: Helppo pho-keitto
LAATULUOKKA 1
INKIVÄÄRI TUORE
KIINA
3 89
€
KG
3.89 €/KG
72
Katso reseptivinkkejä:
WWW.YHTEISHYVA.FI
SATUMAINEN
MANGO
Hapokkaan makea, mehukas ja kuitunikas mango on herkullinen sellaisenaan, rahkassa, pirtelössä ja salaatissa. Mango sopii hyvin kana- ja kalaruokien kanssa. Soseutettua mangoa voi lisätä marinadeihin ja siitä saadaan makeaa jälkiruokaa lisäkkeitä. Kokeile mangoa alkupalassa kinkun, savustetun kalan ja juustojen kanssa tai valmista maustetusta mangochutneytä tai salsaa. Tarjoa jälkiruokana, sametista mangomousse tai valmista välipalaksi raikasta mangolassia.
Katso resepti: Mango-kermaviilikastike kalapuikoille
LAATULUOKKA 1
MANGO
KEITT/KENT
BRASILIA
2 69
€
KG
2.69 €/KG
46
Katso reseptivinkkejä:
WWW.YHTEISHYVA.FI
KUUKAUDEN
SATOKAUSITUOTE
VERIGREIPPI
Verigreput ovat greippilajikkeita, joiden hedelmäliha on punainen. Verigreippiä tuodaan meille mm. USA:sta, josta se tunnetaan hyvin aamiaishedelmänä. Verigreippi on myös hyvä vaihtoehto erilaisissa salaatissa kempeän ja raikkaan makunsa ansiosta. Sen seuraksi sopivat erityisesti avokado, fenkoli ja jauhanta vuohenjuusto. Kokeile verigreippiä myös lisäkkeeksi kalaruoille. Uunissa karamellisoidut verigreipin puolikkaat ovat pirtsovan raikas herkku, joka maistuu niin brunssipöydässä kuin jälkiruokanakin.
Katso resepti: Grillatut verigreput
WWW.YHTEISHYV
VERIGREIPPI
0 9
24
on kirpeän hapokas
naistuu erilaisten ruo-
ruokien mausteena.
steeksi viipaleina tai
käytät limen kuorta
en tai koristeluun, pese
mällä vedellä ja käytä
takerros. Mausta uuni-
uoriraasteella, kokeile
a tai leivo klassinen
ttipiiras (Key lime pie).
andariinit
o reseptivinkkejä:
.YHTEISHYVA.FI

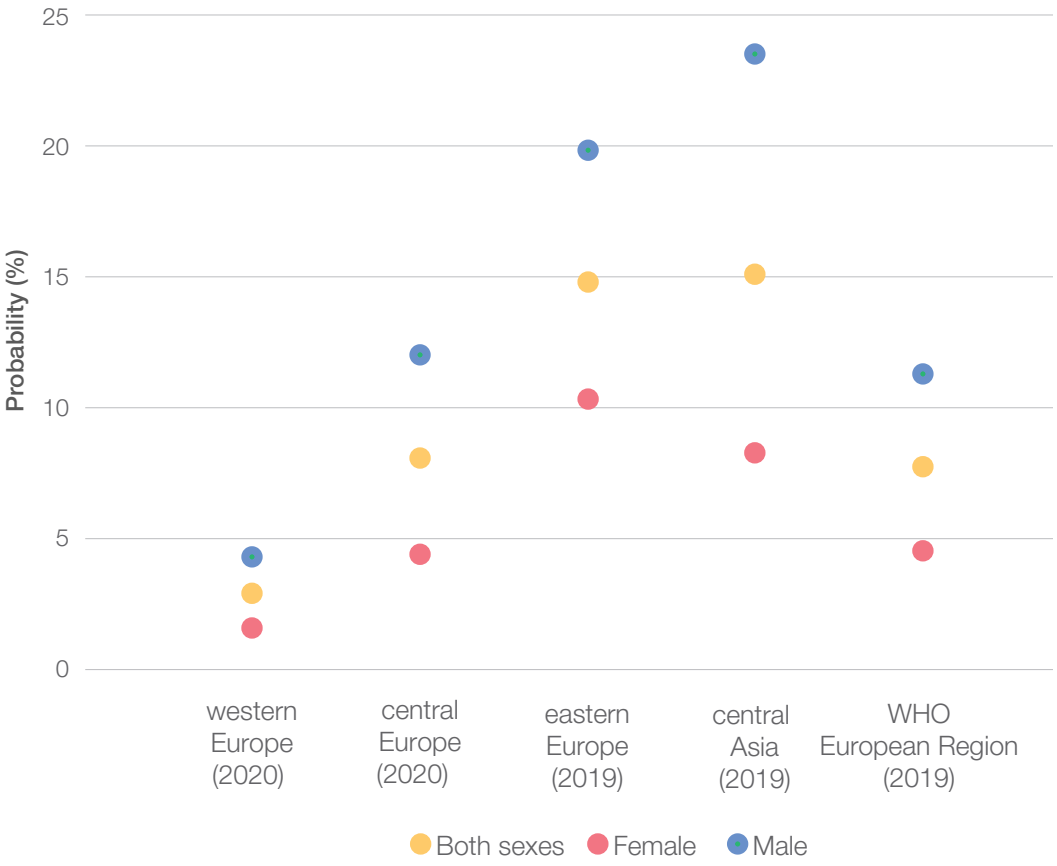
1. Introduction

1.1 Rationale: why this report?

Cardiovascular diseases (CVDs) such as heart attacks and strokes[1] cause more than two fifths (42.5%) of all deaths annually in the WHO European Region, that is, around 10 000 deaths every day *(1)*.

The probability of dying young (30–69 years) from a CVD is nearly five times as high in eastern Europe (15.1%) and central Asia (14.8%) compared to in western Europe (2.9%). For this same age group, men in the WHO European Region are almost 2.5 times more likely to die from CVDs than women, particularly in the more eastern parts of the Region (WHO, unpublished data, 2021) (see Fig. 1).

Fig. 1. The probability of dying young (aged 30–69 years) due to CVD, by country group and sex, latest available data



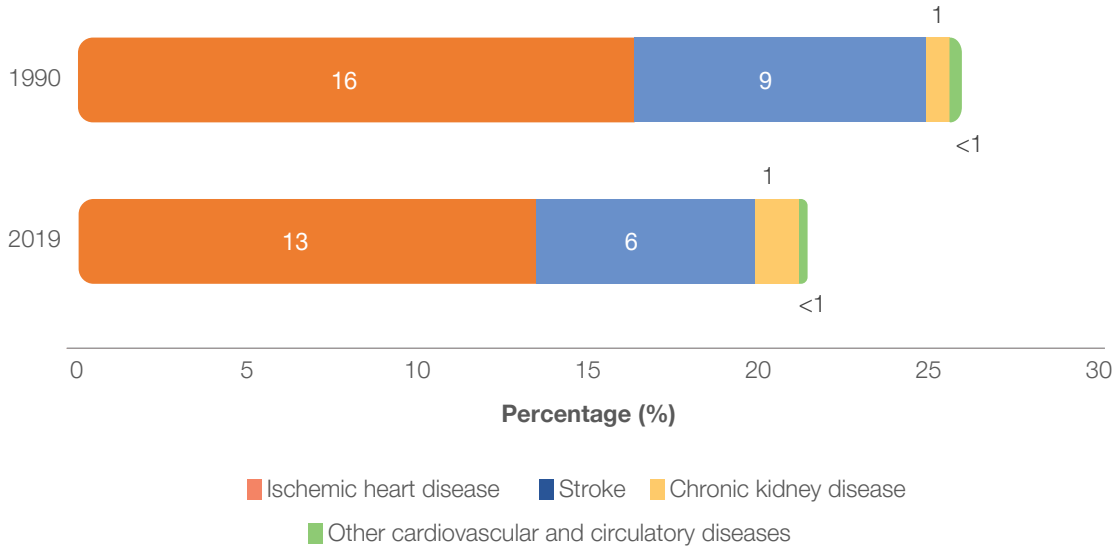
Source: WHO Mortality Database *(2)* and additional calculations.

Raised blood pressure (see Box 1 for terminology) is the leading risk factor for death and disability in the WHO European Region, causing almost a quarter (24%) of deaths and 13% of disability in 2019 – Fig. 2 illustrates this for major conditions *(2)*. Raised blood pressure is also a significant risk factor for CVD mortality, as well as burden (Fig. 3) *(3)*. Other modifiable risk factors include high salt/sodium intake (Box 1) and other dietary risks, high cholesterol, over-

[1] Stroke was re-classified as a "neurological disorder" under the *International Classification of Diseases*, 11th ed. (2021) *(4)*. It is still included within the category "cardiovascular diseases" for the purposes of monitoring Sustainable Development Goal indicators and so is used in this way in this report.

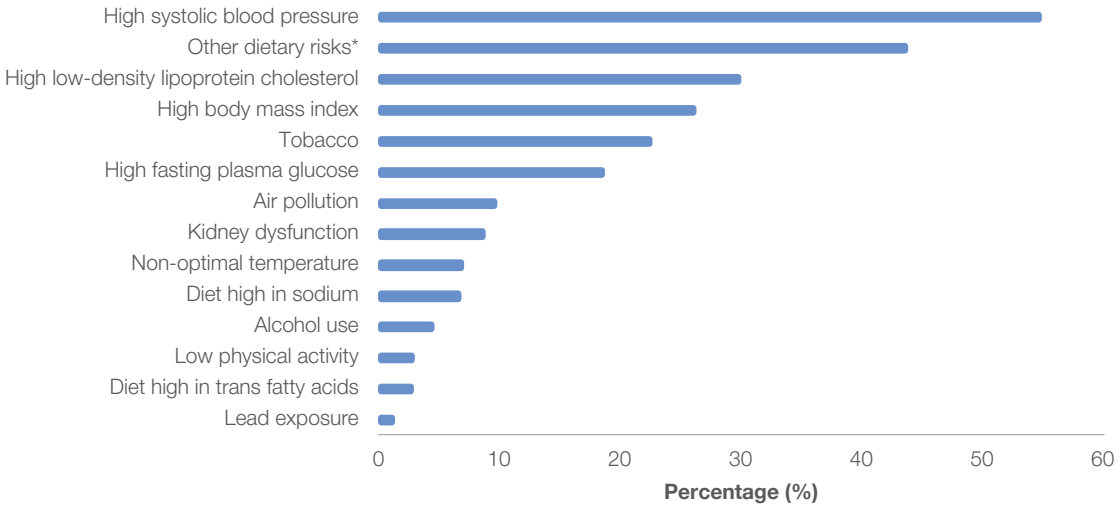
weight/obesity (high body mass index), high blood glucose, and tobacco and alcohol use – all of which can lead in turn to raised blood pressure. Socioeconomic, environmental and commercial determinants also contribute to CVD risk.

Fig. 2. Percentage of deaths caused by high systolic blood pressure in the WHO European Region, 1990 and 2019



Source: Global Burden of Disease, 2019 *(3)*.

Fig. 3. Proportion of CVD burden (disability-adjusted life years) attributable to selected risk factors in the WHO European Region, 2019



Note: * Other dietary risks combines a diet low in whole grains (11.12%), low in legumes (7.93%), high in red meat (5.26%), low in nuts and seeds (4.03%), low in fruits (3.89%), low in fibre (2.58%), high in processed meat (2.27%), low in polyunsaturated fatty acids (1.97%), low in seafood omega-3 fatty acids (1.87%), low in vegetables (1.84%) and high in sugar-sweetened beverages (1.08%).

Source: Global Burden of Disease, 2019 *(3)*.

Box 1. Terminology

Blood pressure measurement comprises two values: the systolic value and the diastolic value *(5)*. Blood pressure measurements in the population follow a Gaussian or normal distribution.

Cardiovascular risk is the likelihood of a person developing a fatal or non-fatal atherosclerotic CVD (heart attack or stroke) and is calculated by combining the effects of several risk factors. Cardiovascular risk increases exponentially starting from a systolic blood pressure of 110 or 115 mmHg *(6–8)*.

Below clarifies the terminology used to refer to blood pressure levels in this document.

- **High systolic blood pressure** can be defined as a systolic blood pressure above the theoretical minimum risk level of 110–115 mmHg as used in the *Global report on hypertension (9)* and *Global Burden of Disease (10).*
- **Hypertension** is defined as having a persistent systolic blood pressure of ≥ 140 mmHg and/or a diastolic blood pressure of ≥ 90 mmHg (denoted as ≥140/90 mmHg), and it is the threshold for treatment in most people *(9)*.
- **Raised blood pressure** is a term used in the Global Monitoring Framework *(11)* which monitors progress towards global NCD targets, and it is defined as "systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg" for the relevant target (see 3.2.3) *(11).*

Furthermore, **high salt intake** is defined as when a person consumes 5 g of salt per day or more, equivalent to more than 2 g of sodium *(12)*.

Raised blood pressure or hypertension (see Box 1 for terminology) often has no symptoms and therefore can remain undiagnosed, meaning the first clinical signs can be potentially catastrophic events such as heart attack or stroke. Around one in three people with hypertension in the WHO European Region are unaware that they have it, and amongst those diagnosed, control can be poor (see Section 5.2).

Living with hypertension and stroke

"In 2021, due to my high blood pressure, I had a stroke with cerebral haemorrhage. I didn't know I had high blood pressure. […] My rehabilitation is still ongoing. […] Hypertension is a very common pathology, but most people are unaware of it and its severe consequences. […] I believe prevention is the most important part of care. Prevention strategies should involve family medicine and primary health-care facilities."

Source: Maurizio Ceccarini, Italy. Speech at the virtual launch event of the CVD Signature Initiative, 9 December 2022, with permission.

Achieving Sustainable Development Goal (SDG) 3, "to ensure healthy lives and promote well-being for all at all ages" in the European Region, and its specific target to reduce premature mortality of major noncommunicable diseases (NCDs) by a third by 2030, requires both the prevention and treatment of CVDs. CVDs drive NCD premature mortality – contributing to around a third of deaths (men 35.4%; women 30%) in the 30- to 69-year age group *(1)* – and present an enormous cost for the Region through health care, informal care and lost productivity *(13)*. Multiple crises are jeopardizing the achievement of this SDG3 target and other global NCD targets (Box 2) *(14)*.

Box 2. Crises in Europe and NCDs

Multiple different crises and their longer-term repercussions are affecting the WHO European Region, including war, the coronavirus disease (COVID-19) pandemic, the economic crisis and climate change. Europe has almost reached a state of "permacrisis", which potentially distracts political attention away from tackling NCDs as well as impacting burden more directly. For example, the COVID-19 pandemic response required concerted efforts and huge resources, yet the total deaths from COVID-19 in the first 3 years of the pandemic were half of that caused by CVDs every year.

Most of the almost 2 million deaths related to non-optimal temperature in 2019 were due to CVDs – a number that will likely increase as the climate emergency progresses *(6)*. Furthermore, emerging evidence also shows that air pollution can impact heart disease and stroke *(15)*. Also, increased migration and damaged infrastructure due to war and natural disasters causes stress and care disruption which can increase the risk of acute cardiovascular events and poor treatment outcomes *(16–18)*.

1.2 Scope and purpose: what does this report cover?

This report presents the background information to support the WHO Regional Office for Europe's Signature Initiative to reduce inequalities in cardiovascular disease burden and high blood pressure prevalence through improving hypertension control in primary care and implementing salt reduction strategies (the CVD Signature Initiative). The concept for this initiative, its focus on salt and hypertension, and its integrated approach are further described in Chapter 2.

1.3 Target audience: who is this report for?

This report is likely to be useful for a variety of stakeholders including ministries of health, policy-makers, non-state actors, health-care professionals and their representative bodies, and patient associations.

Key messages:

- CVDs are the predominant cause of disability and premature death in the WHO European Region, primarily in men, particularly in the eastern part of the Region.
- High salt intake is a significant risk factor for hypertension, which itself is the biggest risk factor for CVDs. Both salt intake and hypertension are modifiable.

2. Conceptual model: why the CVD Signature Initiative?

The CVD Signature Initiative aims to accelerate progress on reducing inequalities in CVD burden through improving hypertension control in primary health care and implementing salt reduction strategies. It is one of six signature initiatives created by the WHO Regional Director for Europe's Advisory Council on Innovation for Noncommunicable Diseases *(19)*, anchored within *The European Programme of Work 2020–2025: United Action for Better Health (20)*.

High salt or sodium intake results in significant premature mortality through increasing blood pressure and therefore the risk of developing CVD. High sodium intake causes an estimated 1.65 million deaths globally every year, and four in 10 of these are in people under 70 years of age *(21)*. High sodium intake is also associated with a higher risk of obesity *(22)*.

There is a dose–response relationship between salt intake and hypertension – the greater the reduction in salt intake, the greater the decrease in blood pressure *(21,23)*. Reducing salt intake through individual-level prevention and behaviour change (such as dietary counselling, information and education) can reduce CVD deaths and the occurrence of cardiovascular events such as heart attacks *(23–26)*. Reduced salt intake at population level is also associated with reductions in blood pressure and the occurrence of cardiovascular events *(27)*. Notably, Finland and the United Kingdom of Great Britain and Northern Ireland have implemented population-level salt reduction strategies and seen reductions in sodium intake alongside reductions in blood pressure and cardiovascular events (see Box 3 and Section 4.3.1) *(28–31)*. Even a modest reduction in salt intake for at least 4 weeks causes significant reductions in blood pressure in people with and without hypertension irrespective of sex and ethnic group *(32)*.

Hypertension (blood pressure ≥ 140/90 mmHg) is a serious medical condition that significantly increases the risk of heart, brain, kidney and other diseases. Individuals with hypertension may also have other CVD risk factors, diabetes, or a history of CVD which raise their overall risk for CVD events and/or mortality *(9)*. Diabetes, for example, leads to a two- to four-fold increase in the risk of heart attack and stroke *(33)* (Box 4). The CVD risk associated with high systolic blood pressure (≥ 140 mmHg) is much higher at an older age when it is more common to have additional risk factors *(34)*. Treating hypertension in individuals through medication and modification of other risk factors can reduce the risk of mortality, CVD mortality, stroke, heart attack, heart failure events and chronic kidney disease *(9,35)*.

An individual-level approach relies on the identification and management of individuals with hypertension and at higher risk of cardiovascular events and/or mortality *(36)*. However, risk factors for many common conditions are distributed within populations so that most cases of a condition are in people at lower risk who do not reach the threshold for treatment initiation *(37)*. For the age group 30–69 years, for example, the risk of death from a heart attack or stroke doubles with every 20-point increase in systolic blood pressure starting at a blood pressure of 115/75 *(9)*. Prevention strategies that include population-level actions as well as individual-level interventions can therefore be more impactful by also affecting that larger proportion of individuals at lower risk as well as those with hypertension or higher CVD risk who remain undetected *(38)*. For example, there is evidence that lowering blood pressure in those with raised blood pressure measurements but below treatment thresholds (as can be achieved with salt intake reduction) still reduces CVD deaths in populations *(39,40)*.

Box 3. The value of an integrated approach to prevention combining population- and individual-level action in North Karelia, Finland

Finland has achieved dramatic reductions in mortality from heart disease through a project focused on CVD prevention and control. In the 1970s, North Karelia in Finland had the highest CVD mortality in men in the world. Authorities implemented the community-targeted North Karelia Project. Population-based prevention interventions included legislation to reduce salt intake such as mandatory food labelling for high-salt content, followed by compulsory labelling of all sodium content from the early 1990s. Individual-level interventions included practical recommendations for improved detection, diagnosis and treatment of hypertension alongside training for health professionals, and the measurement of cholesterol and counselling for those with high levels. Other interventions in this comprehensive project included mass media campaigns, antismoking legislation and mandatory health education in schools including cooking and storing food. As three-quarters of their dietary salt came from processed foods, involving industry and commercial catering among other stakeholders was important for success. Since the start of the North Karelia Project, mortality from coronary heart disease has dropped by over 85% and continues to decline.

