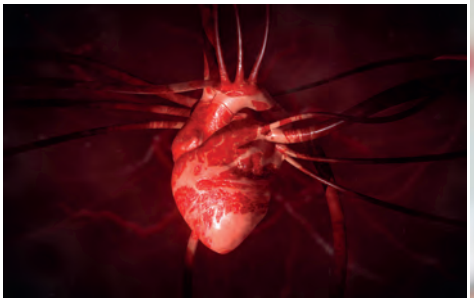
DRIVING SUSTAINABLE ACTION FOR CIRCULATORY HEALTH

WHITE PAPER FOR CIRCULATORY HEALTH



CONTENTS

EXECUTIVE SUMMARY 4

PART 1: BACKGROUND 6
- Why circulatory diseases matter 8
- The Global Coalition for Circulatory Health 10
- Purpose of this White Paper 12

PART 2: THE GLOBAL BURDEN OF CIRCULATORY DISEASE 13
- The circulatory system 13
- Associated conditions and risk factors 14
- Associated conditions and metabolic risk factors 14
- Behavioural risk factors 15
- Other modifiable factors 16
- Non-modifiable risk factors 16
- The burden of circulatory disease 17
- Costs of circulatory disease 20

PART 3: LIVING WITH CIRCULATORY DISEASES 21
- Introduction 22
- Community Voices 22

PART 4: SUCCESS STORIES 26
- Introduction 26
- **SUCCESS STORY 1:** The excise tax reform in the Philippines 27
  - Challenge
  - Response
  - Outcomes
- **SUCCESS STORY 2:** Primary care prevention of heart disease and stroke in the Seychelles 28
  - Challenge
  - Response
  - Outcomes
- **SUCCESS STORY 3:** Nurses stepping up to curb NCDs in Tonga 29
  - Challenge
  - Response
  - Outcomes
- **SUCCESS STORY 4:** SMART Health for better cardiovascular health in India 31
  - Challenge
  - Response
  - Outcomes
- **SUCCESS STORY 5:** Reduced mortality through systematic screening and treatment 32
  - Challenge
  - Response
  - Outcomes

SUCCESS STORY 6: Taxing sugar-sweetened beverages in Mexico 33

Challenge

Response

Outcomes

PART 5: TAKING ACTION 35

Why are heart disease and stroke a public health issue? 35

Taking action 36

PILLAR 1: Prioritizing multisectoral and cost-effective interventions 37

PILLAR 2: Fostering access to prevention and care 38

PILLAR 3: Mobilizing resources 39

PILLAR 4: Measuring and tracking progress 40

Global Coalition's commitments 41

GLOBAL COALITION MEMBERS 42

References 43

ACKNOWLEDGEMENTS

The Global Coalition for Circulatory Health "Global Coalition" would like to acknowledge and thank all those who contributed to the writing, research, development, editing and design of this White Paper. We are especially indebted to the people living with circulatory diseases and to their families for sharing their stories with us. Particular thanks are due to the people and organizations below who made this document possible. Writer: Tania Séverin, Polyscope Communication.

Expert Contributors: Mischa Terzyk (Framework Convention Alliance), David Stewart (International Council of Nurses), Sabine Dupont and Lorenzo Piemonte (International Diabetes Federation), Anne Hradsky, Valerie Luyckx and Luisa Strani (International Society of Nephrology), Michael Moore (World Federation of Public Health Associations), David Wood (World Heart Federation), Dan Lackland and Norm Campbell (World Hypertension League), Domingo Orozco Beltran, Manuel Sanchez Molla, Viviana Martinez-Bianchi and Garth Manning (World Organization of Family Doctors), Maria Fredin Grupper, Werner Hacke, Bo Norrving and Patrik Michel (World Stroke Organization). Reviewers: Florence Berteletti, Jean-Luc Eiselé, Mihela Kralj, Pilar Millan, Sharon Mitchell, Pablo Perel, Andrea Vassalotti, Alastair White (World Heart Federation).

Project coordinator: Oana Scarlatescu (World Heart Federation).
Design: MINT® designbymint.com
© Global Coalition for Circulatory Health 2018

Suggested citation: Driving Sustainable action for Circulatory Health. White Paper on Circulatory Health. Geneva, Switzerland. Global Coalition for Circulatory Health. 2018.

You may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated above. In any use of this work, there should be no suggestion that the Global Coalition for Circulatory Health as a whole or any of its member organizations endorse any specific organization, product or service. The use of the logos of the Global Coalition organizations is not permitted. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the Global Coalition for Circulatory Health. The Global Coalition is not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

The Global Coalition for Circulatory Health and its member organizations have taken all reasonable precautions to verify the information in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the Global Coalition for Circulatory Health or its members shall be liable for damages arising from its use.

EXECUTIVE SUMMARY

CIRCULATORY DISEASES ARE THE WORLDS' NUMBER 1 CAUSE OF DISABILITY AND DEATH

Circulatory diseases are the world's number 1 cause of disability and death. Together, heart disease, stroke, diabetes and kidney disease lead to more than 20 million deaths each year and to more than 374 million years of life lost. Beyond these massive, and sometimes abstract figures, they affect millions of individuals, young and old, rich and poor, in urban and rural settings, on all continents.

Because circulatory diseases share a range of, mostly modifiable, common risk factors, coordinated action can result in major gains in the quality of life for individuals and cost savings for society. Health systems worldwide would therefore greatly benefit from mobilising sufficient resources to preventing and fighting circulatory diseases. This is why the Global Coalition for Circulatory Health urges governments to scale up their action against circulatory diseases and to enact priorities as identified by the WHO Independent High-Level Commission on Non-Communicable Diseases (NCDs) and approved during the Third High-level Meeting of the UN General Assembly on NCDs (UN HLM on NCDs) organized in New York on 27 September 2018.

The Global Coalition for Circulatory Health, which was formed in 2017 to drive the urgent action for circulatory health, is the only network of international, regional and national organizations advocating for increased prevention, control and treatment of all circulatory diseases. All the members of the Coalition commit to work together to support global, regional and national health administrations and organisations in their action.

In order to guide and support governments and intergovernmental agencies in their actions, the Global Coalition for Circulatory Health has identified a range of priority actions. These are meant to reinforce recommendations that stem from the Third UN HLM on NCDs, but also look beyond the High-Level Meeting to drive action on circulatory health for the years to come.

They rely on four core pillars which:

- **Are grounded in evidence;**
- **Are globally relevant, taking into account regional or national differences;**
- **Can be acted upon by members of the Global Coalition for Circulatory Health and their global, regional and national networks.**

TAKING ACTION

PILLAR 1: PRIORITIZING MULTISECTORAL AND COST-EFFECTIVE INTERVENTIONS

Circulatory diseases can largely be prevented and managed through effective and efficient prevention and early detection mechanisms. This is why governments are urged to develop and implement policies that are conducive to a healthy life for their populations. In this respect, the Global Coalition for Circulatory Health strongly supports:

- The full implementation of the WHO Framework Convention on Tobacco Control (FCTC);
- The fight against obesity;
- The introduction of fiscal measures;
- Food reformulation efforts.

Further, focusing on secondary prevention, the Global Coalition for Circulatory Health strongly supports:

- The implementation of the WHO best-buy dedicated to Counselling and multi-drug therapy;
- The implementation of the HEARTS package;
- The treatment of all patients with hypertension and high-risk patients with statins and aspirin;
- The integrated management of circulatory diseases, especially with existing communicable diseases programmes (e.g., HIV, Tuberculosis.)

The Recommendations refer to the following clauses in the Political Declaration of the 3rd United Nations High-Level Meeting on Non-Communicable Diseases: OP1; OP2; OP3; OP4; OP5; OP6; OP7; OP15; OP16; OP18; OP20; OP23; OP26; OP28.[a]

PILLAR 2: FOSTERING ACCESS TO THE PREVENTION AND CARE OF CIRCULATORY DISEASES

To live full and healthy lives, people at- risk of or living with circulatory diseases need strong health systems, that are designed to deliver universal health coverage (UHC) and to ensure access to prevention, screening, and care for all. The Global Coalition for Circulatory Health strongly supports:

- The development of intersectoral collaborations between all relevant departments, as well as with civil society organizations and the private sector;
- An improved access to proven drugs, including low-cost combination pills, as part of a package of essential treatment and services to control heart disease and stroke; [b]
- An improved access to relevant technology, notably by increasing the availability of basic and evidence supported diagnostic tools;
- The implementation of innovative information systems, such as mobile-health technologies and telehealth programmes; The prescribing of essential medicines by adequately trained staff by optimizing the health workforce and enabling health workers to work to their full scope of practice, i.e., in the areas where they are educated, authorized and competent to perform.

The Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP1; OP2; OP14; OP19; OP20; OP22; OP24; OP25.

[a] The recommendations and clauses refer to the draft Political Declaration released in August 2018.

[b] Specifically, aspirin, clopidogrel, ACE inhibitors, angiotensin receptor antagonists, beta-blockers, calcium channel antagonists, diuretics, statins and a basic range of short and long-acting insulins and oral anti-diabetics must be generally available at no or low costs.

PILLAR 3:

MOBILISING RESOURCES FOR CIRCULATORY HEALTH

Investing in the fight against circulatory diseases is cost-effective. For example, investing US$ 1.27 per person per year in low- and middle-income countries (LMICs) until 2030 can save an estimated 8.2 million lives and yield a return on investment of at least US$ 7. The Global Coalition for Circulatory Health strongly supports:

- The taxation of unhealthy products such as alcohol, tobacco, unhealthy foods and non-alcoholic beverages (such as sugar-sweetened beverages);
- The use of these revenues to advance the prevention and control of circulatory diseases;
- The development of innovative financing mechanisms to ensure that sufficient funds are available to achieve health objectives. In the longer term, each country is called upon to mobilise sufficient resources at national level, in particular by enforcing adequate taxation policies and through carefully selected public-private collaborations.

Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP3; OP5; OP8; OP30.

PILLAR 4:

MEASURING AND TRACKING PROGRESS

The Global Coalition for Circulatory Health strongly supports the introduction of instruments which help track progress on circulatory diseases in a clear, timely and transparent fashion. The Global Coalition fully supports:

- The implementation of reliable, simple, and fit-for-purpose surveillance systems for monitoring the burden of circulatory diseases, prevalence of risk factors, and treatment of circulatory diseases at national and global levels;
- The development of reliable health information systems to monitor health behaviours, risk factors, and morbidity and mortality;
- The implementation of the World Health Organization's Global Monitoring Framework;
- A global agreement on international standards for data collection, to enable comparisons across countries, sectors, and systems.

The Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP10; OP11; OP29; OP32.

Why it matters

100 million people a year fall into extreme poverty because of unaffordable health costs.

By 2030 the total global cost of CVD is set to rise from approximately US$ 957 billion in 2015 to a US$ 1,044 billion. 55 percent are direct healthcare costs, and 45 percent are due to indirect costs, mainly losses of productivity.

Circulatory diseases are the world's number 1 cause of disability and death.

Together, heart disease, stroke, diabetes and kidney disease lead to more than 20 million deaths each year.

Circulatory diseases strongly affect quality of life.

The global burden of CVD, diabetes and kidney disease, expressed in disability-adjusted life years (DALYs) amounted to almost half a billion years in 2016.

Global ageing trends will further add to the problem, as the risk of heart disease, stroke and other comorbidities increases with age. The risk of stroke doubles every decade after the age of 55.

Circulatory diseases place a heavy financial burden on individuals and on health systems.

Why action is worthwhile

Fighting circulatory diseases will lead to positive outcomes.

Investing US$ 1.27 per person per year in low- and middle-income countries until 2030 can save an estimated 8.2 million lives, decrease premature mortality from NCDs by 15 percent, and yield a return on investment of at least US$ 7.

Approximately 75 percent of CVD is attributable to modifiable risk factors such as high blood pressure, diabetes, high cholesterol and obesity, tobacco use, alcohol consumption, physical inactivity and unhealthy diet.

US$1 invested in reducing tobacco use can yield a return of US$ 7.43. Managing CVD and diabetes can yield a return of US$ 2.8 and reducing unhealthy diet can bring a return of US$ 12.82!

In low-income neighbourhoods in Berkeley, USA, sugary drink consumption declined by 21 percent after a tax on sugar-sweetened beverages was introduced. Conversely, sales of untaxed beverages rose.