Source: Dr Lara Lehtoranta, WHO Collaborating Centre for Noncommunicable Disease Prevention, Health Promotion and Monitoring, Finland. Presentation at the CVD Signature Initiative country launch event in Zagreb, Croatia, 15 March 2023.

Box 4. Diabetes: a vascular disease

The risk of heart attack and stroke increases up to two-fold for people living with diabetes *(33)* – which affects an estimated 75 million Europeans *(3)*. An estimated one third are undiagnosed, leaving them at risk of cardiovascular events as well as other complications such as blindness, limb amputation and kidney disease. Even when diagnosed, these complications can still occur if blood pressure is not adequately controlled *(41)*.

This means there is an urgent need to prevent CVD in people with diabetes, and to reduce CVD burden in the European Region the assessment and management of cardiovascular risk in people living with diabetes must be included. This requires careful attention to risk factors including hypertension, tobacco use and blood lipid levels *(42)*. Early risk assessment for CVD also presents a valuable opportunity to diagnose and effectively control diabetes, as well as prevent diabetes through effective management of risk factors.

Source: Professor Stefano Del Prato, Chair of the European Diabetes Forum.

Research from high-income countries has shown that 40–72% of reductions in CVD deaths was attributable to primary prevention – particularly declines in population-wide risk factors such as blood pressure, cholesterol levels and smoking prevalence – while 23–55% was attributable to surgical and medical treatment of CVD, particularly secondary prevention such as aspirin *(43)*.

An integrated CVD prevention approach of both population-level salt reduction strategies to prevent hypertension and individual-level interventions to diagnose, treat and control hypertension in primary care are important for reducing CVD burden in the European Region (see Box 5).

There are trade-offs; for example, an individual-level approach may use limited health service resources in scaling up efforts for identification of people with hypertension and at higher CVD risk and still miss those with low health literacy or poor engagement with health services, thereby risking widening inequities *(36,44)*. On the other hand, while population-level interventions may not have the costs associated with identification and in many cases are cost-saving overall *(45)*, including for CVDs *(46)*, they can be harder to implement as they often require cross-sectoral action *(44)*. To achieve the greatest benefit, it is important to take a balanced approach between the strategies according to country context, taking into account factors such as epidemiology, cost-effectiveness and the health system.

Box 5. Hypertension prevention and control: a complex intervention requiring integration

To paraphrase Geoffrey Rose, a pioneer of prevention, "a reduction in blood pressure in the patient in front of me has a very large impact on that one person, but even a small reduction in blood pressure or in salt consumption, for example by policy measures reducing salt in pre-prepared food, has an impact on cardiovascular health in a very large population."

The risk factors for CVD have long been established, but an individual approach to tackling them has limited success. Action is needed on different levels, such as education of patients and health professionals, scientific research on innovative ways to detect and treat hypertension, policy decisions such as mandatory reduction of salt content and food labelling, and the facilitation of opportunities to reduce hypertension through physical activity, reducing air pollution and other factors. Working together to act on these different levels can accelerate progress towards preventing potentially catastrophic outcomes for patients, such as a stroke and heart attack.

Source: Professor Paul Dendale, Honorary President of the European Association of Preventive Cardiology. Speech at the CVD Signature Initiative launch event, virtual, 9 December 2022.

While the CVD Signature Initiative has a particular focus on salt reduction strategies and hypertension control in reducing inequalities in CVD burden, it is supported by the collective effort of other signature initiatives to address the broader CVD risk factors and determinants, collectively working together towards the NCD-related SDGs.

Key messages:

- Reducing salt intake is known to cause reductions in blood pressure, which in turn reduces CVD risk.
- An integrated CVD prevention approach of both population-level salt reduction strategies to prevent hypertension and individual-level interventions to diagnose and control hypertension in primary care is important for reducing CVD burden in the European Region.

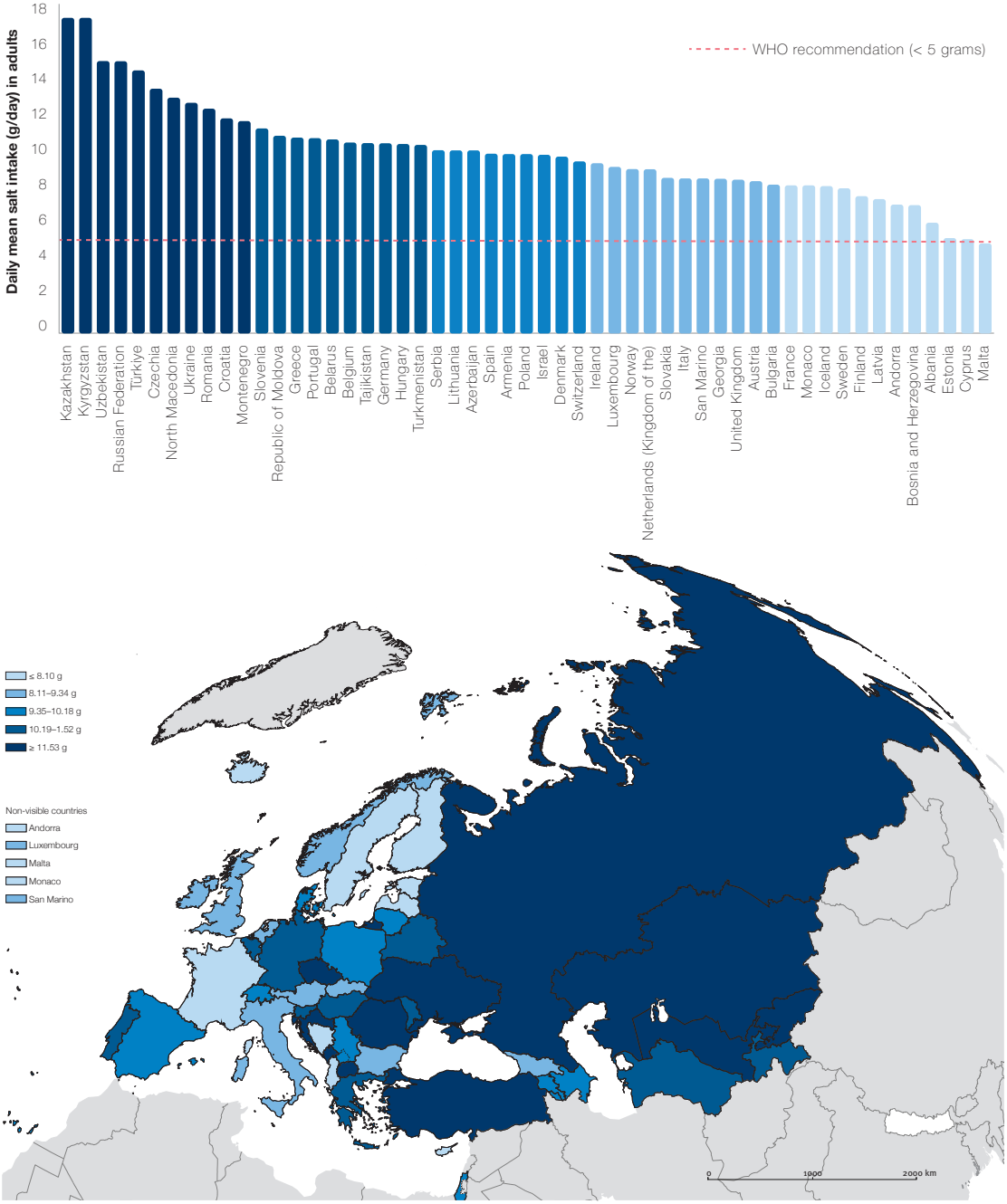
3. Trends and targets

3.1 Current situation: what is the size of the problem?

3.1.1 Salt intake

Almost all countries in the WHO European Region (52 of 53) have an average daily salt intake above the WHO recommended maximum level of 5 g per day (Fig. 4). This ranges from 4.92 g per day in Malta to 17.2 g in Kazakhstan and Kyrgyzstan *(47)*. Salt intake is higher in men than women in most countries *(47)*.

Fig. 4. Total population mean salt intake in the WHO European Region, 2021



Data source: Kwong et al. (2022) *(47)*. Map production: Public Health Information and Geographic Information System (GIS) World Health Organization

3.1.2 Hypertension

One in three adults (36.9%) aged 30–79 years in the WHO European Region are estimated to have hypertension; the second highest of the six WHO regions *(9)*. The prevalence is higher in men (40.4%) than women (33.4%) *(48)* and tends to be higher in the eastern part of the Region compared to the western part (see Fig. 5). While the Region has countries that are amongst those with the lowest prevalence of hypertension globally (in western Europe, for women), some countries in the Region (throughout central and eastern Europe and central Asia) are amongst those with the highest prevalence in the world *(49)*.

Globally, despite stable prevalence, the absolute number of people aged 30–79 years with hypertension doubled during the period 1990 to 2019 due to population growth and ageing *(49)*. With successful risk-factor reduction, fewer new cases of hypertension might be expected; however, population ageing and older groups accounting for larger proportions of the population (alongside rising obesity and other risk factors) threatens to increase future burden *(9)*. In the high-income western countries of the Region and in countries of central and eastern Europe, the effects of declining hypertension prevalence and population growth and ageing led to a small net increase in the number of people with hypertension from 1990 to 2019 *(49)*. For further information on the proportion of people who are diagnosed, treated and controlled, (see Section 5.2).

Fig. 5. Prevalence of hypertension in the WHO European Region in adults aged 30–79 years, 2019

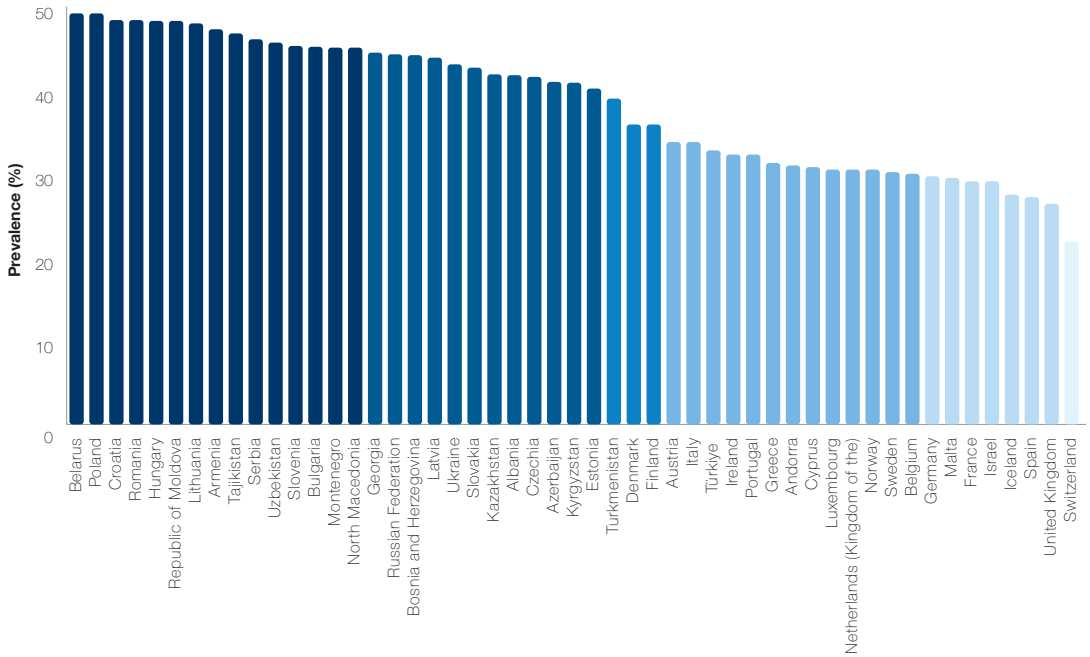
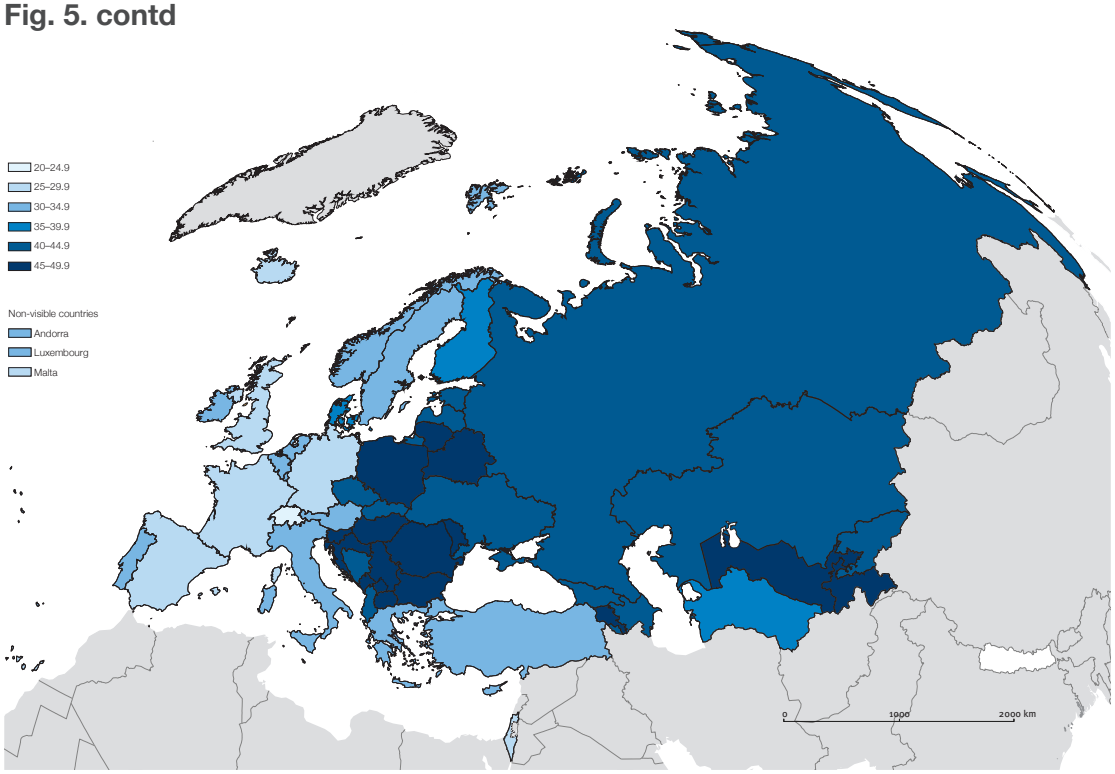


Fig. 5. contd



Data source: Global Health Observatory (2021) *(48).* Map production: Public Health Information and Geographic Information System (GIS) World Health Organization

3.2 Progress towards global targets: what is the trend compared to our goals?

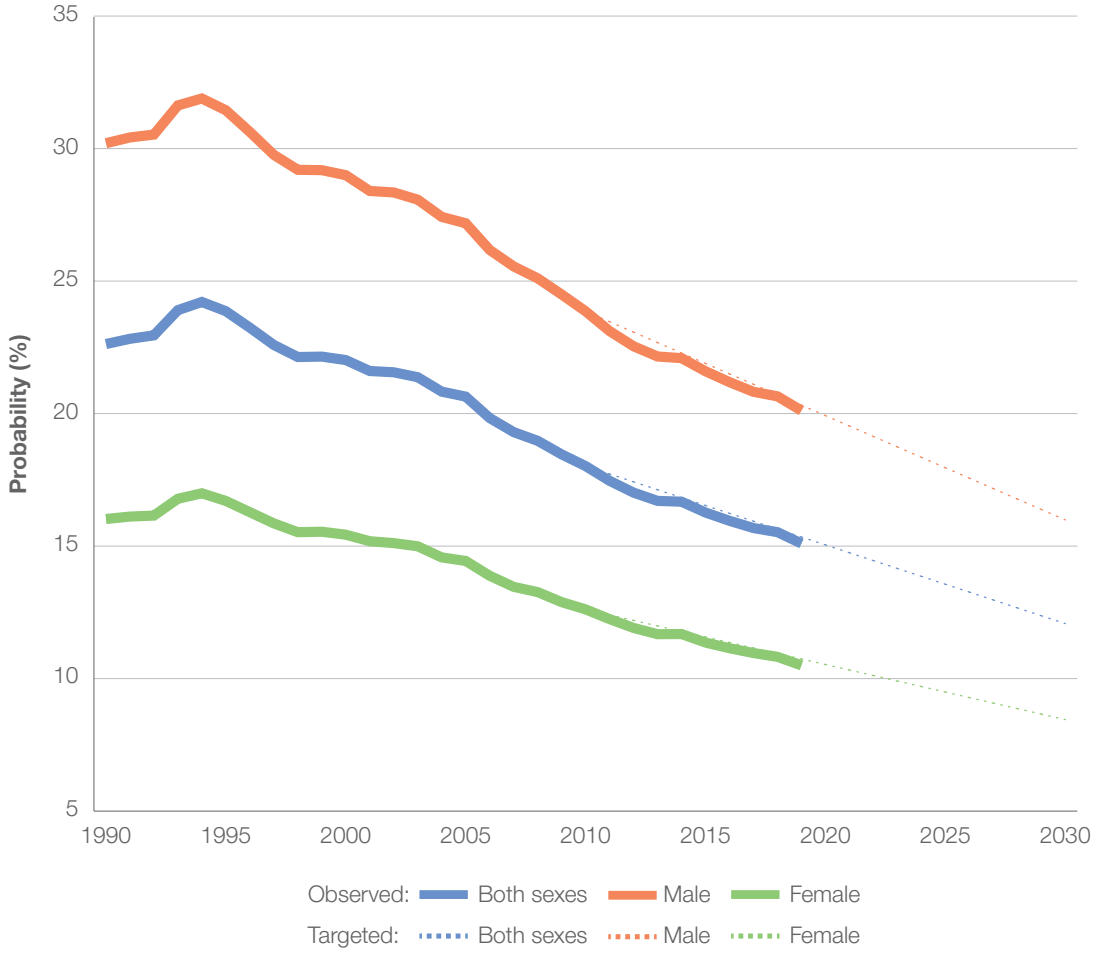
The work of the CVD Signature Initiative drives progress towards several global NCD targets within the European Region. These are the targets within WHO's Global Monitoring Framework *(11)* to track the implementation of the associated *Global action plan for the prevention and control of noncommunicable diseases 2013–2020*, which includes several indicators and nine voluntary targets *(14)*, as well as the SDG3 target on NCD premature mortality *(14)*.

3.2.1 Reduction in premature mortality from NCDs (CVD, cancer, diabetes or chronic respiratory disease)

There are several NCD premature mortality targets. The original Global Monitoring Framework target called for a 25% reduction by 2025 in the unconditional probability of dying between ages 30 and 69 years from four main NCDs – CVD, cancers, diabetes or chronic respiratory disease (baseline 2010) *(11)*. This was later aligned with the extension of the *Global action plan for the prevention and control of noncommunicable diseases 2013–2020* to 2030 *(11,14,50)*. Furthermore, SDG target 3.4.1 calls for reduction in premature mortality from NCDs by one third between 2015 and 2030.

Although the WHO European Region has achieved reductions in premature mortality from NCDs (Fig. 6), achieving the 2030 target is now in jeopardy. The COVID-19 pandemic disrupted progress towards NCD targets by affecting risk-factor reduction and interrupting service delivery *(51)*. In regard to meeting NCD targets, there is important and considerable variation between countries, as well as between the sexes – especially in the eastern part of the Region. When looking at the four main NCDs, CVD predominates in countries with the highest mortality levels, especially in men. In countries with lower premature mortality levels, cancer predominates.

Fig. 6. Unconditional probability of dying between ages 30 and 69 years from four main NCD causes – CVD, cancer, diabetes or chronic respiratory disease: trends and projections based on latest available data



Source: WHO Mortality Database *(2)* and additional calculations.