In the Philippines, increased tobacco taxation decreased smoking prevalence among adults from 29.7 percent in 2009 to 23.8 percent in 2015. This represents a 19.9 percent relative decline of the tobacco use prevalence.

1. WHY CIRCULATORY DISEASES MATTER...

1. The heart and brain are our best companions:

LET'S TREASURE THEM!

- The average heart beats about 100'000 a day, and the brain's 80 billion neurons communicate thousands of times every second to make humans human. It takes just a few minutes after cardiac arrest before a person experiences brain death and therefore complete death.

- Controlling hypertension, the number one risk factors for mortality and disability worldwide, is believed to significantly reduce the risk of stroke, coronary heart disease and heart failure [1,2,3].

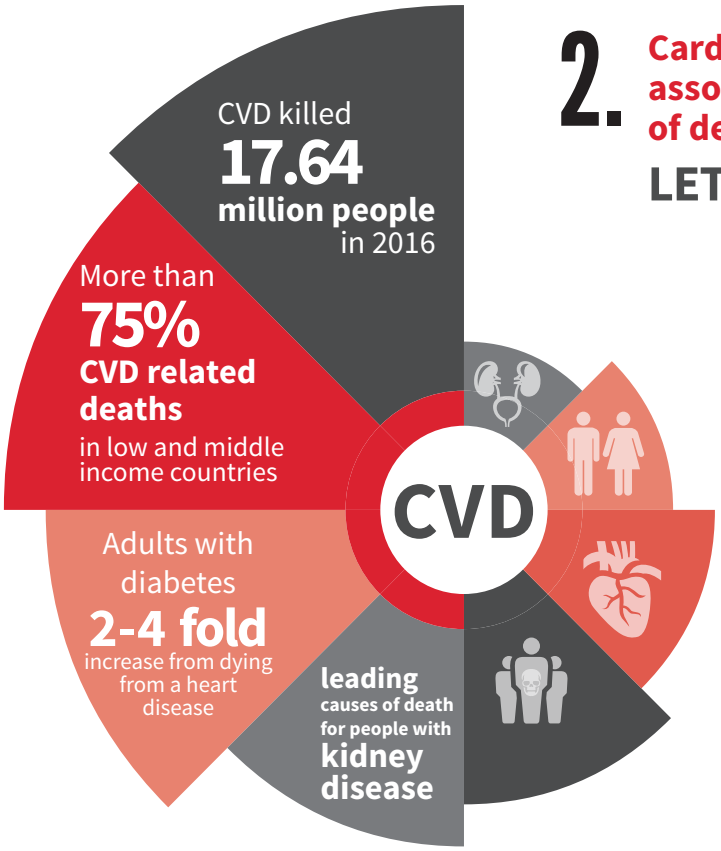
100'000
beats a day

80 billion neurons
communicate thousands of times every second

cardiac arrest
just a few minutes before brain death/complete death

2. Cardiovascular disease (CVD) and associated conditions are leading causes of death and disability:

LET'S CHANGE THAT!



- CVD, including heart disease and stroke, are the leading cause of mortality worldwide[4]. CVD killed 17.64 million people in 2016[5]. The global burden of CVD, diabetes and kidney disease, expressed in disability-adjusted life years (DALYs) equalled almost half a billion years in 2016[6].
- More than 75 percent of CVD-related deaths occur in low- and middle-income countries[7].
- Adults with diabetes have a 2–4 fold increased risk of dying from heart diseases compared to those without diabetes[8]. Life expectancy is reduced by 12 years in diabetes patients with previous CVD[9].
- An estimated 7.1 million people died as a result of uncontrolled hypertension[c]. Almost 1 billion individuals are affected by hypertension, which is a significant risk factor for cardiovascular diseases, stroke and end-stage renal disease[10,11].
- Heart disease and stroke are the leading causes of death for people with kidney disease and acute and chronic kidney disease (CKD) are major risk factors for CVD[12,13,14].
- Interventions in the 21st century have demonstrated that preventive health actions can reverse and improve circulatory health[15].

[c]Hypertension is defined as systolic blood pressure ≥140 mmHg, and raised blood pressure as systolic blood pressure ≥110-115 mmHg.

3. CVDs are costly: LET'S FOSTER BEST-BUY INTERVENTIONS!

US$ 1,044 billion 2030

US$ 957 billion in 2015

global cost CVD

out of pocket cost

of combined therapy for secondary prevention of CVD can cost 18 days wages in low-income countries

- By 2030, the total global cost of CVD is set to rise from approximately US$ 957 billion in 2015 to a US$ 1,044 billion. 55 percent are direct healthcare costs, and 45 percent are due to indirect costs, mainly losses of productivity[16,17].
- Heart disease and stroke-related care represents the largest proportion of diabetes health expenditures: 25 percent of diabetes inpatient costs are a result of heart disease and stroke. Conversely, diabetes is responsible for more than 25 percent of all CVD expenditure[18].
- The out-of-pocket cost of a month's supply of combined therapy for secondary prevention of CVD can reach as much as 18 days' wages in low income countries[19].
- US$ 1 invested in reducing tobacco use can yield a return of US$ 7.43. Managing CVD and diabetes can yield a return of US$ 2.8, and reducing unhealthy diet can bring a return of US$ 12.82![20]
- Keeping blood pressure under control significantly reduces the number of cardiovascular events and deaths, making hypertension control one of the most cost-effective population-based interventions in public health.

4. CVDs can affect everyone: LET'S PROMOTE A LIFE-COURSE APPROACH!

2x

risk for CVD

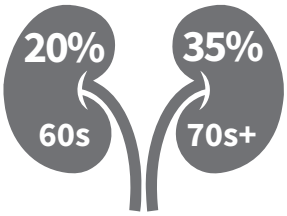
doubles every decade after age 55

8-10%

of people suffer from chronic kidney disease globally

population worldwide

Increasing to:



- Improving maternal and child health will make a difference for the circulatory health of future generations: the risks of CVD, diabetes, hypertension and kidney disease begin in utero and accrue throughout the life course[21].
- Ageing increases the risk of heart disease, stroke and other comorbidities. The risk of stroke doubles every decade after the age of 55.
- 8-10 percent of the population worldwide suffers from chronic kidney disease. This figure increases to 20 percent in individuals in their 60s, and to 35 percent in those aged 70 years and over[22].

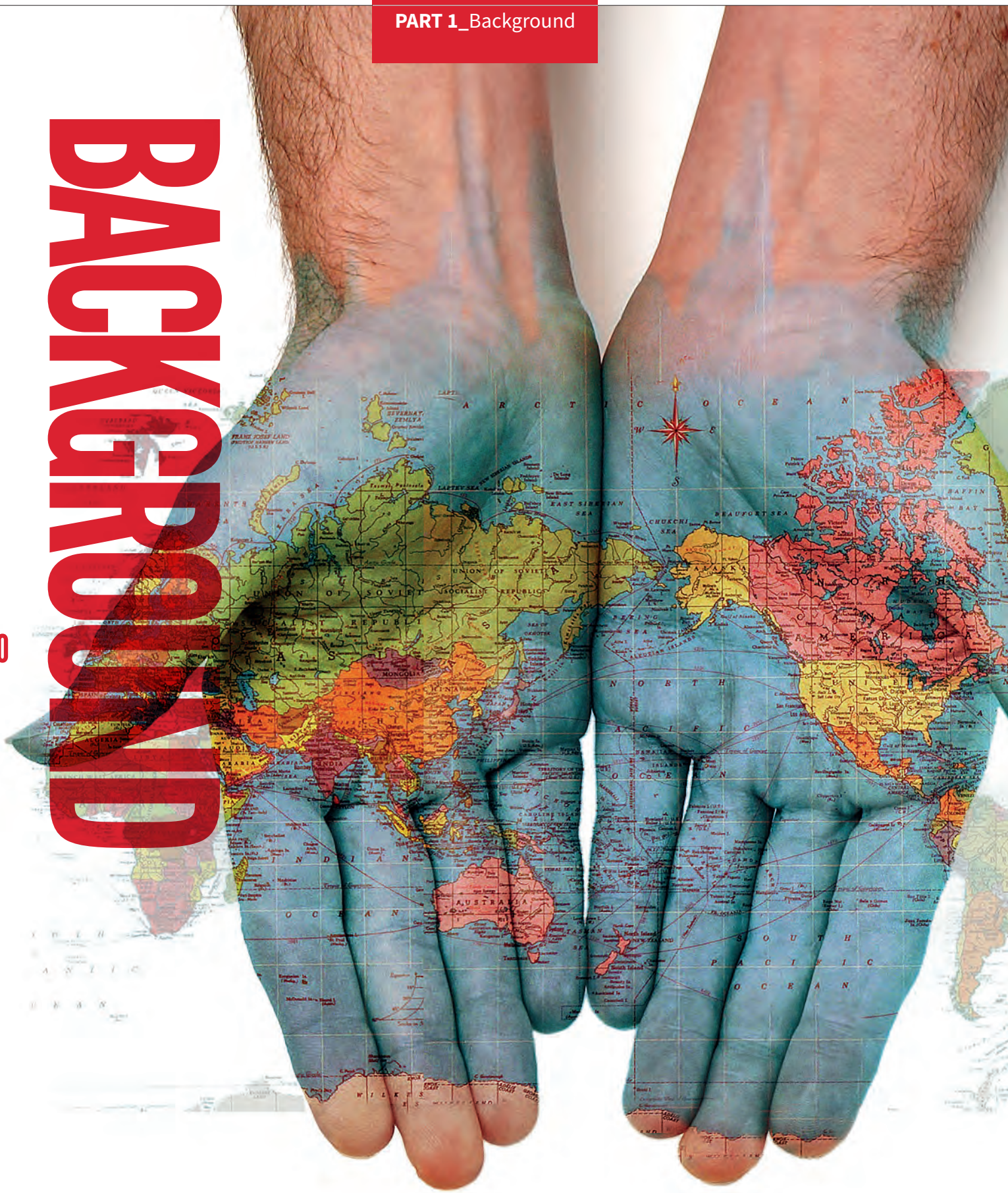
5. Integrated strategies are scarce: LET'S CLOSE THE GAP!

75%

of risk factors are modifiable

- Approximately 75 percent of CVD is attributable to modifiable risk factors such as high blood pressure, diabetes, high cholesterol and obesity, tobacco use, alcohol consumption, physical inactivity and unhealthy diet[23].
- Prevention can yield positive results. Yet, although most countries have a national strategy that addresses either unhealthy diet, tobacco or diabetes, only 42 percent of countries have national strategies for all three issues[24].
- Worldwide, less than 1 in 3 countries have smoke-free environments in all indoor workplaces, public transport and indoor public places[25,26].
- Only 20 percent of countries worldwide have set up an NCD surveillance and monitoring system that includes data on mortality by cause and risk factor surveillance, and very few are in low-income countries[27].
- Screening for comorbidities in high risk patients leads to reduced costs, reduced cumulative incidence of grave disease progression and improved overall life expectancy, and should therefore be part of integrated national NCDs strategies and tailored to each setting according to available resources[28,29,30].

BACKGROUND



THE GLOBAL COALITION FOR CIRCULATORY HEALTH

Cardiovascular disease (CVD), including heart disease, hypertension and stroke, and associated conditions such as kidney diseases and diabetes, are the leading cause of mortality worldwide, with more than 75 percent of these deaths occurring in low- and middle-income countries[31]. Yet this enormous burden is not being addressed with the priority required.

The Global Coalition for Circulatory Health is the only network of international, regional and national organizations advocating for increased prevention, control and treatment of all circulatory diseases. Formed in 2017 to drive the urgent action for circulatory health, the Global Coalition aims to:

- Advocate for and support the achievement of the Sustainable Development Goal (SDG) 3.4 of a one-third reduction in premature NCD deaths by 2030. The Coalition will build on the work done to date to meet the global target of a 25 percent reduction by 2025 in premature mortality from heart disease and stroke, and on the World Health Organization's Global Hearts Initiative;
- Promote common messaging by partner organizations and leverage their extensive networks to cascade messages at regional and national levels in order to influence relevant local policy- and decision-makers;
- Strengthen the voice of people living with heart disease, stroke and associated conditions by including patients, their families and communities in decision-making processes and in national, regional and global advocacy.