3.2.2 A 30% relative reduction in mean population intake of salt/sodium

WHO has not published progress on this target, as few countries are measuring salt intake regularly and so comprehensive trend data are not available. However, salt intake data using the most up-to-date data from WHO European Region Member States have been recently published showing that most countries exceed the WHO recommended limit (see Fig. 4) *(47)*. There is further information on data availability for salt intake in Section 4.3.3 of this report. For data on the implementation of salt reduction strategies, see Section 4.2.

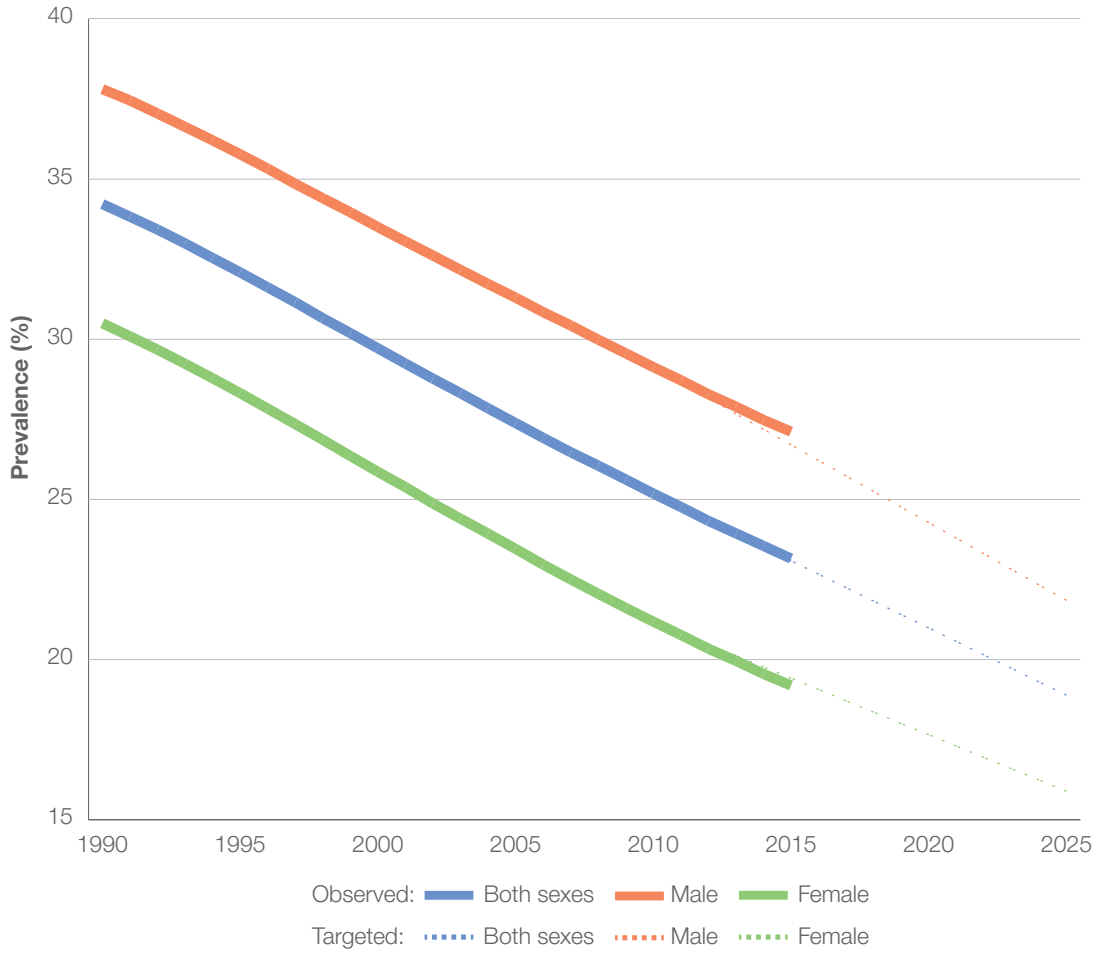
3.2.3 A 25% relative reduction in the prevalence of raised blood pressure[2]

The prevalence of raised blood pressure in the WHO European Region has decreased from 45% since 1990 (Fig. 7). Globally, there has been a decrease in prevalence in high-income countries, and also for women in central and eastern Europe *(49)*.

The target of a 25% relative reduction by 2025 (baseline 2010) in those aged 18 years and above is in reach for the WHO European Region (Fig. 7). There are again, however, considerable differences between countries and the sexes – the target is less likely to be achieved for men and for countries in the eastern part of the Region.

[2] Raised blood pressure in this target refers to a systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg *(14)*.

Fig. 7. Prevalence of raised blood pressure in the WHO European Region in adults aged 18 years and above: trends and projections, based on latest available data

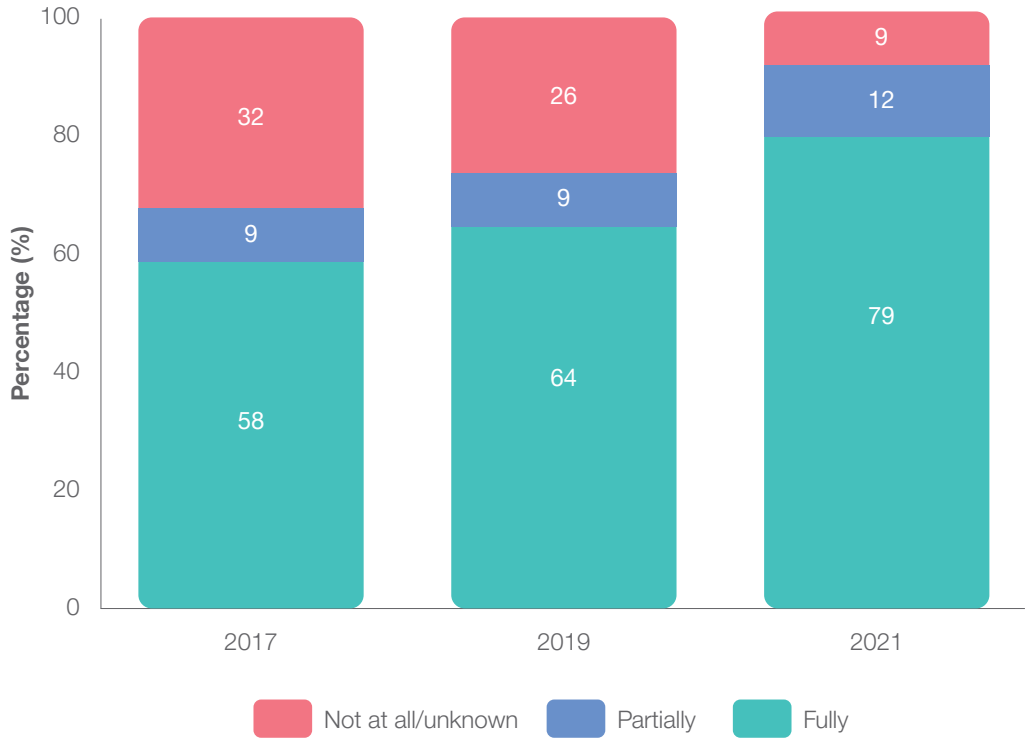


Source: Global Health Observatory (52).

3.2.4 At least 50% of eligible people receiving drug therapy and counselling to prevent heart attacks and strokes

The target of least 50% of eligible people receiving drug therapy and counselling to prevent heart attacks and strokes incorporates the provision of drug therapy and counselling for those at high risk, as well as general availability of medicines in the public sector. In the European Region, 79% of countries reported fully achieving this target in 2021, with a further 12% partially achieving it – an increase since 2017 (Fig. 8). Four of 53 countries reported that "less than 25%" of those eligible receive these preventative interventions.

Fig. 8. Percentage of WHO European Region Member States achieving the target of ≥ 50% primary health care facilities offering cardiovascular risk stratification for the management of patients at high risk of heart attack and stroke, 2021



Source: WHO, 2021 *(53)* and WHO, unpublished data, 2021.

Key messages:

- Almost all countries in the European Region have salt intake that is much higher than recommended maximum levels, and one third of the adult population aged 30–69 years have hypertension.
- Hypertension prevalence, and salt intake, tends to be higher in the eastern part of the Region compared to the western part.
- Although progress has been made towards some relevant global targets, there are important variations and inequalities both within and between countries.
- Progress on reduction in population-level salt intake requires regular monitoring of intake through 24-h urinary sodium studies.
- These studies are not being undertaken consistently throughout the European Region, resulting in a lack of trend data.


-ТАПЕР
ЧЕБУРЕК
СОСИСКА
КОФЕ
ОЖКИ
ЧОЙ
БЕЛЯШИ

4. Prevention: reducing salt intake

4.1 Interventions: we know what works to reduce salt intake

The components of a comprehensive population approach to salt reduction are presented in the WHO evidence-based and cost-effective NCD "best buys", which include: reformulation policies for healthier food and beverage products including reduction in sodium; front-of-pack labelling (FOPL) as part of comprehensive nutrition labelling policies to support consumer understanding and choice of food for a healthier diet, including sodium in pre-packaged foods; public food procurement and service policies to create environments supporting healthy diets including the reduction of sodium added, or procurement of food products that contribute less salt to the diet; and mass media behaviour change campaigns to reduce the intake of sodium, as well as policies to protect children from the harmful impact of food marketing on diet *(51)*.

Investment cases demonstrating the return on investment for NCD interventions have been published for six countries in the WHO European Region: Armenia *(54)*, Belarus *(55)*, Kazakhstan *(56)*, Kyrgyzstan *(57)*, Türkiye *(58)* and Uzbekistan *(59)*. In all six countries, salt policy packages including the best buys had the highest benefit-to-cost ratio after 15 years, ranging from 12 to 1 in Kyrgyzstan to 118 to 1 in Kazakhstan.

The relative importance and impact of each intervention may differ in relation to the setting. Health promotion campaigns and food labelling will likely have a greater impact where high salt intake is predominantly determined by consumers and urban street vendors adding salt to meals, as in many low- and middle-income countries. In contrast, in high-income settings processed food and restaurants largely determine high salt intake, and so reformulation by the food industry and governmental policy may be more effective *(60–62)* (see also Box 6).

Box 6. Salt reduction: food industry profit versus public health

Reducing salt at population level highlights the opposing fundamental interests of public health and the food industry. From a food industry perspective focused on profit, salt contributes to food safety by increasing shelf-life and is a cheap way to make food more palatable. In addition, the body gets used to the taste of salt and craves food with a higher salt content. It is these high-salt foods that tend to yield the most profit. In contrast, the public health perspective is focused on the significant health and economic costs to society caused by high salt intake. The food industry can lobby for limiting reductions in salt, sugar and fat content of food, as well as influence the private health sector which may have less interest in prevention if payment is based on treatments provided. When facing industry opposition, it is important that policy-makers remember that population-level salt reduction through reformulation produces rapid results, is feasible, is cost-saving and ultimately saves lives.

Source: Adapted from presentation by Professor Francesco Cappuccio, University of Warwick, United Kingdom, at the CVD Signature Initiative country launch event, Tbilisi, Georgia, 20 February 2023.

Living with hypertension and reducing salt intake

For ten years I've had hypertension. I receive regulating medication and I noticed if I ate salty food, the medication doesn't work as intended. […] I cut out high-salt foods fully but it was very difficult; […] spices, marinaded foods I excluded which are salt-based and part of our national cuisine. […] As for industrial food, processed food, I really noticed that salt is excessive, it produces negative consequences. I found a solution – I reduced to a minimum my salt intake.

Source: Irina Partskhaladze, Georgia. Speech at the country launch of the CVD Signature Initiative, Tbilisi, Georgia, 20 February 2023, with permission.

The SHAKE technical package is available to assist countries in creating a successful salt reduction strategy *(63)*. The *Accelerating Salt Reduction in Europe* package supports Member States in the European Region to implement strategic salt reduction policies and interventions *(64)*. Both resources focus on the cost-effective best buy interventions.

WHO is currently reviewing the evidence with a view to publishing guidance on the use of low-sodium salt substitutes (see Box 7).

Box 7. Salt substitutes

Salt substitutes have gained attention as a potential alternative to traditional sodium chloride (table salt) for reducing sodium intake. They are designed to partially replace sodium with alternatives such as magnesium or potassium, whilst mimicking the taste of salt. The term "salt substitute" is regulated by the Codex Alimentarius, which states that sodium content will not exceed 120 mg sodium/100 g of the salt substitute mixture *(65)*. There are many commercially available products on the market with reduced sodium that do not meet this standard, which are marketed as "reduced sodium salt" or "low salt". These products can be used to reduce salt intake by consumers and by the food industry within packaged foods in place of regular table salt. They could have a role in further reducing salt where reformulation limits have been reached *(66)*. Research suggests that incorporating these substitutes into daily diets could contribute to population-level sodium reduction, which is crucial for preventing hypertension and CVD *(67,68)*.

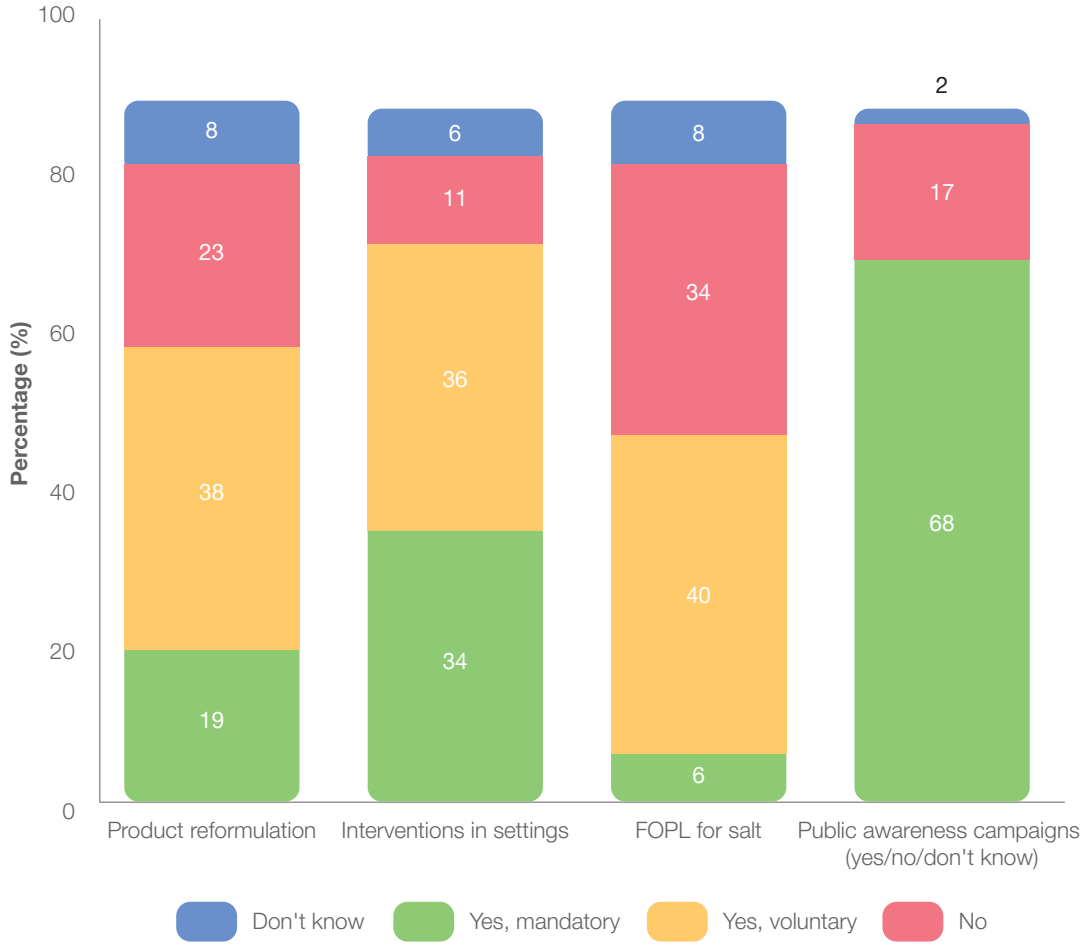
Salt substitutes have already been key to successful salt reduction strategies. For example, the Finnish Government's multifaceted approach (see Box 3) included a sodium-reduced, potassium- and magnesium-enriched salt. Their approach resulted in a decrease in population-level salt intake, a subsequent decrease in population systolic and diastolic blood pressure, and a 75%–80% decrease in both stroke and coronary artery disease mortality *(69)*.
Using potassium-based salt substitutes has been associated with potential cardiovascular benefits as higher intakes of potassium are associated with a decrease in blood pressure, independent of sodium intake *(70)*.

Despite the potential benefits, concerns have been raised about salt substitutes. Increased potassium consumption can cause adverse health effects in those with impaired kidney function or taking certain medications. As such, some public health agencies have been reluctant to endorse the use of (potassium-based) salt substitutes to reduce population-level salt intake.

4.2 Implementation: what are the gaps?

According to the most recent data from countries, most Member States in the WHO European Region (46 out of 53, 87%) have reported having national salt reduction initiatives in place *(71)*, and over two thirds (36 of 53, 68%) have implemented a mass media campaign (Fig. 9). More than half of Member States (30 of 53, 57%) have implemented product reformulation and over two thirds (37 of 53, 70%) report interventions to encourage salt reduction in settings such as schools and workplaces; however, most of these are voluntary rather than mandatory measures. Only three (6%) Member States have mandatory FOPL, with over one third (18 of 53, 34%) having no FOPL interventions at all.

Fig. 9. Percentage of Member States in the WHO European Region which have implemented salt reduction strategies, 2021



Source: WHO, unpublished data, 2021

Salt reduction strategies are least commonly used in eastern Europe and central Asia. This is a major concern as the available data indicate that these countries have the highest population-level salt intake, and the salt content of common foods is extremely high. See Box 8 for further information on salt intake inequalities.

Box 8. Reducing inequities in salt intake

Research has shown that unhealthy diet and behaviours including salt intake are disproportionately present amongst the most disadvantaged groups of society.

A north–south divide in salt intake has been observed in both the United Kingdom and Italy, with people living in the north having significantly higher salt intake compared to the south in the United Kingdom *(72)*, and vice versa in Italy *(73)*. In both countries, higher salt intake has been associated with a lower educational level and occupations that are manual and unskilled *(74)*. In the United Kingdom, these differences in educational level and salt intake remained even after the implementation of the national salt reduction programme *(74)*. Modelling from England in the United Kingdom has indicated that mandatory formulation to limit salt content of processed food has the biggest potential to reduce inequalities compared with voluntary measures, labelling and social marketing *(75)*.

These socioeconomic inequities in salt intake require public health strategies that aim to reduce wider socioeconomic inequalities to create health-promoting environments, as opposed to focusing on downstream individual behaviour alone *(76)*.

Implementing all the population-level strategies for salt intake reduction shown in Fig. 9 has clear potential to accelerate progress towards reducing CVD burden. According to the recent *WHO global report on sodium intake reduction*, such actions could reduce salt intake by 25% by 2030 and avert over 900 000 deaths from CVD *(77)*. See Box 9 for a country example of population-level salt reduction being used as a focus for reducing hypertension.

Box 9. The Hypertension League focuses on salt: an effective salt reduction strategy in Croatia

The Croatian Hypertension League comprises professional associations including public health, family physician, nurse and pharmacist associations. They have collaborated with the Ministry of Agriculture and the Croatian Agency for Food and Agriculture to reduce salt since 2006 by spreading the word about the effect of salt on blood pressure. In 2015, they introduced a regulation to limit the salt content in baked bread to 1.4%. Shortly afterwards, they formed an agreement with the biggest meat industry in Croatia (PIK Vrbovec) to reduce salt content in their products by 25%, although this was only voluntary. The positive effects were clear: by 2021 salt intake had reduced from 11.6 g per day in 2015 to 10 g by 2021, alongside a mean blood pressure reduction of 1.9 mmHg at population level.

More recently in 2022, the Hypertension League developed digital materials to inform their population about the “seven mortal sins” of hypertension and how to reduce their risk. These “sins” including high salt intake as well as imprecise measurement of blood pressure and inadequate treatment. Furthermore, their broader Hunt on a Silent Killer project included providing clinical examination and health education to more deprived and remote areas of the country, and educating trainee health professionals including pharmacists and medical students to measure blood pressure and to give health advice effectively *(78)*.

Source: Presentation from Professor Bojan Jelaković, President of the Croatian Society of Hypertension and Head, Department of Nephrology, Arterial Hypertension, Dialysis and Transplantation, University Hospital Centre, Zagreb, Croatia, at the CVD Signature Initiative country launch event in Zagreb, Croatia, 15 March 2023.

4.3 Barriers and solutions: what prevents us from implementing these interventions and how do we overcome barriers?

Numerous resources exist to assist countries in implementing cost-effective population-level strategies to reduce salt intake. However, according to both the recent Country Capacity Survey, 2021 (WHO, unpublished data, 2021) and the *WHO global report on sodium intake reduction (77)*, only three Member States (6%) in the European Region have implemented the most comprehensive level of salt reduction policies and measures – at least two mandatory policies, all related best buys, and sodium declarations on pre-packaged food – Czechia, Lithuania and Spain. A further 25 Member States (47%) have at least one mandatory policy and sodium declarations on pre-packaged food *(77)*.

Many barriers to implementing an effective salt reduction strategy have been identified that may hinder implementation effectiveness of both the strategy itself and the various interventions within the strategy – and thereby the success of the strategy. Overcoming these barriers requires a comprehensive, multi-faceted approach. Salt reduction strategies need to be tailored to the local context and be continually evaluated and adapted to achieve the desired outcome of a reduction in population salt intake.

Several research studies have been carried out to understand the barriers and opportunities in the implementation of salt reduction strategies. The findings can be broadly categorized into the following elements of a successful salt reduction programme *(64)*: policy commitments; resources (time and financial); availability of data; and industry cooperation – each of which are expanded upon below (Fig. 10). Establishing networks to enable collaboration between countries and opportunities to share best practice, lessons learned and success stories also helps to strengthen salt reduction strategies in countries.

Fig. 10. Elements of a successful salt reduction programme

Source: Authors.

4.3.1 Policy commitments

Successful salt reduction strategies require strong leadership (for example, led by government agencies) that can play a critical role in implementation, monitoring and enforcement (see Box 10). Effective implementation requires coordination and collaboration across various sectors, including government agencies, health organizations, food industry stakeholders, professional and patient associations, and consumer groups (see Box 20 and Box 9 for country examples). The lack of coordination and fragmented efforts can hinder progress *(79,80)*.

Further to this, salt is often used as a vehicle to deliver micronutrients, particularly iodine. Iodine deficiency disorders are a global public health problem and many existing programmes to address iodine deficiency rely on salt as a carrier of iodine. WHO recommends that salt reduction programmes and programmes that promote fortification of salts with micronutrients such as iodine can coexist, but steps need to be taken to synergize programmes for the elimination of iodine deficiency and salt reduction *(81)*.

Interventions to reduce population salt intake include policy changes that require adequate time and strong governance to implement. In particular, the lack of effective governance mechanisms to implement and monitor nutrition policies in low- and middle-income countries has been identified as an ongoing challenge globally *(82)*.

Stakeholder analysis, as part of the initial phase of developing a salt reduction strategy, may help to identify the various stakeholders, their political priorities and opportunities for the implementation of the salt reduction strategy as a standalone strategy or as a component of a larger strategy *(83)*. Stakeholder analysis also ensures that the strategy is well supported, which is particularly relevant when there are changes in leadership *(64,83–85)*.

Strong advocacy groups with scientific credibility are useful to raise awareness of the importance of salt reduction, raise the priority on the political agenda and hold the government to account to deliver on their (prior) agreed commitments *(86)*.

Box 10. Success through setting targets, strong leadership and industry engagement: salt reduction in the United Kingdom

Since the setting of voluntary targets for salt reduction for the food industry in 2006, there have been notable reductions in salt content in breakfast cereal (57%), two types of condiments (36%), soup (30%) and bread (20%) in the United Kingdom. From 2004 to 2011 the average population-level salt intake was reduced by 15%, without requiring costly interventions *(31)*. More progressive targets were introduced in subsequent years to drive further progress in reducing salt content in food and resulting salt intake.

Strategic components of the salt reduction programme in the United Kingdom included the establishment of an action group with strong leadership and scientific credibility; measuring salt intake through urinary sodium; identifying the main sources of dietary salt; working closely with the food industry to set targets and introduce food labelling; public health campaigns; and progress monitoring *(31)*. The programme developed an effective partnership with industry to understand and address any challenges and barriers to salt reduction. This process was led by the Food Standards Agency which engaged the food industry to establish clear action plans and maintained a working relationship.

Achieving sustained reductions in salt consumption requires long-term commitment and sustainability of the implemented strategies. Accountability mechanisms are essential to ensure the continuity and success of salt reduction strategies. These may include conducting regular assessments of compliance towards achieving salt targets (sodium benchmarks); holding industry to account for ensuring accurate and transparent nutritional information including the level of salt in foods; and regularly measuring population salt intake and reporting on progress towards meeting targets.

4.3.2 Resources

Adequate resources need to be provided to implement and monitor programme impact. The initial costs involved in the development, implementation and monitoring of a salt reduction strategy and accompanying interventions can be minimized by efficient planning and collaboration and sustained efforts. Adequate resources are also needed to collect data to inform the development of the strategy and assess the impact of the various interventions, as well as for the development and implementation of public awareness campaigns *(87)*. The long-term benefits have been shown to far outweigh the initial costs *(82)*.

4.3.3 Availability of data

Accurate data on salt intake, knowledge, and attitudes and behaviours on salt, salt levels in foods and population health outcomes are useful for designing, implementing and evaluating salt reduction strategies.

Strong surveillance systems to monitor and report on progress require reliable data. Regular and robust monitoring systems are useful to ensure evidence-based decision-making. Data collected can be used to identify challenges, inform improvements and track progress towards the goal. It has been demonstrated that 24-h urine surveys are the gold standard for measurement of salt intake at population level and are of particular importance for the evaluation of salt reduction programmes *(88)*.

The WHO Regional Office for Europe has produced a tool to support countries in the European Region to measure population-level sodium intake *(89)* and to estimate achievable salt intake reduction targets *(90)*.

Whilst comprehensive trend data on salt intake are not available, modelling studies demonstrate that interventions for reducing dietary sodium, such as mandatory salt targets for salt levels in foods, have the potential to generate large health gains and large cost savings for a health system *(90–92)*. The *WHO global report on sodium intake reduction (77)* used data on country-level interventions from the Global database on the Implementation of Nutrition Action (known as GINA) database. Countries were scored based on implementation level ranging from a national policy commitment alone (Score 1) to implementation of: at least two sodium reduction measures, a mandatory sodium declaration on packaging and all four related best buys (Score 4). If countries in the European Region increased their score by 2, it was estimated that mean population salt intake would reduce by 25.3% by 2030, with almost 1 million CVD deaths averted *(77)*.

4.3.4 Industry engagement

Food industry engagement is vital to achieving a reduction in salt intake in countries where most of the salt consumed is from packaged, processed foods manufactured by the food industry.

However, the interference of the food industry in public health nutrition policy formulation and implementation is well cited in the literature *(93,94)*. Food industry engagement is essential for the implementation of salt reduction targets (also known as sodium benchmarks). However, engagement is not required for the setting of targets. WHO has developed global sodium

benchmarks to inform target setting, which can be used to inform the development of targets at national level, in line with country context *(95)*.

The implementation of targets can be either mandatory or voluntary. The merits of each will depend on the specific context, the level of industry engagement and the regulatory environment. Voluntary initiatives include encouraging the food industry to voluntarily commit to reducing salt levels in their products and self-reporting of achievements towards the established targets *(96)*. Voluntary targets can be faster to implement than mandatory targets, as there are no legal processes to follow *(97)*.

Mandatory targets have, however, been consistently shown to be more effective in reducing salt levels across the food sector and in reducing salt intake than voluntary targets *(76,98)*, but the process of setting mandatory targets can be lengthy and may cause delays in action.

The importance of establishing robust and transparent mechanisms for engaging and monitoring industry in relation to salt reduction targets has been well established *(87)*. Enforcing salt reduction targets and regulations can be challenging, particularly in cases where compliance is voluntary or when monitoring mechanisms are inadequate. Insufficient resources for enforcement and a lack of penalties for non-compliance can undermine the effectiveness of the strategy. Public commitments by the food industry hold the industry to account.

Strategies to ensure these targets are adhered to need to be effectively implemented. Considering the large contribution of processed foods to salt in the diet, this is an important component of interventions to reduce salt intake *(87,99)*.

There is often strong industry opposition to the introduction of salt reduction targets. Cited reasons for this opposition include perceived threats to food safety, taste, sales and increased cost of technologies to produce foods with less salt, and claims that industry jobs will be lost due to reduced sales *(100)*. However, the success of some companies already meeting salt targets can be used to counter these arguments, as well as the public health benefit.

Taxes can be used to reduce consumption of salt, either through price increases, which impact purchasing patterns, or incentivizing reformulation by the food industry; however, there is little evidence that demonstrates the impact of a salt tax *(101)*.

Evidence that salt reduction positively impacts health with minimal negative implications for industry can help to counter these arguments from industry and increase cooperation for implementing progressively lower targets. The WHO Regional Office for Europe is developing a *Reformulation Manual*, which is a tool to support enterprises (especially small and medium-sized ones, which may have fewer resources) on how to reformulate food to contain less salt, in different food categories.

4.3.5 Networks

Networks facilitate the exchange of knowledge, expertise and experience between countries, allowing for shared strategies and solutions. Networks can enable the identification and implementation of effective salt reduction strategies appropriate to the local context. Salt reduction is a complex issue that requires actions from multiple sectors: networks can bring together stakeholders from these different sectors to find solutions from different angles and coordinate efforts. They can also draw on their collective power and advocate for stronger policies, as well as pool resources. The European Salt Action Network (ESAN, Box 11) was established in 2007 to help facilitate progress towards the globally agreed target to reduce salt intake by 30% by 2025, towards the WHO < 5 g target *(102)*.

Box 11. Collaborating to reduce salt: ESAN

ESAN was established in 2007 under the auspices of WHO and with the support of the United Kingdom Food Standards Agency, recognizing salt reduction as a priority intervention for tackling NCDs amongst people in the region. The Network consists of 33 of the Member States of the WHO European Region and is chaired by Switzerland. Participants include governmental institutions (or those nominated by government) and representatives of WHO and WHO collaborating centres *(103)*. One notable success of ESAN has been its role in raising awareness about the health risks associated with high salt consumption and its advocacy for salt reduction policies.

The Network is instrumental in bringing countries and experts together to exchange knowledge and ideas, and invites experts to address specific topics of concern including reformulation, synergizing salt reduction and iodine fortification programmes *(92)*.

Key messages:

- All parts of a comprehensive salt reduction strategy are crucial and cost-effective, but only 6% of Member States in the WHO European Region have implemented the highest level of salt reduction interventions despite the availability of evidence-based and effective guidance and tools to support countries.
- There are inequities in salt intake within countries, as higher salt intake is associated with indicators of lower socioeconomic status.
- Barriers and opportunities for implementing evidence-based salt reduction strategies can be broadly categorized into the elements of a successful salt reduction strategy: policy commitments, resources (time and financial), data availability and industry cooperation.
- Resources and tools from WHO and other organizations exist to assist countries and there are good practice examples to guide countries when implementing effective salt reduction strategies.


Отделение гематологии

5. Control: diagnosis, treatment and control of hypertension

5.1 Interventions: we know what works to detect and control hypertension

WHO's list of cost-effective and evidence-based interventions for NCD prevention and control recommend antihypertensives to control hypertension (including in people with diabetes), and to reduce cardiovascular risk through drug therapy and counselling for those at high risk or as secondary prevention in those who have had a heart attack or stroke *(51)*. Cardiac rehabilitation following heart attack is also recommended, which involves controlling risk factors like hypertension as well as lifestyle modification and counselling.

WHO has produced several tools to support the management of hypertension over recent decades. The *WHO package of essential noncommunicable (PEN) disease interventions for primary health care,* first published in 2010, initially contained a simple treatment algorithm promoting CVD risk assessment and management, including for hypertension *(104)*. This guidance has now been replaced by WHO's *Guideline for the pharmacological treatment of hypertension in adults*, which includes a drug- and dose-specific treatment protocol using treatment thresholds regardless of a risk assessment *(35,105)*. Some Member States have the capacity and resources to produce their own national guidelines or have adapted and implemented guidance based on WHO materials and/or those of professional bodies such as the European Society of Cardiology (ESC) *(8,106)*. These national guidelines and/or adapted guidelines may also include simple protocols or algorithms for use in primary care.

WHO's HEARTS technical package provides a public health approach to managing hypertension and other risk factors, comprising six modules and an implementation guide *(107)*. Recent modelling based on data from HEARTS implementation programmes estimated that, globally, 76 million CVD deaths, 79 million heart attacks and 120 million strokes could be averted between 2023 and 2050 by improving blood pressure control in populations *(108)*. The economic benefits of implementing hypertension treatment programmes could outweigh the costs as much as 18 to one. This is due to the estimated 250 million disability-adjusted life years averted from better blood pressure control *(9)*. For information on population-level CVD screening, see Box 12.

WHO has produced the *WHO list of priority medical devices for the management of cardiovascular disease and diabetes* to support universal health coverage, particularly in lower-resource settings, which spans the continuum of care from assessment to imaging and diagnostics, and treatment and rehabilitation *(109)*. There are also technical specifications for blood pressure measurement devices *(110)*.

The *WHO model list of essential medicines* supports the efficient use of limited resources by identifying priority generic medicines including antihypertensives and a combination "polypill" for CVD prevention. It acts as an evidence-informed guide to support countries preparing their own national lists according to local priorities and disease burden *(111)*.

Box 12. Health Evidence Network (HEN) report: population-level screening for CVD and its risk factors

The HEN is an information service for public health decision-makers and policy-makers in the WHO European Region, enabling the use of the best available evidence for health policies and public health improvements. A recent HEN synthesis report looked at the effectiveness of systematic population-level screening programmes[a] on reducing CVD burden in the WHO European Region. The results clearly showed that this type of screening for CVD and its risk factors on a population level has no effect on lowering morbidity, mortality or health-care expenses in society. Studies included in the report that looked at systematic population-level screening for a mixture of risk factors and pre-clinical CVDs showed a marginal effect on morbidity and mortality, and some studies showed serious adverse effects of screening, likely due to overdiagnosis and overtreatment. On the basis of this best available evidence, policy-makers may consider reviewing and re-evaluating any existing systematic population-level screening programmes for CVD and avoiding initiating such programmes *(112)*.

[a] The term "systematic population-level screening programme" is used here (and in the HEN report) to describe an organized, systematic public health programme to reduce the burden of disease in society by identifying and managing preclinical disease or the risk factors of disease amongst asymptomatic people. In this type of screening, a predefined eligible population (based on age or sex) is actively invited to participate in a quality assured screening pathway that includes diagnosis and treatment.

5.2 Implementation: what are the gaps?

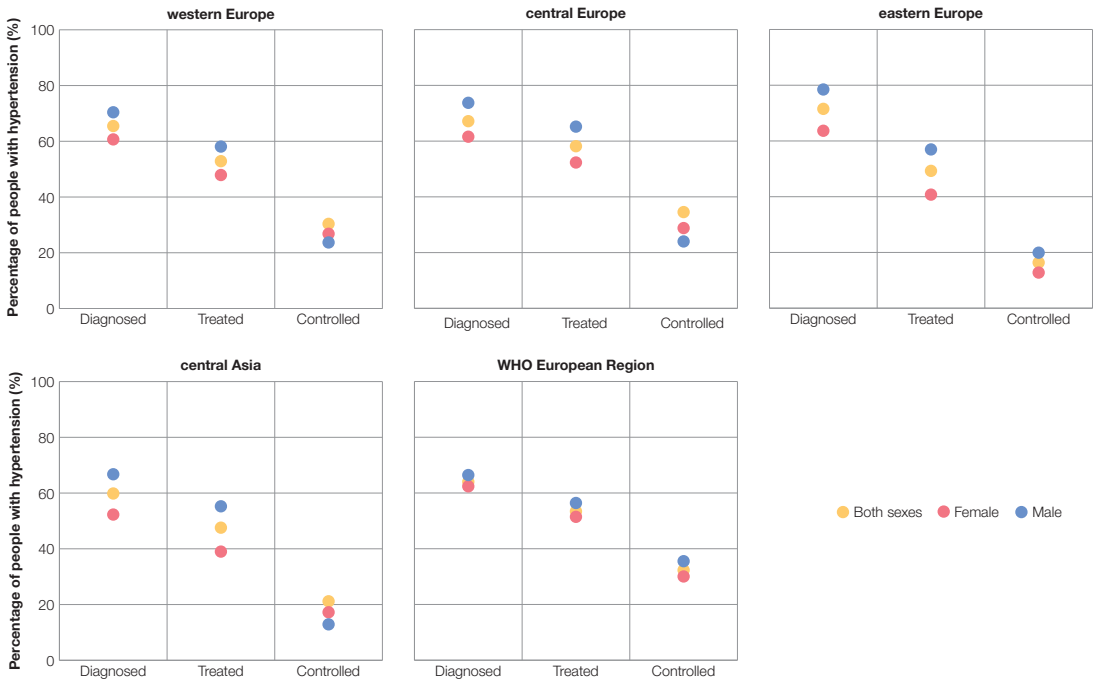
A large majority of Member States (46 of 53, 87%) have recognized evidence-based national guidelines, protocols or standards for CVD management (including management of hypertension) through primary care *(9)*. Despite this, and despite being highly prevalent (37% amongst adults aged 30–79 years) in the WHO European Region, hypertension is generally under-detected, under-treated and under-controlled. Two in three adults (66%) aged 30–79 years with hypertension are aware they have it, while only half (53%) are receiving treatment, and only a quarter (26%) have achieved adequate blood pressure control *(113)*. Among those diagnosed, four in five (80%) are estimated to be receiving treatment whereas only two in five (41%) have achieved adequate blood pressure control. It has been estimated that among people in the WHO European Region with diagnosed diabetes, up to two thirds (67%) may have uncontrolled hypertension (in those countries where data were available) *(114,115)*.

Hypertension treatment and control has improved in most countries since 1990, with improvements largest in high-income countries globally and in central Europe *(49)*. Detection, treatment and control of hypertension are all lower in men compared to women in the WHO European Region (Fig. 11). There are notable gaps between the detection, treatment and adequate control of hypertension between males and females in the WHO European Region. In addition, there is a gap between treatment and adequate control in all subregions – although these gaps are larger in central Asia and eastern Europe than in western Europe (Box 13). The concept of "missing men" describes the men that are missing from health services, even after being diagnosed *(116)*. This indicates that health services are not meeting men's needs, causing reduced engagement and leaving them at an increased risk of CVD.

Although all Member States have access to a variety of guidelines and resources for controlling hypertension, and most report having national guidelines for CVD management, this is not consistently translated into better blood pressure control. Adherence to CVD guidelines has been shown to be variable across Europe *(117,118)*. For example, preventative treatment and counselling in those at high risk of CVD are widely recommended; however, as highlighted in Section 3.2.4, one fifth of the countries in the WHO European Region have yet to provide this to at least half of those eligible. Most high-risk cardiovascular patients in Europe do not achieve blood pressure treatment goals as well as other risk factor goals, and blood pressure control has failed to improve over recent years *(119,120)*.

It is clear that producing contextualized guidance for hypertension control is not enough to reduce CVD risk and disease burden, and further focus on supporting implementation is required.