REDUCE NCD DEATHS BY 2030

STRENGTHEN THE VOICE OF PEOPLE

PROMOTE COMMON MESSAGING

PURPOSE OF THIS WHITE PAPER

The present White Paper aims to inform a coherent policy approach to circulatory disease prevention, control and treatment at international, regional and national levels. It provides policymakers with key information and recommendations.

3.4

The White Paper is written with sustainability in mind. This is why it is firmly placed in the context of the United Nations' Sustainable Development Goals (SDGs) and in particular of SDG Target 3.4. of reducing by one third premature mortality from non-communicable diseases through prevention and treatment and promoting mental health and well-being by 2030.

Beyond target 3.4 and considering the impact that circulatory diseases and NCDs have on health, productivity and the economy, improving circulatory health is paramount for SDG 1 (No Poverty), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities).

The White Paper consists of two main parts: the first provides a situation analysis, the second focuses on problem-solving.

This White Paper sheds light on the global burden of CVD and the state of circulatory health, and highlights current gaps in policy. In addition to providing an overview of the burden of the disease in terms of mortality, morbidity, disability-adjusted life years (DALYs), years of life lost (YLL), and cost, it also gives people living with circulatory diseases a voice. Through their testimonies, individuals from different backgrounds illustrate the daunting impact of circulatory conditions on their daily lives.
The second part of this White Paper focuses on possible solutions.

It presents a range of success stories in various settings and lists a range of recommended actions in different fields, such as education and training, universal health coverage, financing, infrastructure, access to medicines, and technology

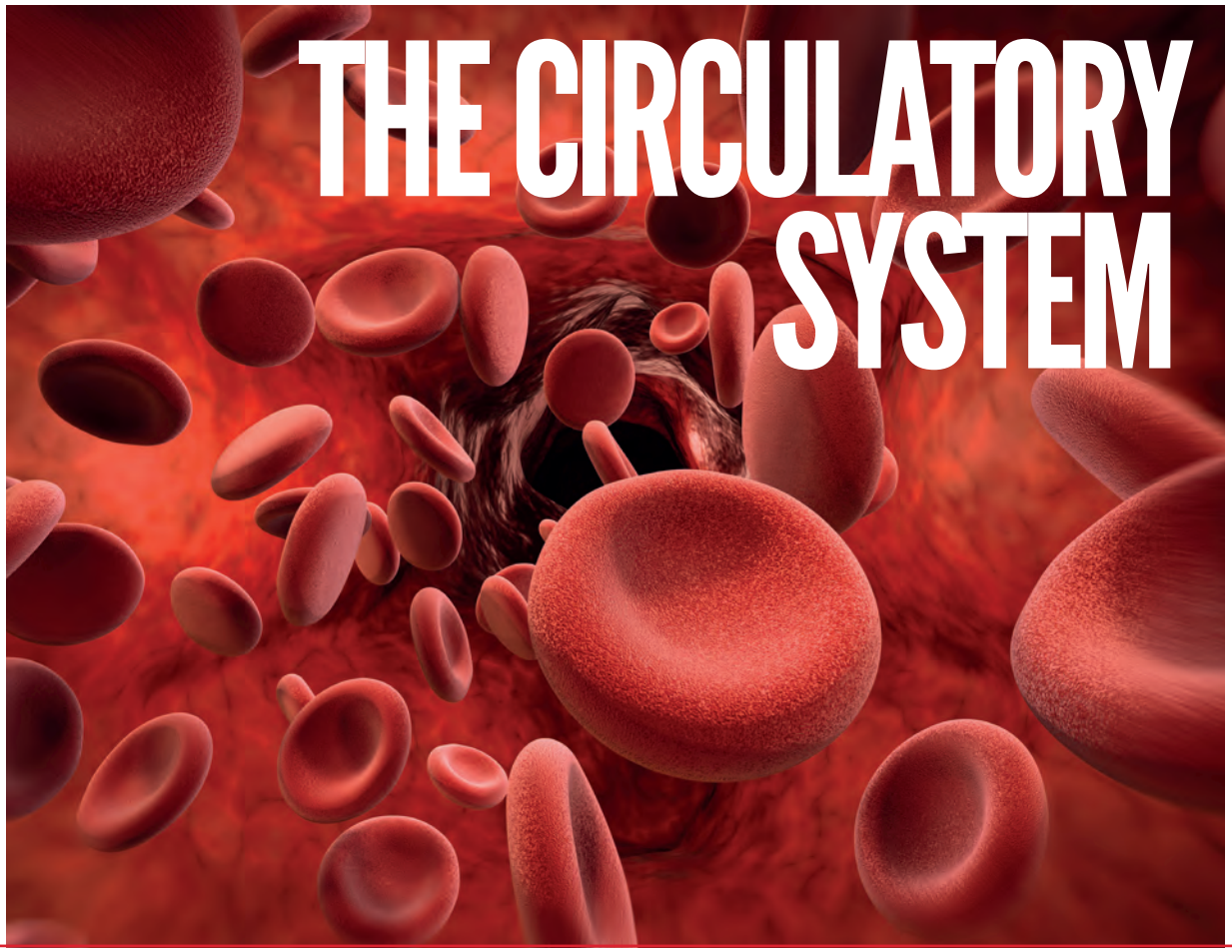
2. GLOBAL BURDEN

The cardiovascular system is composed of three main elements: the heart, blood vessels, and blood, which deliver nutrients and oxygen to all cells in the body. The circulatory system consists of two circuits: pulmonary and systemic. The pulmonary circuit brings blood to the lungs to be oxygenated and then back to the heart. The systemic circuit pumps blood to deliver oxygen and returns de-oxygenated blood to the heart.

Interruptions, blockages, or diseases that affect blood flow can lead to heart disease and stroke. Such complications can be caused by a variety of factors, which are metabolic, behavioural, environmental and occupational in nature[32] .

Many of the risk factors for cardiovascular disease lead to atherosclerosis, which is the narrowing and thickening of arteries that develops over the years without causing symptoms. It can happen in any part of the body. When atherosclerosis appears around the heart, it is known as coronary artery disease. In the legs it is known as peripheral arterial disease.

Atherosclerosis of the arteries is due to the deposition of fatty material, cholesterol and other substances in the walls of blood vessels, also known as plaques. The rupture of a plaque can lead to stroke or a heart attack[33].



ASSOCIATED CONDITIONS AND RISK FACTORS

ASSOCIATED CONDITIONS AND METABOLIC RISK FACTORS

Cardiovascular diseases are intrinsically linked with a range of other chronic conditions, such as diabetes, hypertension, obesity and kidney disease. Each of these conditions affect each other in various ways, leading to a vicious cycle of cause and consequence.

HYPERTENSION:

is a major risk factor for heart attack, causing about 50 percent of ischaemic strokes, and is a significant cause and consequence of kidney disease. The World Health Organization (WHO) rates hypertension as one of the most important causes of premature death worldwide.

DIABETES:

multiplies the risk of developing CVD by 2 to 4 and contributes to 16.1 percent of the CVD burden. Conversely, heart disease and stroke are the leading cause of mortality for people with diabetes. Diabetes is the leading cause of end-stage kidney disease worldwide.

CHRONIC KIDNEY DISEASE:

reduced kidney function increases the risk for heart disease and stroke. It can lead to hypertension, which in turn is a major risk for heart attack and stroke. Conversely, high blood pressure can damage the blood vessels that carry blood to the kidney filters, and the kidney filters themselves. Severe hypertension can weaken and enlarge the heart muscle, which can cause kidney failure. Low glomerular filtration rate (GFR) contributes to 7 percent of cardiovascular deaths[34].

People with kidney disease are up to 20 times more likely to die from a heart attack or stroke than they are to receive dialysis[35] .

OBESITY:

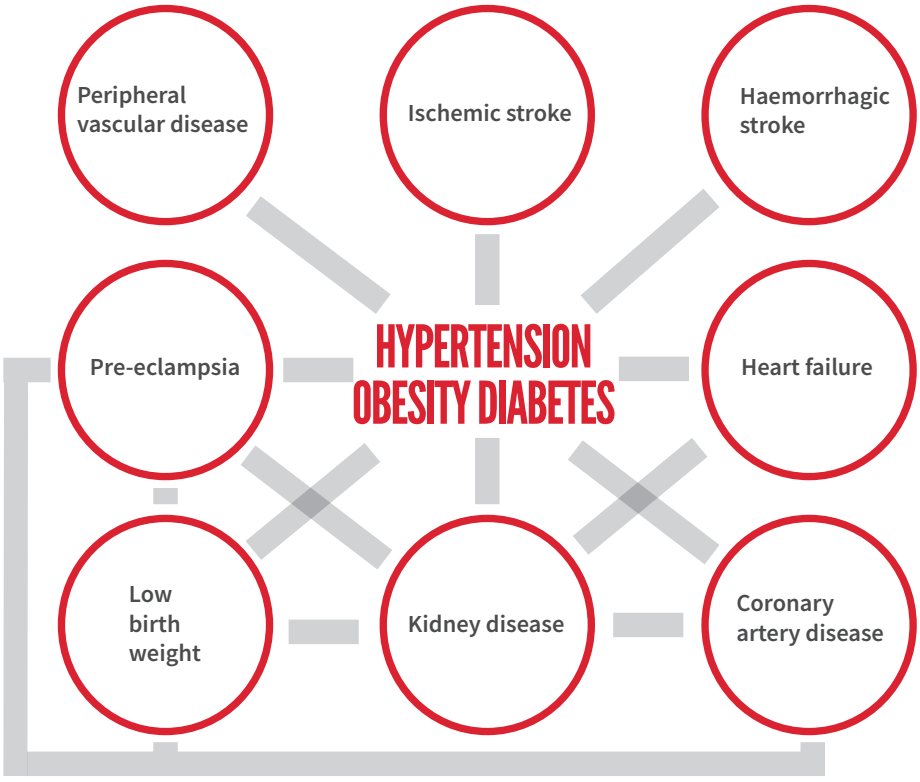
overweight and obesity may lead to hypertension, diabetes and atherosclerosis, which in turn increase the risk for heart disease, stroke and kidney disease.

ABNORMAL BLOOD LIPIDS:

high total cholesterol, low-density lipoprotein (LDL)-cholesterol and triglyceride levels, and low levels of high-density lipoprotein (HDL)-cholesterol increase the risk for coronary heart disease and ischaemic stroke.

PRE-ECLAMPSIA:

which occurs in 3-5 percent of all pregnancies worldwide, is an important, yet often neglected, predictor of future CVD, hypertension and kidney disease[36].



[d] Adapted from a figure provided by Dr Valerie Luyckx, International Society of Nephrology.

Number of Disability-Adjusted Life Years (DALYs) due to CVD, Global, both sexes, 2000 and 2016

CVD CAUSE	2000 RANK (% OF ALL)	2016 RANK (% OF ALL)
1. Ischemic heart disease	158,738,404.1 (52.1%)	208,846,775.3 (54.5%)
2. Stroke	100,757,889.8 (33.1%)	116,332,748.9 (30.4%)
3. Hypertensive heart disease	13,701,579.5 (4.5%)	15,450,446.6 (4.0%)
4. Other cardiovascular and circulatory diseases	10,101,831.6 (3.3%)	14,888,661.5 (3.9%)
5. Rheumatic heart disease	7,163,585.2 (2.4%)	9,542,474.7 (2.5%)
6. Cardiomyopathy and myocarditis	6,644,777.7 (2.2%)	6,239,513.3 (1.6%)
7. Atrial fibrillation and flutter	3,375,243.2 (1.1%)	5,407,780.4 (1.4%)
8. Aortic aneurysm	2,170,413.6 (0.7%)	3,728,304.7 (1.0%)
9. Endocarditis	1,667,716.7 (0.5%)	1,998,407.2 (0.5%)
10. Peripheral artery disease	503,394.0 (0.2%)	861,976.0 (0.2%)
All CVD causes (total)	**304,824,835.5 (100%)**	**383,297,088.4 (100%)**

BEHAVIOURAL RISK FACTORS

TOBACCO USE: increases the risk of heart disease, stroke and kidney disease, in particular in people who started young, and in heavy smokers. Passive smoking is an additional risk. It is estimated that smoking increases the risk of stroke and coronary heart disease by 100 percent. Smoking increases the risk of death from undiagnosed coronary heart disease by 300 percent[37].