Fig. 11. Proportions of people with hypertension that are diagnosed, treated and controlled in the WHO European Region by subregion and sex, latest available data



Source: Global Health Observatory *(113)* and additional calculations.

Box 13. Inequities in hypertension diagnosis and control

The WHO STEPwise approach to surveillance (STEPS) is an internationally comparable, standardized and integrated tool through which countries can collect, analyse and disseminate core information on NCDs *(121)*.

STEPS surveys of adults aged 18–69 years from eight countries in eastern Europe and central Asia found that all countries had a hypertension prevalence of at least 30%, with values largely similar for men and women. Concerningly, more than half of those who knew they had hypertension or had been prescribed antihypertensives in the last 2 weeks were currently not taking their medication – especially men *(122)*. When looking at gender and risk factors for NCDs, men appeared to be more exposed to behavioural risk factors (such as alcohol and tobacco use), whereas women were more exposed to biological risk (such as raised cholesterol and hypertension), especially in older age groups. However, untreated hypertension was the exception as prevalence was significantly higher in men *(122)*.

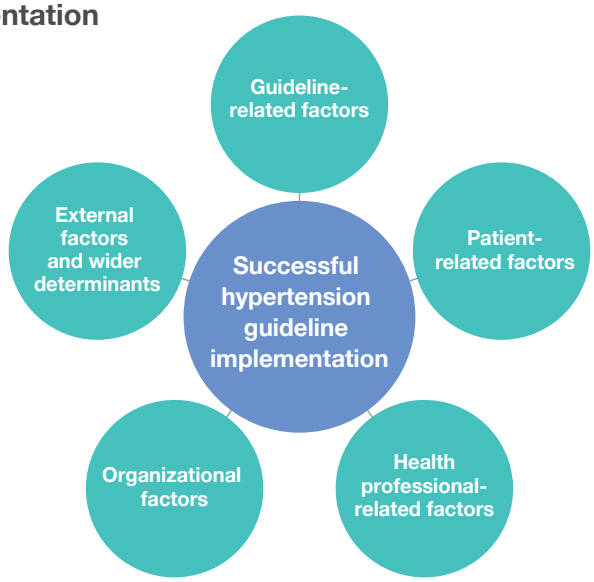
The examination of wider social determinants found that hypertension prevalence was usually higher for lower-educated women compared to higher-educated women and men of any educational level. Hypertension prevalence was also generally higher for low-income women and unemployed men and women. For example, in Kyrgyzstan the prevalence of hypertension in lower-educated women was 44.5%, which was higher than for higher-educated women (32.5%), and higher than both lower- and higher-educated men (41.2% and 39.4%) *(123)*.

Differences in care access were also apparent as more men than women had not had their blood pressure measured, especially those with a low educational level and migrants of either sex. Notably, the proportion of rural women who had not had their blood pressure measured in rural areas was often similar to that in men in urban areas *(122)*.

5.3 Barriers and solutions: what prevents us from implementing interventions we know are effective, and how do we overcome this?

Numerous barriers to the implementation of guidelines have been explored in academic literature. These range from issues related to the guidelines themselves, the patient, the health professional, organizational factors and external barriers *(124–126)*, as presented in Fig. 12 and elaborated upon below.

Fig. 12. Categories of barriers and solutions for successful hypertension guideline implementation



Source: Authors.

5.3.1 Guideline-related

Characteristics of clinical guidelines themselves can negatively affect their implementation, such as having a weak evidence base *(127–129)*, being too complex *(127,130,131)*, not being applicable to the clinical context *(127–129,132)* and being difficult to use *(127,129,131)*.

There is evidence that guidelines that are simplified and user-friendly *(127,130,133–136)*, straightforward to observe or try out *(133,134)* and applicable locally *(132,137)* have greater chances of successful implementation (see Box 14). Consideration should also be given to time needed to treat, which is the time taken by the clinician to implement the guidance and improve an outcome for one person *(138)*.

The *WHO guideline for the pharmacological treatment of hypertension in adults* provides guidance for use by health professionals (doctors and/or nurses) in primary health care and contains clear and concise protocols and algorithms to simplify service delivery *(35)*.

Box 14. Improving hypertension control through the implementation of adapted HEARTS and PEN guidelines in Tajikistan and the Republic of Moldova

Two real-world demonstration projects have shown that it is possible to implement simplified treatment protocols in lower-resource settings.

Primary health facilities in Tajikistan and the Republic of Moldova received a multicomponent intervention for CVD prevention. The intervention consisted of adapted WHO HEARTS/PEN clinical algorithms and decision support tools for hypertension and diabetes management, staff training and supportive measures such as clinical audit and feedback *(139,140)*.

In Tajikistan, blood pressure control significantly improved over time and compared to facilities that did not receive the intervention. There was also clear improvement in other CVD risk factors: smoking assessment, prescription of statins and drug therapy for those at high risk. The measurement of blood pressure improved too *(139)*. In the Republic of Moldova, follow-up data after 2 years showed sustained improvements in hypertension control beyond the lifetime of the project *(140)*.

5.3.2 Patient-related

Factors related to the patient can also impact guideline implementation. Barriers and drivers to interventions may relate to the individual (emotion, knowledge, health literacy and self-efficacy) or to the context as detailed below (social norms, cultural transition, health system structures and service provision) (see sections 5.3.3–5.3.5). Understanding and using behavioural and cultural insights can further explore barriers and drivers for interventions among those affected and find ways to overcome them *(141)*. To be effective, interventions for hypertension detection and control (as for salt reduction) should be adapted and tailored to the needs and circumstances of those affected and be evaluated in context before adjustment or scale-up.

Behavioural and cultural insights into hypertension control and adherence to treatment suggest that the main barriers at individual level seem to be a lack of knowledge about hypertension and its complications *(142)*, and misconceptions about the effectiveness of treatment (WHO, unpublished data, 2023). Poor knowledge of hypertension can be related to lower levels of health literacy *(143)*, which represents an individual's opportunity to access, understand, appraise and use information and services in ways that promote and maintain good health and well-being *(144)*. Lower health literacy can mean that patients are less likely to actively participate in consultations, disclose information *(145)* and adhere to antihypertensive medication *(146)*, and they have worse quality of life *(147)*. Health literacy levels can be improved with therapeutic patient education to improve their knowledge of their condition and its management *(148)* (see Section 5.3.3).

Co-existing health issues can affect a person's ability to manage their hypertension and a health professional's ability to follow guidance if it cannot be adapted for such co-morbidities *(127,130,134)*. People with symptoms of depression, for example, have been shown to have worse compliance with CVD prevention such as hypertension control *(149)*.

A further barrier to hypertension control is the patient not taking prescribed antihypertensive medicines (accessibility and affordability is discussed in Section 5.3.4). Research indicates that only one in two patients take antihypertensives as prescribed, rising to only two in three in those who have already had a cardiovascular event such as a heart attack *(150)*. Non-adherence increases as the number of antihypertensives prescribed increases: for example, increasing

from two to three medications doubles non-adherence *(151)*. In Europe, as many as one in 10 cases of CVD can be attributed to prescribed medication not being taken *(152)*. This can be a bigger issue for people of a lower educational level, and when taking several other medications for co-morbidities *(153)*.

Taking a person-centred approach to patient care aims to achieve a meaningful life for patients. Its principles include offering personalized care, and support for people to recognize and develop their own strengths according to what matters to them *(154)*. This can mean prioritizing other aspects of health alongside (or before) cardiovascular health in order to achieve the best long-term health outcomes. In this way, a person with depression who is at high risk of CVD and struggling to take their preventative medication daily may need to be supported to improve their mental health first in order to reduce their cardiovascular risk *(133)*.

There is increasing evidence that polypills that contain combinations of medications for CVD prevention and treatment can improve adherence as well as blood pressure control *(126,155,156)*. Single-pill combinations of antihypertensive medications are recommended in WHO guidelines for hypertension for this reason *(35)*.

5.3.3 Health professional-related

Factors related to health professionals can also present barriers to the implementation of clinical guidance. A concept thought to be a major contributor to uncontrolled hypertension is therapeutic inertia. Therapeutic inertia can be described as the failure of a health professional to initiate or intensify therapy when therapeutic goals are not reached (Box 15) *(157)*. In one western European study of over half a million patients receiving treatment for hypertension, 10% had uncontrolled hypertension due to therapeutic inertia, which was defined as "not undertaking therapeutic action in follow-up despite uncontrolled blood pressure". Therapeutic inertia was associated with patients with older age, lower blood pressure, blood pressure near target and co-existing diabetes. The reasons given by physicians for not intensifying therapy at follow-up were: not considering blood pressure measurements taken in a clinical environment as representative; waiting for further blood pressure measurements before taking action; and wanting to optimize the patient's lifestyle first *(158)*.

It has been shown that physician discretion and their misuse or misinterpretation of guidelines is a huge determinant of prescription of medications that reduce cardiovascular risk *(153)*. If a health professional is not aware of the existence of a guideline and unfamiliar with its content, it is unlikely to be implemented *(127,131,134)*. A lack of agreement with the guideline *(127,129,131)* as well as a lack of relevant skills and training can also reduce guideline adherence *(127,129)*.

Box 15. Therapeutic inertia

Therapeutic or clinical inertia has been described as the failure of clinicians to initiate or intensify therapy when managing chronic conditions such as hypertension, despite treatment goals (such as hypertension control) not being achieved *(157,159)*. It is thought to be a major barrier to hypertension control and relevant guideline implementation *(131,136,160)*. It seems to occur more often when blood pressure is closer to the target *(158,161)* and could be related to poor health literacy, medication access issues and poor communication between patients and health professionals, amongst others *(162)*.

Opportunities to overcome health professional-related barriers relate to guideline dissemination strategies and educational activities. Strategies may be more effective if tailored to the guideline, setting and target group *(127,163)*. There is evidence that interventions that are accessible

for health professionals (such as by using technology) *(127,132)*, take multiple approaches *(127,132–134,136,164–167)* and involve repeated and active learning as part of continuing education *(127,167,168)* improve guideline implementation. Educational activities may include raising awareness amongst health professionals of the burden of uncontrolled hypertension, as well as of using devices and technologies to diagnose and monitor the condition *(126)*.

Particular approaches that have been shown to improve adherence to guidance include tailored point-of-care reminders *(133,169)*, decision-support systems *(127,170)* and tailored repeated educational outreach *(171)*. Smaller effects have been seen for printed educational materials *(172)*, educational meetings *(173)*, local opinion leaders *(127,174,175)* and use of tools created by guideline producers *(176,177)*. Clinical audit and feedback can also have small but potentially important effects on improving the quality of care and patient outcomes *(127,133,175,178,179)*. Such educational strategies can also help to overcome therapeutic inertia *(162)*.

Shared decision-making between the health professional and patient, such as joint goal-setting, is thought to overcome therapeutic inertia *(160)* and can also improve adherence to medication *(180)*. Shared decision-making is part of self-management support and high-quality person-centred care. For people with heart diseases and hypertension, this approach can improve patient knowledge about their condition and reduce conflict around decisions related to their health *(181,182)* (see Box 16 for a country example).

Self-management support interventions are systematically delivered to increase a patient's knowledge, skills and confidence in their ability to manage chronic conditions *(183–185)*. Specific interventions which appear to improve hypertension control are those that target behaviour change, drug regimen change, and use supportive technology such as home blood pressure monitors for patients to self-monitor their blood pressure (Box 17). These seem to be especially effective when delivered alongside education or other interventions. No one intervention alone appears to have the greatest effect, allowing individuals involved in the decision-making to decide what approach is the best for them *(180,186)*. Therapeutic patient education (Box 18) brings together several types of interventions which support the self-management of chronic conditions including hypertension *(186)*.

Box 16. CVD prevention in Slovenia: integrating salt reduction and hypertension control at an individual level

> *"People in Slovenia have a lot of trust in doctors. It is a joint activity, we are all in it together"*
>
> *– Dr Urska Blaznik, Slovenia's National Institute of Public Health*

Slovenia's CVD prevention programme includes population-wide health promotion campaigns, individual risk assessment and management, and patient education. Deaths from heart disease have decreased by more than 30% over 20 years of programme implementation, and an estimated 900 lives are saved annually from both the prevention and treatment of heart disease.

Almost five in 10 men and over four in 10 women aged 30–79 years in Slovenia have hypertension *(48)* and salt intake is much higher than recommended, especially in men. Recent promotion efforts have focused on salt intake harms, and the salt reduction action plan includes measuring blood pressure and discussing salt intake and hypertension at public events, and health examinations, alongside comprehensive training for health professionals.
Training clinicians to discuss salt reduction and hypertension control with patients shows integration of salt reduction and hypertension control at the individual level. It is hoped that continuing to encourage productive conversations about salt reduction and hypertension prevention and control between patients and health professionals will empower people to reduce their life-long cardiovascular risk.

Source: Professor Zlatko Fras, Professor of Medicine & Cardiology and Medical Director, Division of Medicine, University Medical Centre, Ljubljana, Slovenia. Presentation at the CVD Signature Initiative country launch event in Zagreb, Croatia,15 March 2023.

Box 17. Telemonitoring and home blood pressure measurement for improved control and drug adherence

Telemonitoring can be particularly useful when health and care infrastructure are disrupted, such as during the COVID-19 pandemic *(191)*.

A study from the Almazov National Medical Research Centre, within the Russian Federation, demonstrated that telemonitoring and remote counselling had a positive impact on blood pressure control and was cost-effective. Patients with uncontrolled hypertension regularly measured their blood pressure at home and recorded the results using a mobile application and website. Patients could send queries to their physician (for example, related to their blood pressure recording or any symptoms) which the physician could answer or organize a consultation for. The physician checked the recordings and used them to guide treatment decisions. Significant blood pressure reductions were observed after 3 months, and patients who received telemonitoring had better treatment experiences, and most had good adherence *(192)*. These results build upon previous research indicating that home blood pressure measurement can improve adherence to treatment and reduce blood pressure *(193–195)*, especially if combined with co-interventions *(195,196)*.

Source: WHO Collaborating Centre on Cardiovascular Diseases, eHealth and Value-based Care, Almazov National Medical Research Centre.

Box 18. Therapeutic patient education

Therapeutic patient education is a structured person-centred learning process that supports individuals living with chronic conditions to self-manage their own health by drawing on their own resources supported by the people around them. It is adapted to patients and their condition and continues over their lifetime. It draws on theories of adult learning and behavioural sciences, and has been shown to improve health outcomes and quality of life whilst making cost-effective use of health-care services and available resources. Implementing effective structured therapeutic patient education services must include training for health professionals in its delivery *(185)*.

5.3.4 Organizational factors

Organizational barriers related to the health-care system can also impede guideline implementation. Insufficient time and/or staff *(117,131,134,135)*; social influence such as lack of support from peers and supervisors *(129,131,133,134)*; administrative policies that conflict with guidance *(128)*; and lack of leadership *(117)* can all negatively affect implementation.

To improve adherence to a guideline from an organizational perspective, it is important to have support from leadership, a supportive workplace culture *(187)*, and provision of enough time and resources to use guidelines in practice *(127)*. Financial incentives for the physician and/or health facility may be helpful *(127,135)* and have been explored for their effect on quality of care *(188)* and changing health professional behaviours and patient outcomes *(189)*, but the evidence is not strong that they are effective in improving adherence to clinical guidelines.

To use limited resources effectively, provision of care via multi-disciplinary teams is an evidence-based and cost-effective service delivery model to improve hypertension control by reducing the burden on physicians. It can be helpful to involve all staff (not just clinical staff) at a facility, such as a primary care facility, when implementing clinical guidelines *(190)*.

Cardiac rehabilitation teams are multidisciplinary teams that work to reduce cardiovascular risk for people who have had a cardiovascular event. Key components of cardiac rehabilitation services, as well as for stroke, include patient education, risk factor control such as drug treatment for hypertension and self-management support. Rehabilitation services are an important part of universal health coverage for the continuum of care *(197)*. Strengthening suboptimal cardiac rehabilitation programmes in the European Region is an important opportunity to improve adherence to guidelines amongst the health professionals within them, so that they may support risk-factor reduction effectively *(198,199)*.

Another important barrier related to the health system is access to quality medical devices and medicines for ensuring universal access to good-quality care. Hypertension is usually treated by medicines dispensed on an outpatient basis. However, such antihypertensives are not always available in countries (Box 19) or are unaffordable to those that need them the most, which can exacerbate inequality. So-called out-of-pocket payments for outpatient medication is the main driver of catastrophic health spending, especially in eastern Europe, central Asia and amongst the poorest groups *(200)*. Concerningly, more people are likely to forego prescribed medications to save money in countries where financial protection is weak, such as in the eastern parts of the Region where the CVD burden is highest *(200)*.

Box 19. Accessibility and affordability of antihypertensives in five countries in the WHO European Region

WHO has collected and analysed data on the price and availability of medicines in health facilities and procurement centres of five countries within the WHO European Region since 2018. The availability of each of the four categories[a] of recommended medications to treat hypertension *(35)* in the public sector was variable *(201–203)*. For example, in Uzbekistan in 2021, 81.8% of surveyed facilities had ACE inhibitors, 63.6% had calcium channel blockers and only 18.2% had thiazide-like diuretics *(201)*. The price of medications also varied widely within countries *(201–203)*. For example, there was a 38-fold difference in Kyrgyzstan between the cheapest and most expensive brand of amlodipine (a calcium channel blocker), ranging from 0.5–19 Kyrgystani som) (WHO, unpublished data, 2023). The fold difference for the same medication was 28 in Tajikistan (*202)*, 16.9 in Uzbekistan *(201)* and 4.4 in the Republic of Moldova (WHO, unpublished data, 2019). In Ukraine it was provided for free in some settings *(203)*. Ensuring that quality medications used for treating hypertension are both available and affordable is important for improving adherence, as is selecting treatment protocols according to the local context *(204)*. WHO provides guidance to Member States to strengthen their pharmaceutical pricing policies *(205)*.

[a] Calcium channel blockers, angiotensin receptor blockers (ARBs), thiazide-like diuretics and angiotensin converting enzyme (ACE) inhibitors.

Focusing health system strengthening on primary care and universal health coverage helps to ensure equitable access to effective hypertension detection and treatment to all who require it. Efforts should be made to reduce inequities in access to hypertension diagnosis and treatment both between and within countries. Quality and fit-for-purpose devices to diagnose and monitor hypertension are an important component, and WHO provides resources to support countries in this *(109,110)*.

Emerging new technologies and digital tools should be embraced by health systems where they have been shown to be effective. These may include devices for measuring blood pressure in the home and those enabling telemonitoring (see Box 17), as well as device-based treatment for patients whose hypertension is resistant to pill-based treatment *(206)*. Training is important for their effective use.

In settings where health systems are weaker and medicine access and affordability is worse, polypills for CVD prevention and treatment that simplify treatment regimens could facilitate universally available treatments when made affordable *(155,156)*. Single-pill combinations are recommended in WHO guidelines *(35),* and they are already available and used as a first-line treatment in several European countries with costs reimbursed *(126)*.

5.3.5 External factors and wider determinants of guideline implementation

Factors that are external to the guideline, patient, health professional and health-care organization can also impact the implementation of guidance. For example, as reported by physicians, a major barrier to the implementation of cardiovascular prevention guidance is “unhelpful governmental health policy” *(207)*.

Further examples are war, natural disasters, economic crises and other emergencies that divert resources and force governments to redirect their attention. NCD treatment and care requires continuous coordination across the whole health system. This can be disrupted by emergencies, such as climate change, war and pandemics, and the longer-term repercussions of emer-

gencies. During the COVID-19 pandemic, for example, there were global deficiencies in NCD pharmaceutical manufacturing and supply chains *(208)*. Integrated cross-sectoral approaches including strengthening supply chain resilience can protect against disruptions to NCD care caused by permacrises, such as pandemics *(165)* and other health emergencies *(209)*. Strong, resilient and inclusive national health systems should be developed, focusing particularly on primary care and care for NCDs *(210)*.