PHYSICAL INACTIVITY: can lead to obesity and increases the risk of heart disease and stroke by 50 percent. It is also a risk factor for both insulin resistance and CVD.

UNHEALTHY DIET: A diet high in saturated fat increases the risk of heart disease and stroke. It is estimated to cause about 31 percent of coronary heart disease and 11 percent of stroke worldwide. Compared to the typical diet of someone living in high-income countries, a diet low in saturated fats, which is rich in fresh fruit and vegetables, reduces the risk of new major cardiac events by 73 percent.

A diet high in sodium (salt) increases the risk for hypertension. Estimates have shown that a reduction in dietary intake of sodium by about 1g of sodium a day, about 3g of salt, would lead to a 22 percent drop in the number of deaths resulting from strokes and a 16 percent fall in the number of deaths from coronary heart disease[38].

Conversely, a diet rich in fruits and vegetables, wholegrain cereals and fish has a protective effect. As an example, low fruit and vegetable intake accounts for about 20 percent of heart disease and stroke worldwide.

Large amounts of sugar, in particular in sweetened soda beverages, have been linked to an increase in CVD mortality[39].

It is estimated that each US$ invested in reducing unhealthy diet yields a return of investment of US$ 12.82[40].

EXCESSIVE ALCOHOL USE: Harmful uses of alcohol has been shown to damage heart muscle and increase the risk of stroke and cardiac arrhythmia. It is estimated that each US$ invested in reducing the harmful use of alcohol yields a return of investment of US$ 9.13[41].

OTHER MODIFIABLE FACTORS

LIFE-COURSE RISKS:	Such as low birth weight and preterm births, constitute risk factors for CVD, hypertension, diabetes and kidney disease that could be modified through improved maternal and child health and nutrition[42].
ENVIRONMENTAL RISK FACTORS:	Environmental factors, such as exposure to ambient air pollution and particulate matters, play a significant and modifiable role in CVD and associated conditions[43].
LOW SOCIOECONOMIC STATUS:	Poorer segments of the population are disproportionately affected by circulatory and stroke. A chronically **stressful life, social isolation, anxiety** and **depression** also increase the risk[44].
LACK OF AWARENESS:	Awareness of CVD, CKD and diabetes within the population is low, hence these conditions are often only diagnosed once they have reached advanced stages and have caused irreversible damage.

NON-MODIFIABLE RISK FACTORS

ADVANCING AGE:
Getting older constitutes a risk factor for circulatory disease. The risk of stroke, for example, doubles every decade after age 55.

SEX:
CVD affects men more than pre-menopausal women. But once past the menopause, a woman's risk is similar to a man's. The risk of stroke is similar for men and women.

ETHNICITY:
Individuals with African or Asian ancestry are at higher risks of developing heart disease and stroke than other racial groups. In addition, some of these high-risk racial groups have less access to care.

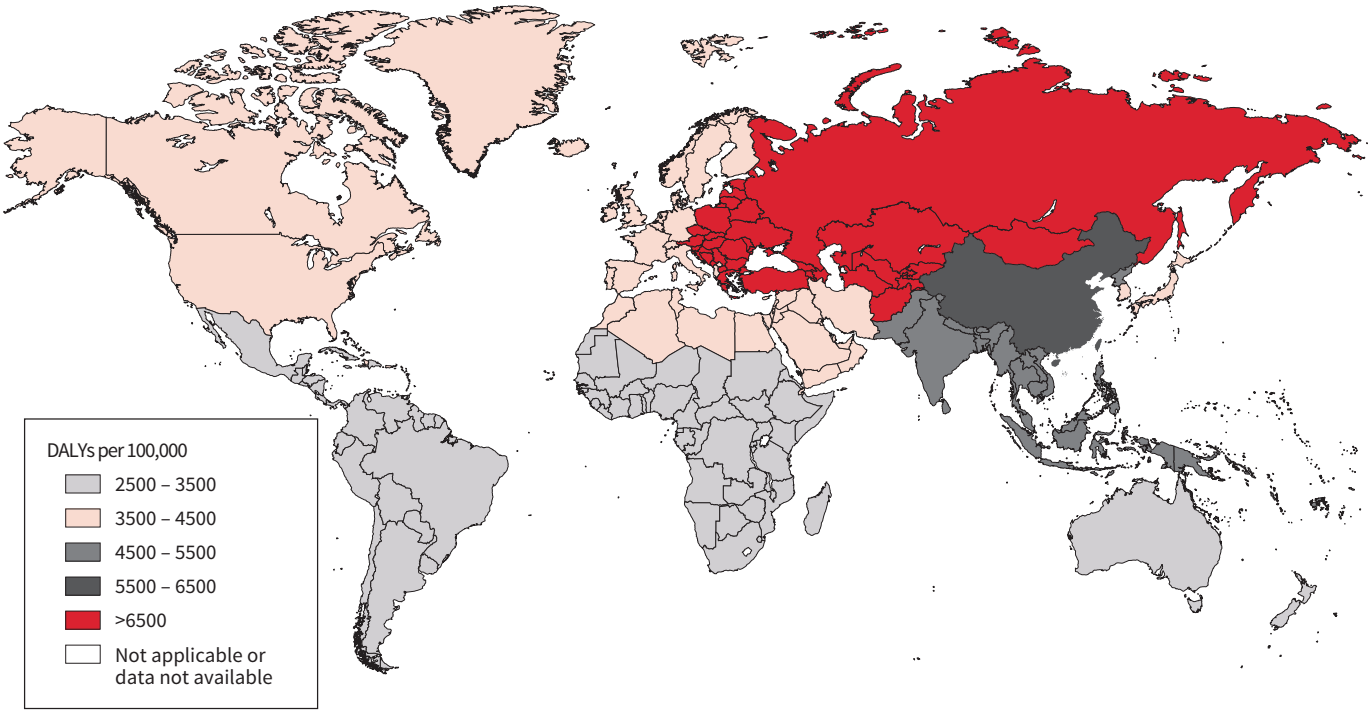
HEREDITY OR FAMILY HISTORY:
The risk increases if a first-degree blood relative has had coronary heart disease or stroke before the age of 55 years (for men) or 65 years (women)[45].