Section 5.2 detailed the clear differences between the sexes in hypertension detection and control. Gender norms play a role in these differences by affecting exposure to CVD risk factors and affecting health-seeking behaviour and access to primary health care *(116,122,211)*. Traditional concepts of masculinity in society can act as a barrier to men caring for their own health and to seeking health services at all ages and educational levels *(116)*.

Gender-responsive policy helps to reduce gender norms that can be harmful to health and provides an opportunity to reduce the gap between the sexes for hypertension control. For example, increasing the flexibility of primary care that is orientated towards men's needs and preferences can improve their engagement with services *(116)*. Educating health professionals about cardiovascular risk and detection in both men and women would help to overcome the perception of reduced risk in women *(211,212)*. Data monitoring of differences in access to diagnostic and therapeutic services between genders is important to monitor such inequities and efforts to reduce them.

Key messages:

- Hypertension is highly prevalent (37%) in the WHO European Region but generally under-detected, under-treated and under-controlled, and it is worse in men than women and in central Asia and eastern Europe compared to central and western Europe.
- Evidence-based, effective guidance and tools for the diagnosis and management of hypertension and CVD risk in primary care are available but not consistently implemented across the WHO European Region, leaving people at risk of CVD.
- Reasons for lack of guideline implementation include factors related to the guidelines, patients, health professionals, the health-care system and external socioeconomic factors.
- Resources from WHO and others exist to assist countries, and there are good practice examples to guide countries when implementing programmes to detect and control hypertension and reduce CVD risk.


Molly Malone's
MAHARAJA
EVENTECH

6. Conclusions and policy considerations

Raised blood pressure is the leading risk factor for death and disability in the WHO European Region and a major contributor to CVD. Around 10 000 people die per day in the Region from CVD, of which over half of the deaths are attributable to raised blood pressure or hypertension. Premature death from CVD is higher for men and in the eastern part of the Region.

Hypertension can be a silent killer. It often has no symptoms and around one in three people are unaware they have it, with the first indication being a catastrophic event such as a stroke.

CVDs and hypertension are largely preventable – and controllable. High salt intake is one of its leading causes and other modifiable risk factors include diet, physical inactivity, tobacco and alcohol use and broader determinants such as air pollution. Almost all countries in the European Region have salt intake that is much higher than recommended maximum levels and a third of adults (30–69 years) have hypertension. Hypertension prevalence, and especially salt intake, is higher in men than women and in the eastern part of the Region compared to the western part.

Evidence-based interventions have been identified and can make a difference. The greater the reduction in salt intake, the greater the decrease in blood pressure: reducing salt intake can reduce CVD deaths and the occurrence of cardiovascular events such as heart attacks. Treating hypertension in individuals through medication and modification of other risk factors can reduce the risk of mortality, CVD mortality, stroke, heart attack, heart failure events and chronic kidney disease. Both population-level and individual-level approaches are needed.

Relevant guidance, technical packages, protocols and other support for implementing salt reduction strategies, and hypertension control programmes are available but are not consistently implemented across the WHO European Region. Only 6% of Member States have implemented the highest level of salt reduction interventions, and despite being highly prevalent, hypertension is generally under-detected, under-treated and under-controlled (especially for men in central Asia and eastern Europe). Barriers to implementing salt reduction strategies broadly align with the elements of a successful salt reduction strategy: policy commitments, resources (time and financial), data availability and industry cooperation. Barriers to clinical guideline implementation relate to the guidelines themselves, patients, health professionals, the health-care system and external socioeconomic factors. Understanding and using behavioural and cultural insights can further explore barriers and drivers for interventions amongst those affected and find ways to overcome them.

The foundations for action have already been laid through the political declarations and commitments on NCD prevention and control made by WHO Member States at the United Nations General Assembly and World Health Assembly. Yet the monitoring of the implementation of these commitments and related 2025 and 2030 targets indicate that progress is uneven and that achievement is in jeopardy, particularly given the context of the permacrisis. Both this report and the *Global report on hypertension: the race against a silent killer (9)* have highlighted ways to overcome the barriers and urged a renewed focus and sense of urgency. These include: leadership; monitoring systems; comprehensive risk-factor reduction programmes; improved clinical management through treatment protocols; team-based care; access to medicines and devices; and support through resilient health systems. Further detail is provided in both this report and the global report *(9)*, and countries can use the WHO resources (see List of

WHO resources) and country examples provided to guide their efforts, working in collaboration with relevant non-state actors (Box 20).

To reduce the significant CVD burden in the WHO European Region, the CVD Signature Initiative promotes an integrated CVD prevention approach of both population-level salt reduction strategies to prevent hypertension and individual-level interventions to diagnose and control hypertension in primary care. All are welcome to take up the challenge.

Box 20. Initiatives to reduce CVD burden: professional associations driving Regional commitment in Europe

> *"Every child born in the new millennium has the right to live until the age of at least 65 years without suffering from avoidable cardiovascular disease."*
>
> *European Heart Health Charter (213)*

Professional and patient associations are actively advocating for evidence-based prevention and care of CVDs.

The European Heart Health Charter was signed in 2007 at EU level and subsequently launched in over 20 countries. Developed by the European Society of Cardiology (ESC) and the European Heart Network (EHN), it aims to substantially reduce the CVD burden in the EU and WHO European Region, and to reduce inequalities and inequities within and between countries. The need to assess, diagnose and manage risk factors such as hypertension were highlighted, and gender differences within cardiovascular health and disease acknowledged *(213)*. The updated 2023 Charter emphasizes the importance of population-level prevention *(214)* as well as treatment *(215)*.

The ESC and EHN have also developed a "blueprint for EU action" which recommends front-of-pack labelling (FOPL) (including for salt), marketing restrictions for children and collaboration between Member States to more effectively manage individuals at high risk of CVD *(216)*.

Similarly, the European Stroke Association prepared the *Action Plan for Stroke in Europe 2018–2030* working alongside the Stroke Alliance for Europe. The overarching targets comprise reducing the incidence of strokes, treating strokes in a dedicated stroke unit as the first level of care, having national stroke care plans and implementing strategic public health interventions. The importance of prevention across the continuum of care is emphasized, including control of hypertension as a common modifiable risk factor and a target that hypertension is both detected and controlled in 80% of cases *(217)*.

List of useful WHO resources

Salt reduction

- Accelerating salt reduction in Europe: a country support package to reduce population salt intake in the WHO European Region *(64)*.
- How to obtain measures of population-level sodium intake in 24-hour urine samples: protocol *(89)*.
- SHAKE the salt habit *(63)*.
- Using dietary intake modelling to achieve population salt reduction: a guide to developing a country-specific salt reduction model *(90)*.
- WHO global report on sodium intake reduction *(77)*.
- WHO global sodium benchmarks for different food categories *(95)*.
- WHO Guideline: sodium intake for adults and children *(218)*.

Hypertension control

- Global report on hypertension: the race against a silent killer *(9)*.
- Guideline for the pharmacological treatment of hypertension in adults *(35).*
- Guideline for the pharmacological treatment of hypertension in adults: summary *(105)*.

Medicines and devices

- WHO guideline on country pharmaceutical pricing policies *(205)*.
- WHO list of priority medical devices for management of cardiovascular diseases and diabetes *(109)*.
- WHO model list of essential medicines – 22nd list, 2021 *(111)*.
- WHO technical specifications for automated non-invasive blood pressure measuring devices with cuff *(110)*.

NCD management and control

- A guide to tailoring health programmes: using behavioural and cultural insights to tailor health policies, services and communications to the needs and circumstances of people and communities *(141).*
- CVD ASSESS implementation manual: preventing cardiovascular disease (CVD) in primary health care: assessing essential interventions using routine data (CVD ASSESS) *(219).*
- HEARTS: Technical package for cardiovascular disease management in primary health care *(7).*
- Noncommunicable disease facility-based monitoring guidance: framework, indicators and application *(220)*.
- Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases, and mental health: Draft updated menu of policy options and cost-effective interventions for the prevention and control of noncommunicable diseases *(51)*.
- Tackling NCDs: 'best buys' and other recommended interventions for the prevention and control of noncommunicable diseases *(217)*.
- Therapeutic patient education: an introductory guide *(185).*
- WHO package of essential noncommunicable (PEN) disease interventions for primary health care *(104)*.

References[3]

1. Global health estimates: Leading causes of death. In: World Health Organization [website]. Geneva: World Health Organization; 2023 (https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death).
2. WHO Mortality Database. In: World Health Organization [website]. Geneva: World Health Organization; 2023 (https://www.who.int/data/data-collection-tools/who-mortality-database).
3. Global Burden of Disease Results [database]. Seattle: Institute for Health Metrics and Evaluation; 2019 (https://vizhub.healthdata.org/gbd-results/).
4. International Classification of Diseases, 11th Revision (ICD-11). Geneva: World Health Organization; 2021 (https://icd.who.int/en).
5. Hypertension. In: World Health Organization [website]. Geneva: World Health Organization; 2023 (https://www.who.int/news-room/fact-sheets/detail/hypertension).
6. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1223–49. doi:10.1016/S0140-6736(20)30752-2.
7. HEARTS: Technical package for cardiovascular disease management in primary health care. Geneva: World Health Organization; 2016 (https://iris.who.int/handle/10665/252661).
8. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice: Developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies. With the special contribution of the European Association of Preventive Cardiology (EAPC). Rev Esp Cardiol (Engl ed). 2022;75(5):429. English, Spanish. doi:10.1016/j.rec.2022.04.003.
9. Global report on hypertension: the race against a silent killer. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/372896).
10. GBD 2015 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1659–1724. doi:10.1016/S0140-6736(16)31679-8.
11. WHO NCD Accountability Framework, including Global Monitoring Framework for NCD prevention and control (2021 update) in alignment with the extension of the NCD Global Action Plan to 2030. Geneva: World Health Organization; 2021 (https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/who-ncd-accountability-framework-for-ncd-implementation-roadmap.pdf?sfvrsn=346fb61b_1&download=true).
12. Sodium reduction. In: World Health Organization [website]. Geneva: World Health Organization; 2020 (https://www.who.int/news-room/fact-sheets/detail/salt-reduction).
13. Luengo-Fernandez R, Walli-Attaei M, Gray A, Torbica A, Maggioni AP, Huculeci R, et al. Economic burden of cardiovascular diseases in the European Union: a population-based cost study. Eur Heart J. 2023;44(45):4752–67. doi:10.1093/eurheartj/ehad583.
14. Global action plan for the prevention and control of noncommunicable diseases 2013–2020. Geneva: World Health Organization; 2013 (https://apps.who.int/iris/handle/10665/94384).

[3] All references were accessed on 19 January 2024.

15. Brauer M, Casadei B, Harrington RA, Kovacs R, Sliwa K; WHF Air Pollution Expert Group. Taking a Stand Against Air Pollution-The Impact on Cardiovascular Disease: A Joint Opinion from the World Heart Federation, American College of Cardiology, American Heart Association, and the European Society of Cardiology. Circulation. 2021;143(14):e800–4. doi:10.1161/CIRCULATIONAHA.120.052666.
16. Rosenthal T, Touyz RM, Oparil S. Migrating Populations and Health: Risk Factors for Cardiovascular Disease and Metabolic Syndrome. Curr Hypertens Rep. 2022;24(9):325–40. doi:10.1007/s11906-022-01194-5.
17. UN Interagency Task Force on NCDs. Responding to the Challenge of Non-Communicable Diseases. New York: United Nations Development Programme; 2019 (https://www.undp.org/publications/responding-challenge-non-communicable-diseases).
18. Rosenthal T. The effect of migration on hypertension and other cardiovascular risk factors: a review. J Am Soc Hypertens. 2014;8(3):171–91. doi:10.1016/j.jash.2013.12.007.
19. WHO Regional Director for Europe's Advisory Council on Innovation for Noncommunicable Diseases. In: WHO Regional Office for Europe [website]. Copenhagen: WHO Regional Office for Europe; 2023 (https://www.who.int/europe/groups/who-regional-director-for-europe-s-advisory-council-on-innovation-for-noncommunicable-diseases).
20. European Programme of Work 2020–2025: United Action for Better Health. Copenhagen, WHO Regional Office for Europe, 2021 (https://iris.who.int/handle/10665/339209).
21. Mozaffarian D, Fahimi S, Singh GM, Micha R, Khatibzadeh S, Engell RE, et al. Global Burden of Diseases Nutrition and Chronic Diseases Expert Group. Global sodium consumption and death from cardiovascular causes. N Engl J Med. 2014;371(7):624–34. doi:10.1056/NEJMoa1304127.
22. Zhang X, Wang J, Li J, Yu Y, Song Y. A positive association between dietary sodium intake and obesity and central obesity: results from the National Health and Nutrition Examination Survey 1999–2006. Nutr Res. 2018;55:33–44. doi:10.1016/j.nutres.2018.04.008.
23. Aburto NJ, Ziolkovska A, Hooper L, Elliott P, Cappuccio FP, Meerpohl JJ. Effect of lower sodium intake on health: systematic review and meta-analyses. BMJ. 2013;346:f1326. doi:10.1136/bmj.f1326.
24. He FJ, MacGregor GA. Salt reduction lowers cardiovascular risk: meta-analysis of outcome trials. Lancet. 2011;378(9789):380–2. doi:10.1016/S0140-6736(11)61174-4.
25. Cook NR, Appel LJ, Whelton PK. Lower levels of sodium intake and reduced cardiovascular risk. Circulation. 2014;129(9):981–9. doi:10.1161/CIRCULATIONAHA.113.006032.
26. Cook NR, Appel LJ, Whelton PK. Sodium Intake and All-Cause Mortality Over 20 Years in the Trials of Hypertension Prevention. J Am Coll Cardiol. 2016;68(15):1609–17. doi:10.1016/j.jacc.2016.07.745.
27. He FJ, Pombo-Rodrigues S, Macgregor GA. Salt reduction in England from 2003 to 2011: its relationship to blood pressure, stroke and ischaemic heart disease mortality. BMJ Open. 2014;4(4):e004549. doi:10.1136/bmjopen-2013-004549.
28. Vartiainen E, Puska P, Pekkanen J, Tuomilehto J, Jousilahti P. Changes in risk factors explain changes in mortality from ischaemic heart disease in Finland. BMJ. 1994;309(6946):23–7. doi:10.1136/bmj.309.6946.23.
29. Vartiainen E, Sarti C, Tuomilehto J, Kuulasmaa K. Do changes in cardiovascular risk factors explain changes in mortality from stroke in Finland? BMJ. 1995;310(6984):901–4. doi:10.1136/bmj.310.6984.901.
30. Laatikainen T, Pietinen P, Valsta L, Sundvall J, Reinivuo H, Tuomilehto J. Sodium in the Finnish diet: 20-year trends in urinary sodium excretion among the adult population. Eur J Clin Nutr. 2006;60(8):965–70. doi:10.1038/sj.ejcn.1602406.

31. He FJ, Brinsden HC, MacGregor GA. Salt reduction in the United Kingdom: a successful experiment in public health. J Hum Hypertens. 2014;28(6):345–52. doi:10.1038/jhh.2013.105.
32. He FJ, Li J, Macgregor GA. Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomised trials. BMJ. 2013;346:f1325. doi:10.1136/bmj.f1325.
33. Emerging Risk Factors Collaboration; Sarwar N, Gao P, Seshasai SR, Gobin R, Kaptoge S, et al. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet. 2010;375(9733):2215–22. doi:10.1016/S0140-6736(10)60484–9.
34. Gaciong Z, Siński M, Lewandowski J. Blood pressure control and primary prevention of stroke: summary of the recent clinical trial data and meta-analyses. Curr Hypertens Rep. 2013;15(6):559–74. doi:10.1007/s11906-013-0401-0.
35. Guideline for the pharmacological treatment of hypertension in adults. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/344424).
36. Platt JM, Keyes KM, Galea S. Efficiency or equity? Simulating the impact of high-risk and population intervention strategies for the prevention of disease. SSM Popul Health. 2016;3:1–8. doi:10.1016/j.ssmph.2016.11.002.
37. Rose G, Khaw K-T, Marmot M. Rose's Strategy of Preventive Medicine. Oxford: Oxford University Press; 2008.
38. Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.
39. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R; Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. Lancet. 2002;360(9349):1903–13. doi:10.1016/s0140-6736(02)11911-8.
40. Cappuccio FP. Sodium and potassium intake, blood pressure, and cardiovascular prevention. In: The ESC Textbook of Cardiovascular Medicine,3rd ed. Oxford: Oxford University Press; 2018:2431–44. (https://academic.oup.com/esc/book/35489/chapter/312428997).
41. IDF Diabetes Atlas. Brussels: International Diabetes Federation; 2021 (https://www.diabetesatlas.org).
42. Mitchell S, Malanda B, Damasceno A, Eckel RH, Gaita D, Kotseva K, et al. A Roadmap on the Prevention of Cardiovascular Disease Among People Living With Diabetes. Glob Heart. 2019;14(3):215–40. doi:10.1016/j.gheart.2019.07.009.
43. OECD, The King's Fund Workshop Proceedings. Is Cardiovascular Disease Slowing Improvements in Life Expectancy? Paris: OECD; 2020 (https://www.oecd-ilibrary.org/social-issues-migration-health/is-cardiovascular-disease-slowing-improvements-in-life-expectancy_47a04a11-en).
44. The World Health Report: 2002: reducing risks, promoting healthy life: overview. Geneva: World Health Organization; 2002 (https://iris.who.int/handle/10665/67454).
45. Masters R, Anwar E, Collins B, Cookson R, Capewell S. Return on investment of public health interventions: a systematic review. J Epidemiol Commun Health. 2017;71(8):827–34. doi:10.1136/jech-2016-208141.
46. Barton P, Andronis L, Briggs A, McPherson K, Capewell S. Effectiveness and cost effectiveness of cardiovascular disease prevention in whole populations: modelling study. BMJ. 2011 Jul 28;343:d4044. doi:10.1136/bmj.d4044.
47. Kwong EJL, Whiting S, Bunge AC, Leven Y, Breda J, Rakovac I, et al. Population-level salt intake in the WHO European Region in 2022: a systematic review. Public Health Nutr. 2023;26(S1):s6–s19. doi:10.1017/S136898002200218X.

48. Prevalence of hypertension among adults aged 30–79 years. In: The Global Health Observatory [website]. Geneva: World Health Organization; 2021 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-hypertension-among-adults-aged-30-79-years).
49. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. Lancet. 2017;389(10064):37–55. doi:10.1016/S0140-6736(16)31919-5.
50. World Health Assembly 75. Seventy-fifth World Health Assembly: Geneva, 22–28 May 2022: resolutions and decisions, annexes. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/365610).
51. Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases, and mental health: Draft updated menu of policy options and cost-effective interventions for the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2023 (https://apps.who.int/gb/ebwha/pdf_files/EB152/B152_6-en.pdf).
52. Raised blood pressure (SBP≥140 OR DBP≥90) (age-standardized estimate). In: The Global Health Observatory [website]. Geneva: World Health Organization; 2017 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/raised-blood-pressure-(sbp-=140-or-dbp-=90)-(age-standardized-estimate)).
53. Monitoring noncommunicable disease commitments in Europe 2021: are we on track to reach targets 10 years after the Moscow Declaration and First United Nations High-Level Meeting? Copenhagen: WHO Regional Office for Europe; 2021 (https://iris.who.int/handle/10665/350457).
54. Prevention and control of noncommunicable diseases in Armenia: the case for investment. Copenhagen: WHO Regional Office for Europe; 2019 (https://iris.who.int/handle/10665/346420).
55. Prevention and control of noncommunicable diseases in Belarus: the case for investment. Copenhagen: WHO Regional Office for Europe; 2018 (https://apps.who.int/iris/handle/10665/343979).
56. Prevention and control of noncommunicable diseases in Kazakhstan: the case for investment. Copenhagen: WHO Regional Office for Europe; 2019 (https://apps.who.int/iris/handle/10665/346422).
57. Prevention and control of noncommunicable diseases in Kyrgyzstan: the case for investment. Copenhagen: WHO Regional Office for Europe; 2017 (https://apps.who.int/iris/handle/10665/351407).
58. Prevention and control of noncommunicable diseases in Turkey: the case for investment. Copenhagen: WHO Regional Office for Europe; 2018 (https://apps.who.int/iris/handle/10665/345584).
59. Prevention and control of noncommunicable diseases in Uzbekistan: the case for investment. Copenhagen: WHO Regional Office for Europe; 2018 (https://apps.who.int/iris/handle/10665/362354).
60. Bhat S, Marklund M, Henry ME, Appel LJ, Croft KD, Neal B, et al. A Systematic Review of the Sources of Dietary Salt Around the World. Adv Nutr. 2020;11(3):677–86. doi:10.1093/advances/nmz134.
61. Cappuccio FP, Capewell S, Lincoln P, McPherson K. Policy options to reduce population salt intake. BMJ. 2011;343:d4995. doi:10.1136/bmj.d4995.
62. Mattes RD, Donnelly D. Relative contributions of dietary sodium sources. J Am Coll Nutr. 1991;10(4):383–93. doi:10.1080/07315724.1991.10718167.
63. SHAKE the salt habit. Geneva: World Health Organization; 2016 (https://iris.who.int/handle/10665/250134).

64. Accelerating salt reduction in Europe: a country support package to reduce population salt intake in the WHO European region. Copenhagen: WHO Regional Office for Europe; 2020 (https://iris.who.int/handle/10665/340028).

65. World Health Organization, Food and Agriculture Organization. CODEX Standard for Special Dietary Foods With Low-Sodium Content (including salt substitutes). Rome: Codex Alimentarius Commission; 1981 (https://www.fao.org/input/download/standards/287/CXS_053e.pdf).

66. Kloss L, Mayer JD, Graeve L, Vetter W. Sodium intake and its reduction by food reformulation in the European Union – A review. NFS Journal, 2015;1(C):9–19. doi:10.1016/j.nfs.2015.03.001.

67. He FJ, Tan M, Song J, MacGregor GA. Salt substitution to lower population blood pressure. Nat Med. 2020;26(3):313–14. doi:10.1038/s41591-020-0784-9.

68. Tsai YC, Tsao YP, Huang CJ, Tai YH, Su YC, Chiang CE, et al. Effectiveness of salt substitute on cardiovascular outcomes: A systematic review and meta-analysis. J Clin Hypertens (Greenwich). 2022;24(9):1147–60. doi:10.1111/jch.14562.

69. Karppanen H, Mervaala E. Sodium intake and hypertension. Prog Cardiovasc Dis. 2006;49(2):59–75. doi:10.1016/j.pcad.2006.07.001.

70. Aburto NJ, Hanson S, Gutierrez H, Hooper L, Elliott P, Cappuccio FP. Effect of increased potassium intake on cardiovascular risk factors and disease: systematic review and meta-analyses. BMJ. 2013;346:f1378. doi:10.1136/bmj.f1378.

71. Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2021 global survey. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/370423).

72. Ji C, Kandala NB, Cappuccio FP. Spatial variation of salt intake in Britain and association with socioeconomic status. BMJ Open. 2013;3(1):e002246. doi:10.1136/bmjopen-2012-002246.

73. Cappuccio FP, Ji C, Donfrancesco C, Palmieri L, Ippolito R, Vanuzzo D, et al. Geographic and socioeconomic variation of sodium and potassium intake in Italy: results from the MINISAL-GIRCSI programme. BMJ Open. 2015;5(9):e007467. doi:10.1136/bmjopen-2014-007467.

74. Ji C, Cappuccio FP. Socioeconomic inequality in salt intake in Britain 10 years after a national salt reduction programme. BMJ Open. 2014;4(8):e005683. doi:10.1136/bmjopen-2014-005683.

75. Gillespie DO, Allen K, Guzman-Castillo M, Bandosz P, Moreira P, McGill R, et al. The Health Equity and Effectiveness of Policy Options to Reduce Dietary Salt Intake in England: Policy Forecast. PLoS One. 2015;10(7):e0127927. doi:10.1371/journal.pone.0127927.

76. Hyseni L, Elliot-Green A, Lloyd-Williams F, Kypridemos C, O'Flaherty M, McGill R, et al. Systematic review of dietary salt reduction policies: Evidence for an effectiveness hierarchy? PLoS One. 2017;12(5):e0177535. doi:10.1371/journal.pone.0177535.

77. WHO global report on sodium intake reduction. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366393).

78. Jelaković A. Croatian Hypertension League. Hunt on a Silent Killer. RAD Croatian Academy of Sciences and Arts - Medical Sciences. 2022;553(60–61):155–157 (https://hrcak.srce.hr/file/420991).

79. Webster J, Santos JA, Hogendorf M, Trieu K, Rosewarne E, McKenzie B, et al. Implementing effective salt reduction programs and policies in low- and middle-income countries: learning from retrospective policy analysis in Argentina, Mongolia, South Africa and Vietnam. Public Health Nutr. 2022;25(3):805–16. doi:10.1017/S136898002100344X.

80. Rodriguez-Fernandez R, Siopa M, Simpson SJ, Amiya RM, Breda J, Cappuccio FP. Current salt reduction policies across gradients of inequality-adjusted human development in the WHO European region: minding the gaps. Public Health Nutr. 2014;17(8):1894–904. doi:10.1017/S136898001300195X.

81. Universal salt iodization and sodium intake reduction: compatible, cost-effective strategies of great public health benefit. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/361823).

82. McLaren L, Sumar N, Barberio AM, Trieu K, Lorenzetti DL, Tarasuk V, et al. Population-level interventions in government jurisdictions for dietary sodium reduction. Cochrane Database Syst Rev. 2016;9(9):CD010166. doi:10.1002/14651858.CD010166.pub2.

83. Balane MA, Palafox B, Palileo-Villanueva LM, McKee M, Balabanova D. Enhancing the use of stakeholder analysis for policy implementation research: towards a novel framing and operationalised measures. BMJ Glob Health. 2020;5(11):e002661. doi:10.1136/bmjgh-2020-002661.

84. Gupta P, Mohan S, Johnson C, Garg V, Thout SR, Shivashankar R, et al. Stakeholders' perceptions regarding a salt reduction strategy for India: Findings from qualitative research. PLoS One. 2018;13(8):e0201707. doi:10.1371/journal.pone.0201707.

85. Rosewarne E, Chislett WK, McKenzie B, Reimers J, Jolly KA, Corben K, et al. Stakeholder perspectives on the effectiveness of the Victorian Salt Reduction Partnership: a qualitative study. BMC Nutr. 2021;7(1):12. doi:10.1186/s40795-021-00414-6.

86. Cullerton K, Donnet T, Lee A, Gallegos D. Effective advocacy strategies for influencing government nutrition policy: a conceptual model. Int J Behav Nutr Phys Act. 2018;15(1):83. doi:10.1186/s12966-018-0716-y.

87. Webster J, Pillay A, Suku A, Gohil P, Santos JA, Schultz J, et al. Process Evaluation and Costing of a Multifaceted Population-Wide Intervention to Reduce Salt Consumption in Fiji. Nutrients. 2018;10(2):155. doi:10.3390/nu10020155.

88. Cappuccio FP, D'Elia L, Rakovac I. Spot urine samples and estimation of population salt intake: the return of the phoenix? J Hypertens. 2023;41(5):869-71. doi:10.1097/HJH.0000000000003405.

89. How to obtain measures of population-level sodium intake in 24-hour urine samples: protocol. Copenhagen: WHO Regional Office for Europe; 2021 (https://apps.who.int/iris/handle/10665/340732).

90. Using dietary intake modelling to achieve population salt reduction: a guide to developing a country-specific salt reduction model. Copenhagen: WHO Regional Office for Europe; 2018 (https://apps.who.int/iris/handle/10665/345142).

91. Schorling E, Niebuhr D, Kroke A. Cost-effectiveness of salt reduction to prevent hypertension and CVD: a systematic review. Public Health Nutr. 2017;20(11):1993–2003. doi:10.1017/S1368980017000593.

92. British Heart Foundation, Health Lumen. Modelling the potential impact of a reduction in salt consumption on hypertension, coronary heart disease and stroke in the population of the United Kingdom from 2021 to 2035. London: British Heart Foundation; 2022 (https://www.bhf.org.uk/what-we-do/policy-and-public-affairs/creating-healthier-environments/reducing-the-uks-salt-intake).

93. Garton K, Swinburn B, Thow AM. Who influences nutrition policy space using international trade and investment agreements? A global stakeholder analysis. Global Health. 2021;17(1):1–16. doi:10.1186/s12992-021-00764-7.

94. Pedroza-Tobias A, Crosbie E, Mialon M, Carriedo A, Schmidt LA. Food and beverage industry interference in science and policy: efforts to block soda tax implementation in Mexico and prevent international diffusion. BMJ Glob Health. 2021;6(8):e005662. doi:10.1136/bmjgh-2021-005662.

95. WHO global sodium benchmarks for different food categories. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/341081).

96. Action on Salt and WASSH. Roundtable Report: Accelerating Salt Reduction in the UK. London: Action on Salt; 2022 (https://www.actiononsalt.org.uk/media/action-on-salt/awareness/shake-the-salt-habit2022/Roundtable-Report_Accelerating-Salt-Reduction-in-the-UK.pdf).

97. Charlton K, Webster J, Kowal P. To legislate or not to legislate? A comparison of the UK and South African approaches to the development and implementation of salt reduction programs. Nutrients. 2014;6(9):3672–95. doi:10.3390/nu6093672.

98. Strauss-Kruger M, Wentzel-Viljoen E, Ware LJ, Van Zyl T, Charlton K, Ellis S, et al. Early evidence for the effectiveness of South Africa's legislation on salt restriction in foods: the African-PREDICT study. J Hum Hypertens. 2023;37(1):42–49. doi:10.1038/s41371-021-00653-x.

99. Santos JA, Tekle D, Rosewarne E, Flexner N, Cobb L, Al-Jawaldeh A, et al. A Systematic Review of Salt Reduction Initiatives Around the World: A Midterm Evaluation of Progress Towards the 2025 Global Non-Communicable Diseases Salt Reduction Target. Adv Nutr. 2021;12(5):1768–80. doi:10.1093/advances/nmab008.

100. Lacey C, Clark B, Frewer L, Kuznesof S. "Reaching its limits": industry perspectives on salt reduction. Brit Food J. 2016;118(7):1610–24. doi:10.1108/BFJ-01-2016-0027.

101. Blakely T, Cleghorn C, Mizdrak A, Waterlander W, Nghiem N, Swinburn B, et al. The effect of food taxes and subsidies on population health and health costs: a modelling study. Lancet Public Health. 2020;5(7):e404–13. doi:10.1016/S2468-2667(20)30116-X.

102. Thirteenth meeting of the WHO Action Network on Salt Reduction on the Population in the European Region (ESAN): Virtual meeting, 2 September 2021. Copenhagen: WHO Regional Office for Europe; 2022 (https://apps.who.int/iris/handle/10665/358465).

103. Salt Action Network (ESAN). In: WHO Regional Office for Europe [website]. Copenhagen: WHO Regional Office for Europe; 2023 (https://www.who.int/europe/initiatives/european-salt-action-network-%28esan%29).

104. WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://www.who.int/publications/i/item/9789240009226).

105. Guideline for the pharmacological treatment of hypertension in adults: summary. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/356108).

106. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Cardiology and the European Society of Hypertension. J Hypertens. 2018;36(10):1953–2041. doi:10.1097/HJH.0000000000001940.

107. Technical package for cardiovascular disease management in primary health care: implementation guide. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/275728).

108. Pickersgill SJ, Msemburi WT, Cobb L, Ide N, Moran AE, Su Y, et al. Modeling global 80-80-80 blood pressure targets and cardiovascular outcomes. Nat Med. 2022;28(8):1693–9. doi:10.1038/s41591-022-01890-4.

109. WHO list of priority medical devices for management of cardiovascular diseases and diabetes. WHO medical device technical series. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/341967).

110. WHO technical specifications for automated non-invasive blood pressure measuring devices with cuff. WHO medical device technical series. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/331749).

111. WHO model list of essential medicines - 22nd list, 2021. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/345533).

112. Jørgensen T, Rotar O, Juhl CB, Linneberg A. What is the effectiveness of systematic population-level screening programmes for reducing the burden of cardiovascular diseases? 2nd ed. Health Evidence Network synthesis report, 78. Copenhagen: WHO Regional Office for Europe; 2024. (https://iris.who.int/handle/10665/375993).

113. Noncommunicable diseases: Risk factors. In: Global Health Observatory [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/themes/topics/noncommunicable-diseases-risk-factors).

114. Improving Health Outcomes of People with Diabetes Mellitus. Geneva: World Health Organization; 2021 (https://www.who.int/publications/m/item/improving-health-outcomes-of-people-with-diabetes-mellitus).

115. Gregg EW, Buckley J, Ali MK, Davies J, Flood D, Mehta R, et al. Improving health outcomes of people with diabetes: target setting for the WHO Global Diabetes Compact. Lancet. 2023;401(10384):1302–12. doi:10.1016/S0140-6736(23)00001-6.

116. The health and well-being of men in the WHO European Region: better health through a gender approach. Copenhagen: WHO Regional Office for Europe; 2018 (https://iris.who.int/handle/10665/329686).

117. McKee G, Kerins M, Hamilton G, Hansen T, Hendriks J, Kletsiou E, et al. Barriers to ESC guideline implementation: results of a survey from the European Council on Cardiovascular Nursing and Allied Professions (CCNAP). Eur J Cardiovasc Nurs. 2017;16(8):678–86. doi:10.1177/1474515117710097.

118. Kränkel N, Abela M, Babu A, Gaber M, Kopylova O, Scherrenberg M, et al. Implementation of ESC Guideline on Cardiovascular Disease Prevention in Clinical Practice Across 13 European Countries: Changes Between 2011 and 2021. European Association of Preventive Cardiology; 2022 (https://www.escardio.org/static-file/Escardio/Subspecialty/EAPC/Documents/EAPC_implementation-report_2022.pdf).

119. Kotseva K, De Backer G, De Bacquer D, Rydén L, Hoes A, Grobbee D, et al. Lifestyle and impact on cardiovascular risk factor control in coronary patients across 27 countries: Results from the European Society of Cardiology ESC-EORP EUROASPIRE V registry. Eur J Prev Cardiol. 2019;26(8):824–35. doi:10.1177/2047487318825350.

120. Kotseva K, De Backer G, De Bacquer D, Rydén L, Hoes A, Grobbee D, et al. Primary prevention efforts are poorly developed in people at high cardiovascular risk: A report from the European Society of Cardiology EURObservational Research Programme EUROASPIRE V survey in 16 European countries. Eur J Prev Cardiol. 2021;28(4):370–9. doi:10.1177/2047487320908698.

121. Noncommunicable Disease Surveillance, Monitoring and Reporting: STEPwise approach to NCD risk factor surveillance (STEPS). In: World Health Organization [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps).

122. Gender and noncommunicable diseases in Europe: analysis of STEPS data. Copenhagen: WHO Regional Office for Europe; 2020 (https://iris.who.int/handle/10665/337471).

123. Gender and noncommunicable diseases in Kyrgyzstan: analysis of STEPS data. Copenhagen: WHO Regional Office for Europe; 2020 (https://iris.who.int/handle/10665/337488).

124. Uchmanowicz I, Hoes A, Perk J, McKee G, Svavarsdóttir MH, Czerwińska-Jelonkiewicz K, et al. Optimising implementation of European guidelines on cardiovascular disease prevention in clinical practice: what is needed? Eur J Prev Cardiol. 2021;28(4):426–31. doi:10.1177/2047487320926776.

125. Adherence to long-term therapies: evidence for action. Geneva: World Health Organization; 2003 (https://apps.who.int/iris/handle/10665/42682).
126. Mancia G, Cappuccio FP, Burnier M, Coca A, Persu A, Borghi C, et al. Perspectives on improving blood pressure control to reduce the clinical and economic burden of hypertension. J Intern Med. 2023;294(3):251–68. doi:10.1111/joim.13678.
127. Fischer F, Lange K, Klose K, Greiner W, Kraemer A. Barriers and Strategies in Guideline Implementation-A Scoping Review. Healthcare (Basel). 2016;4(3):36. doi:10.3390/healthcare4030036.
128. Katz DA. Barriers between guidelines and improved patient care: an analysis of AHCPR's Unstable Angina Clinical Practice Guideline. Agency for Health Care Policy and Research. Health Serv Res. 1999;34(1 Pt 2):377–89.
129. Saillour-Glenisson F, Michel P. Facteurs individuels et collectifs associés à l'application des recommandations de pratique clinique par le corps médical. Revue de la littérature [Individual and collective facilitators of and barriers to the use of clinical practice guidelines by physicians: a literature review]. Rev Epidemiol Sante Publique. 2003;51(1 Pt 1):65–80. doi:RESP-02-2003-51-1-C1-0398-7620-101019-ART6 (in French).
130. Erhardt L, Komajda M, Hobbs FD, Soler-Soler J. Cardiologists' awareness and perceptions of guidelines for chronic heart failure. The ADDress your Heart survey. Eur J Heart Fail. 2008;10(10):1020–5. doi:10.1016/j.ejheart.2008.08.001.
131. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud P-AC, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. JAMA. 1999;282(15):1458–65. doi:10.1001/jama.282.15.1458.
132. Welke KF, BootsMiller BJ, McCoy KD, Vaughn TE, Ward MM, Flach SD, et al. What factors influence provider knowledge of a congestive heart failure guideline in a national health care system? Am J Med Qual. 2003;18(3):122–7. doi:10.1177/106286060301800306.
133. Davis DA, Taylor-Vaisey A. Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. CMAJ. 1997;15;157(4):408–16.
134. Francke AL, Smit MC, de Veer AJ, Mistiaen P. Factors influencing the implementation of clinical guidelines for health care professionals: a systematic meta-review. BMC Med Inform Decis Mak. 2008;8:38. doi:10.1186/1472-6947-8-38.
135. Graham IM, Stewart M, Hertog MG; Cardiovascular Round Table Task Force. Factors impeding the implementation of cardiovascular prevention guidelines: findings from a survey conducted by the European Society of Cardiology. Eur J Cardiovasc Prev Rehabil. 2006;13(5):839–45. doi:10.1097/01.hjr.0000219112.02544.24.
136. Handler J, Lackland DT. Translation of hypertension treatment guidelines into practice: a review of implementation. J Am Soc Hypertens. 2011;5(4):197–207. doi:10.1016/j.jash.2011.03.002.
137. Knops AM, Storm-Versloot MN, Mank AP, Ubbink DT, Vermeulen H, Bossuyt PM, et al. Factors influencing long-term adherence to two previously implemented hospital guidelines. Int J Qual Health Care. 2010;22(5):421–9. doi:10.1093/intqhc/mzq038.
138. Johansson M, Guyatt G, Montori V. Guidelines should consider clinicians' time needed to treat. BMJ. 2023;380:e072953. doi:10.1136/bmj-2022-072953.
139. Collins D, Inglin L, Laatikainen T, Shoismatuloeva M, Sultonova D, Jonova B, et al. Evaluation and pilot implementation of essential interventions for the management of hypertension and prevention of cardiovascular diseases in primary health care in the Republic of Tajikistan. BMC Health Serv Res. 2021;21(1):472. doi:10.1186/s12913-021-06490-5.
140. Collins D, Inglin L, Laatikainen T, Ciobanu A, Curocichin G, Salaru V, et al. Implementing a package of noncommunicable disease interventions in the Republic of Moldova:

two-year follow-up data. Prim Health Care Res Dev. 2020;21:e39. doi:10.1017/S1463423620000420.

141. A guide to tailoring health programmes: using behavioural and cultural insights to tailor health policies, services and communications to the needs and circumstances of people and communities. Copenhagen: WHO Regional Office for Europe; 2023 (https://iris.who.int/handle/10665/367041).
142. Volpe M, Dedhiya SD. Physicians, patients, and public knowledge and perception regarding hypertension and stroke: a review of survey studies. Curr Med Res Opin. 2006;22(7):1319–30. doi:10.1185/030079906X112570.
143. Du S, Zhou Y, Fu C, Wang Y, Du X, Xie R. Health literacy and health outcomes in hypertension: An integrative review. Int J Nurs Sci. 2018;5(3):301–9. doi:10.1016/j.ijnss.2018.06.001.
144. Health promotion glossary of terms 2021. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/350161).
145. Sim D, Yuan S, Yun J. Health literacy and physician-patient communication: a review of the literature. Int J Commun Health. 2016;10:101–14.
146. Guo A, Jin H, Mao J, Zhu W, Zhou Y, Ge X, et al. Impact of health literacy and social support on medication adherence in patients with hypertension: a cross-sectional community-based study. BMC Cardiovasc Disord. 2023;23(1):93. doi:10.1186/s12872-023-03117-x.
147. Zhang Q, Huang F, Zhang L, Li S, Zhang J. The effect of high blood pressure-health literacy, self-management behavior, self-efficacy and social support on the health-related quality of life of Kazakh hypertension patients in a low-income rural area of China: a structural equation model. BMC Public Health. 2021;21(1):1114. doi:10.1186/s12889-021-11129-5.
148. Vandenbosch J, Van den Broucke S, Schinckus L, Schwarz P, Doyle G, Pelikan J, et al. The impact of health literacy on diabetes self-management education. Health Education Journal. 2018;77(3):349–62. doi:10.1177/0017896917751554.
149. Hennein R, Hwang SJ, Au R, Levy D, Muntner P, Fox CS, et al. Barriers to medication adherence and links to cardiovascular disease risk factor control: the Framingham Heart Study. Intern Med J. 2018;48(4):414–21. doi:10.1111/imj.13687.
150. Naderi SH, Bestwick JP, Wald DS. Adherence to drugs that prevent cardiovascular disease: meta-analysis on 376,162 patients. Am J Med. 2012;125(9):882–7.e1. doi:10.1016/j.amjmed.2011.12.013.
151. Gupta P, Patel P, Štrauch B, Lai FY, Akbarov A, Marešová V, et al. Risk Factors for Nonadherence to Antihypertensive Treatment. Hypertension. 2017;69(6):1113–20. doi:10.1161/HYPERTENSIONAHA.116.08729.
152. Chowdhury R, Khan H, Heydon E, Shroufi A, Fahimi S, Moore C, et al. Adherence to cardiovascular therapy: a meta-analysis of prevalence and clinical consequences. Eur Heart J. 2013;34(38):2940–8. doi:10.1093/eurheartj/eht295.
153. Cordero A, Rodriguez Padial L, Batalla A, López Barreiro L, Torres Calvo F, Castellano JM, et al. Optimal pharmacological treatment and adherence to medication in secondary prevention of cardiovascular events in Spain: Results from the CAPS study. Cardiovasc Ther. 2017;35(2). doi:10.1111/1755-5922.12240.
154. De Longh A, Fagan P, Fenner J, Kidd L. A practical guide to self-management support: Key components for successful implementation. London: The Health Foundation; 2015 (https://www.health.org.uk/publications/a-practical-guide-to-self-management-support).
155. Castellano JM, Pocock SJ, Bhatt DL, Quesada AJ, Owen R, Fernandez-Ortiz A, et al. Polypill Strategy in Secondary Cardiovascular Prevention. N Engl J Med. 2022;387(11):967–77. doi:10.1056/NEJMoa2208275.

156. Sukonthasarn A, Chia YC, Wang JG, Nailes J, Buranakitjaroen P, Van Minh H, et al. The feasibility of polypill for cardiovascular disease prevention in Asian Population. J Clin Hypertens (Greenwich). 2021;23(3):545–55. doi:10.1111/jch.14075.

157. Lebeau JP, Cadwallader JS, Aubin-Auger I, Mercier A, Pasquet T, Rusch E, et al. The concept and definition of therapeutic inertia in hypertension in primary care: a qualitative systematic review. BMC Fam Pract. 2014;15:130. doi:10.1186/1471-2296-15-130.

158. Ali DH, Kiliç B, Hart HE, Bots ML, Biermans MCJ, Spiering W, et al. Therapeutic inertia in the management of hypertension in primary care. J Hypertens. 2021;39(6):1238–45. doi:10.1097/HJH.0000000000002783.

159. Phillips LS, Branch WT, Cook CB, Doyle JP, El-Kebbi IM, Gallina DL, et al. Clinical inertia. Ann Intern Med. 2001;135(9):825–34. doi:10.7326/0003-4819-135-9-200111060-00012.

160. Pathak A, Poulter NR, Kavanagh M, Kreutz R, Burnier M. Improving the Management of Hypertension by Tackling Awareness, Adherence, and Clinical Inertia: A Symposium Report. Am J Cardiovasc Drugs. 2022;22(3):251–61. doi:10.1007/s40256-021-00505-6.

161. Ferrari P, Hess L, Pechere-Bertschi A, Muggli F, Burnier M. Reasons for not intensifying antihypertensive treatment (RIAT): a primary care antihypertensive intervention study. J Hypertens. 2004;22(6):1221–9. doi:10.1097/00004872-200406000-00024.

162. Byrnes PD. Why haven't I changed that? Therapeutic inertia in general practice. Aust Fam Physician. 2011;40(1–2):24–8.

163. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. Lancet. 2003;362(9391):1225–30. doi:10.1016/S0140-6736(03)14546-1.

164. Harris MF, Parker SM, Litt J, van Driel M, Russell G, Mazza D, et al. Implementing guidelines to routinely prevent chronic vascular disease in primary care: the Preventive Evidence into Practice cluster randomised controlled trial. BMJ Open. 2015;5(12):e009397. doi:10.1136/bmjopen-2015-009397.

165. Forsner T, Hansson J, Brommels M, Wistedt AA, Forsell Y. Implementing clinical guidelines in psychiatry: a qualitative study of perceived facilitators and barriers. BMC Psychiatry. 2010;10:8. doi:10.1186/1471-244X-10-8.

166. Flanagan ME, Ramanujam R, Doebbeling BN. The effect of provider- and workflow-focused strategies for guideline implementation on provider acceptance. Implement Sci. 2009;4:71. doi:10.1186/1748-5908-4-71.

167. Sachs M. Erfolgreiche Strategien und Methoden der Implementierung von Pflegestandards. Eine systematische Übersichtsarbeit [Successful strategies and methods of implementing standards of care. A systematic review]. Pflege. 2006;19(1):33–44. doi:10.1024/1012-5302.19.1.33 (in German).

168. Flodgren G, Conterno LO, Mayhew A, Omar O, Pereira CR, Shepperd S. Interventions to improve professional adherence to guidelines for prevention of device-related infections. Cochrane Database Syst Rev. 2013;(3):CD006559. doi:10.1002/14651858.CD006559.pub2.

169. Arditi C, Rège-Walther M, Durieux P, Burnand B. Computer-generated reminders delivered on paper to healthcare professionals: effects on professional practice and healthcare outcomes. Cochrane Database Syst Rev. 2017;7(7):CD001175. doi:10.1002/14651858.CD001175.pub4.

170. Shojania KG, Jennings A, Mayhew A, Ramsay CR, Eccles MP, Grimshaw J. The effects of on-screen, point of care computer reminders on processes and outcomes of care. Cochrane Database Syst Rev. 2009;2009(3):CD001096. doi:10.1002/14651858.CD001096.pub2.

171. O'Brien MA, Rogers S, Jamtvedt G, Oxman AD, Odgaard-Jensen J, Kristoffersen DT, et al. Educational outreach visits: effects on professional practice and health care outcomes. Cochrane Database Syst Rev. 2007;2007(4):CD000409. doi:10.1002/14651858.CD000409.pub2.
172. Giguère A, Zomahoun HTV, Carmichael PH, Uwizeye CB, Légaré F, Grimshaw JM, et al. Printed educational materials: effects on professional practice and healthcare outcomes. Cochrane Database Syst Rev. 2020;8(8):CD004398. doi:10.1002/14651858.CD004398.pub4.
173. Forsetlund L, O'Brien MA, Forsén L, Reinar LM, Okwen MP, Horsley T, et al. Continuing education meetings and workshops: effects on professional practice and healthcare outcomes. Cochrane Database Syst Rev. 2021;9(9):CD003030. doi:10.1002/14651858.CD003030.pub3.
174. Flodgren G, Parmelli E, Doumit G, Gattellari M, O'Brien MA, Grimshaw J, et al. Local opinion leaders: effects on professional practice and health care outcomes. Cochrane Database Syst Rev. 2011;(8):CD000125. doi:10.1002/14651858.CD000125.pub4.
175. Greenhalgh T. How to Implement Evidence-Based Healthcare. Oxford: John Wiley & Sons, Ltd.; 2018.
176. Eagle KA, Koelling TM, Montoye CK. Primer: implementation of guideline-based programs for coronary care. Nat Clin Pract Cardiovasc Med. 2006;3(3):163–71. doi:10.1038/ncpcardio0499.
177. Flodgren G, Hall AM, Goulding L, Eccles MP, Grimshaw JM, Leng GC, et al. Tools developed and disseminated by guideline producers to promote the uptake of their guidelines. Cochrane Database Syst Rev. 2016;2016(8):CD010669. doi:10.1002/14651858.CD010669.pub2.
178. Ivers N, Jamtvedt G, Flottorp S, Young JM, Odgaard-Jensen J, French SD, et al. Audit and feedback: effects on professional practice and healthcare outcomes. Cochrane Database Syst Rev. 2012;(6):CD000259. doi:10.1002/14651858.CD000259.pub3.
179. Ormseth CH, Sheth KN, Saver JL, Fonarow GC, Schwamm LH. The American Heart Association's Get With the Guidelines (GWTG)-Stroke development and impact on stroke care. Stroke Vasc Neurol. 2017;2(2):94–105. doi:10.1136/svn-2017-000092.
180. Taylor SJC, Pinnock H, Epiphaniou E, Pearce G, Parke HL, Schwappach A, et al. A rapid synthesis of the evidence on interventions supporting self-management for people with long-term conditions: PRISMS – Practical systematic Review of Self-Management Support for long-term conditions. Health Soc Care Deliv Res. 2014;2(53).
181. Burton D, Blundell N, Jones M, Fraser A, Elwyn G. Shared decision-making in cardiology: do patients want it and do doctors provide it? Patient Educ Couns. 2010;80(2):173–9. doi:10.1016/j.pec.2009.10.013.
182. Mitropoulou P, Grüner-Hegge N, Reinhold J, Papadopoulou C. Shared decision making in cardiology: a systematic review and meta-analysis. Heart. 2022;109(1):34–9. doi:10.1136/heartjnl-2022-321050.
183. Orrego C, Ballester M, Heymans M, Camus E, Groene O, Niño de Guzman E, et al. Talking the same language on patient empowerment: Development and content validation of a taxonomy of self-management interventions for chronic conditions. Health Expect. 2021;24(5):1626–38. doi:10.1111/hex.13303.
184. Therapeutic patient education: continuing education programmes for health care providers in the field of prevention of chronic diseases: report of a WHO working group. Copenhagen: WHO Regional Office for Europe; 1998 (https://iris.who.int/handle/10665/108151).
185. Therapeutic patient education: an introductory guide. Copenhagen: WHO Regional Office for Europe; 2023 (https://iris.who.int/handle/10665/372743).

186. PRO-STEP project Promoting Self-management for chronic diseases in Europe: Pilot Project on the Promotion of Self-Care in Chronic Diseases in the European Union. Brussels: European Commission; 2018 (https://www.eu-patient.eu/globalassets/projects/prostep/pro-step-final-report.pdf).

187. Cardiovascular diseases. In: World Health Organization [website]. Geneva: World Health Organization; 2023 (https://www.who.int/europe/news-room/fact-sheets/item/cardiovascular-diseases).

188. Scott A, Sivey P, Ait Ouakrim D, Willenberg L, Naccarella L, Furler J, et al. The effect of financial incentives on the quality of health care provided by primary care physicians. Cochrane Database Syst Rev. 2011;(9):CD008451. doi:10.1002/14651858.CD008451.pub2.

189. Flodgren G, Eccles MP, Shepperd S, Scott A, Parmelli E, Beyer FR. An overview of reviews evaluating the effectiveness of financial incentives in changing healthcare professional behaviours and patient outcomes. Cochrane Database Syst Rev. 2011;2011(7):CD009255. doi:10.1002/14651858.CD009255.

190. Houghton C, Meskell P, Delaney H, Smalle M, Glenton C, Booth A, et al. Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis. Cochrane Database Syst Rev. 2020;4(4):CD013582. doi:10.1002/14651858.CD013582.

191. Omboni S, Padwal RS, Alessa T, Benczúr B, Green BB, Hubbard I, et al. The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future. Connect Health. 2022;1:7–35. doi:10.20517/ch.2021.03.

192. Ionov MV, Zhukova OV, Yudina YS, Avdonina NG, Emelyanov IV, Kurapeev DI, et al. Value-based approach to blood pressure telemonitoring and remote counseling in hypertensive patients. Blood Press. 2021;30(1):20–30. doi:10.1080/08037051.2020.1813015.

193. Jo SH, Kim SA, Park KH, Kim HS, Han SJ, Park WJ. Self-blood pressure monitoring is associated with improved awareness, adherence, and attainment of target blood pressure goals: Prospective observational study of 7751 patients. J Clin Hypertens (Greenwich). 2019;21(9):1298–1304. doi:10.1111/jch.13647.

194. Ogedegbe G, Schoenthaler A. A systematic review of the effects of home blood pressure monitoring on medication adherence. J Clin Hypertens (Greenwich). 2006;8(3):174–80. doi:10.1111/j.1524-6175.2006.04872.x.

195. Burnier M, Egan BM. Adherence in Hypertension. Circ Res. 2019;124(7):1124–40. doi:10.1161/CIRCRESAHA.118.313220.

196. Tucker KL, Sheppard JP, Stevens R, Bosworth HB, Bove A, Bray EP, et al. Self-monitoring of blood pressure in hypertension: A systematic review and individual patient data meta-analysis. PLoS Med. 2017;14(9):e1002389. doi:10.1371/journal.pmed.1002389.

197. Rehabilitation in Health Systems. Geneva: World Health Organization; 2017 (https://iris.who.int/handle/10665/254506).

198. Kotseva K, Wood D, De Bacquer D; EUROASPIRE investigators. Determinants of participation and risk factor control according to attendance in cardiac rehabilitation programmes in coronary patients in Europe: EUROASPIRE IV survey. Eur J Prev Cardiol. 2018;25(12):1242–51. doi:10.1177/2047487318781359.

199. Ruivo J, Moholdt T, Abreu A. Overview of Cardiac Rehabilitation following post-acute myocardial infarction in European Society of Cardiology member countries. Eur J Prev Cardiol. 2023;30(9):758–68. doi:10.1093/eurjpc/zwad024.

200. Can people afford to pay for health care? Evidence on financial protection in 40 countries in Europe. Copenhagen: WHO Regional Office for Europe; 2023 (https://iris.who.int/handle/10665/374504).

201. Availability and prices of essential medicines in Uzbekistan in 2021. Copenhagen: WHO Regional Office for Europe; 2023 (https://apps.who.int/iris/handle/10665/365808).
202. Availability and prices of essential medicines in Tajikistan in 2021. Copenhagen: WHO Regional Office for Europe; 2023 (https://apps.who.int/iris/handle/10665/367351).
203. Assessment of access to essential outpatient medicines in Ukraine. Copenhagen: WHO Regional Office for Europe; 2021 (https://apps.who.int/iris/handle/10665/342433).
204. Technical package for cardiovascular disease management in primary health care: evidence-based treatment protocols. Geneva: World Health Organization; 2018 (https://iris.who.int/handle/10665/260421).
205. WHO guideline on country pharmaceutical pricing policies, 2nd ed. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/335692).
206. Schmieder RE, Mahfoud F, Mancia G, Azizi M, Böhm M, Dimitriadis K, et al. European Society of Hypertension position paper on renal denervation 2021. J Hypertens. 2021;39(9):1733–41. doi:10.1097/HJH.0000000000002933.
207. Graham IM, Stewart M, Hertog MG; Cardiovascular Round Table Task Force. Factors impeding the implementation of cardiovascular prevention guidelines: findings from a survey conducted by the European Society of Cardiology. Eur J Cardiovasc Prev Rehabil. 2006;13(5):839–45. doi:10.1097/01.hjr.0000219112.02544.24.
208. Access to NCD medicines: emergent issues during the COVID-19 pandemic and key structural factors. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/366528).
209. Cordero A, Padial LR, Batalla A, López Barreiro L, Torres Calvo F, Castellano JM, et al. Optimal pharmacological treatment and adherence to medication in secondary prevention of cardiovascular events in Spain: Results from the CAPS study. Cardiovasc Ther. 2017;35(2):e12240. (https://onlinelibrary.wiley.com/doi/full/10.1111/1755-5922.12240).
210. European Observatory on Health Systems and Policies, McKee M. Drawing light from the pandemic: a new strategy for health and sustainable development: a review of the evidence. Copenhagen: WHO Regional Office for Europe; 2021 (https://iris.who.int/handle/10665/345027).
211. Women's health and well-being in Europe: beyond the mortality advantage. Copenhagen: WHO Regional Office for Europe; 2016 (https://iris.who.int/handle/10665/332324).
212. Vogel B, Acevedo M, Appelman Y, Bairey Merz CN, Chieffo A, Figtree GA, et al. The Lancet women and cardiovascular disease Commission: reducing the global burden by 2030. Lancet. 2021;397(10292):2385–438. doi:10.1016/S0140-6736(21)00684-X.
213. Rydén L, Martin J, Volqvartz S. The European Heart Health Charter: towards a healthier Europe. Eur J Cardiovasc Prev Rehabil. 2007;14(3):355–6. doi:10.1097/01.hjr.0000275426.85303.8c.
214. Tackling NCDs: 'best buys' and other recommended interventions for the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2017 (https://iris.who.int/handle/10665/259232).
215. European Society of Cardiology, European Heart Health Network. European Heart Health Charter: 2023 Revision. Sophia Antipolis: European Society of Cardiology; 2023 (https://www.escardio.org/static-file/Escardio/Advocacy/Documents/EHHC-Brochure-2023.pdf).
216. European Society of Cardiology, European Heart Network. Fighting cardiovascular disease – a blueprint for EU action. Sophia Antipolis: European Society of Cardiology; 2020 (https://www.escardio.org/static-file/Escardio/Advocacy/Documents/2020%20ESC-EHN-blueprint_digital%20edition.pdf).
217. Norrving B, Barrick J, Davalos A, Dichgans M, Cordonnier C, Guekht A, et al. Action Plan for Stroke in Europe 2018–2030. Eur Stroke J. 2018 Dec;3(4):309–36. doi:10.1177/2396987318808719.

218. World Health Organization. Guideline: sodium intake for adults and children. Geneva: World Health Organization; 2012 (https://iris.who.int/handle/10665/77985).
219. CVD ASSESS implementation manual: preventing cardiovascular disease (CVD) in primary health care: assessing essential interventions using routine data (CVD ASSESS). Copenhagen: WHO Regional Office for Europe; 2020 (https://www.who.int/europe/publications/m/item/cvd-assess-implementation-manual).
220. Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379).

The WHO Regional Office for Europe

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

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands (Kingdom of the)
North Macedonia
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
Türkiye
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization
Regional Office for Europe

UN City, Marmorvej 51,
DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00
Fax: +45 45 33 70 01
Email: eurocontact@who.int
Website: www.who.int/europe

9 789289 060813