Impact of associated conditions and selected risk factors on CVD deaths (2016)[45]

RISK FACTOR	NUMBER OF DEATHS
All risk factors	15,256,450
High systolic blood pressure	9,759,724
Dietary risks	9,085,088
High total cholesterol	4,392,505
Environmental/occupational risks	3,898,727
Tobacco	2,914,125
High body-mass index	2,850,587
High fasting plasma glucose	2,840,891
Impaired kidney function	1,368,494
Alcohol use	797,869

THE BURDEN OF CIRCULATORY DISEASE

2016 Disability-adjusted life years by country, Global CVD DALYs per 100,000 persons, 2016



Heart disease, stroke, diabetes and kidney disease are major causes of premature death and chronic disability in all regions of the world. More people die from heart disease and stroke worldwide than from any other cause.

In 2016, there were an estimated 470 million cases of heart disease and stroke and 17.64 million deaths due to heart disease and stroke. Of these deaths, 80 percent are due to heart attack and strokes, and about three quarters occur in low- and middle-income countries[48] .

Diabetes affected 425 million individuals and caused 4 million deaths in 2017[49]. Hypertension (SBP ≥140 mmHg), a leading risk factor for circulatory diseases and associated conditions such as renal diseases, affects over one billion people globally and is linked to one in five deaths and seven percent of disability[50,51,52]. Chronic kidney disease affects 752 million individuals worldwide and caused at least 2.4 million deaths in 2016[53,54].

In 2016, the global burden of CVD, diabetes and kidney disease, expressed in DALYs, amounted to almost half a billion years (445,386,944.5)! World-wide, CVD, diabetes, kidney disease, hypertension and obesity amounted to 665,913,553 years of life lost in 2016[55].

Circulatory diseases predominantly affect the poor and vulnerable, in particular in low- and middle-income countries[56]. Although age-standardized rates of heart disease and stroke mortality have dramatically dropped in regions with high socio-demographic indicators in the past 25 years, only a gradual decrease or no change has been observed at all in most other regions.

Significant reductions in atherosclerotic vascular disease mortality, an important success for public health, seem to have come to a halt in many regions of the world, despite impressive advances in technical capacity for preventing and treating heart disease and stroke[57]. Similar concerns prevail for other associated conditions.

In 2016, the global burden of CVD, diabetes and kidney disease, expressed in disability-adjusted life years, amounted to almost half a billion years (445,386,944.5)! World-wide, CVD, diabetes, kidney disease, hypertension and obesity amounted to 665,913,553 years of life lost in 2016[55].

Change in CVD Disability-Adjusted Life Years (DALYs), 2000-2016, Global Percent change in CVD DALYs per 100,000 persons between 2000 and 2016

Prevalence, deaths, Disability-Adjusted Life Years (DALYs)[e 58], and Years of Life Lost (YLLs) in 2016[59]

	Prevalence	Deaths	DALYs	YLLS
CVD (incl. stroke)	470,811,346	17,646,585	353,120,871	319,638,664
Stroke alone	80, 065, 452	5,528,232	116,445,136	101,992,787
DM	383,453,015	1,437,706	57,233,688	28,650,003
Impaired kidney function/CKD	752.7 million[52]	2,554,212	60,482,176	49,696,955
Obesity	432,822,019	4,525,095.23	135,381,335	100,463,112
Raised blood pressure SBP ≥110-115 mm H	3,466,261,000[53]	10,455,860	212,105,088	190,901,236

COSTS OF CIRCULATORY DISEASE

In 2015, the global cost of CVD was estimated at US$ 957 billion. This cost is likely to reach US$ 1,044 billion in 2030 – an increase of 22 percent. About 55 percent of the global cost of CVD is due to direct healthcare costs and the remaining 45 percent to productivity loss from disability or premature death, or time loss from work because of illness or the need to seek care[62,63].

$956 BILLION

Global costs attributable to CVD and CVD incidence (in 1000s), selected years: 2010-2030[64]

Year	Total cost (billions of US$)	CHF Incidence	IHD Incidence	Stroke Incidence
2010	863	10,072	24,167	28,299
2015	906	10,821	25,933	30,370
2020	957	11,830	28,284	33,122
2025	1,002	12,754	30,369	35,571
2030	1,004	13,637	32,339	37,886
Total all years, 2010-2030	**20,032**			

In addition, CVD-related care also represent large proportions of the health expenditure related to other diseases. For example, 25 percent of diabetes inpatient costs are a result of cardiovascular complications. At the same time, diabetes is responsible for more than 25 percent of all heart disease and stroke expenditure[66]. In 2015, 1 in 5 Medicare dollars in the United States of America (USA) were spent on patients with chronic kidney disease[67]. In the UK, annual costs due to kidney disease alone amount to approximately £1.44 billion[68].

$ 1,044 BILLION

Heart disease, stroke and related conditions easily can lead to poverty, especially in countries where out-of-pocket expenditure is high. It means that, for some parts of the population, treatment becomes unaffordable. For example, the cost of combined therapy for secondary prevention in patients with established CVD was found to equal 18 days' wages in some low-income countries[f,65].

18 DAYS V

[f]Secondary prevention: aspirin, betablocker, angiotensin-converting enzyme inhibitor and statin.

PART 3_Living with circulatory diseases

COMMUNITY VOICES

KEVIN

[g] **Kevin's life is not as exciting as it should be when you're 17 years old.** He lives with his parents in a small flat in a crowded urban area. His weekly routine consists of a bowl of cereals for breakfast and entire days spent at school. At lunchtime, Kevin and his friends grab a soda, a slice of pizza, a hotdog or a burrito, because "It's cheaper and tastier than the daily 'balanced' menu they serve there". Before going back to class, they usually sneak out and smoke a couple of cigarettes. After school, the same routine applies: a cigarette and then the bus drive home, where he usually does some homework and then plays online with friends, drinking massive amounts of soda. Kevin used to play basketball down the block, but the last green patch in the neighbourhood was replaced by a huge office building. What does this daily routine mean for his health? Kevin knows that he is slightly overweight, but believes himself to be otherwise healthy. He is still young, so he is not worried about the effects of too much comfort food, smoking and lack of exercise on his body.

IMPACT ON CIRCULATORY HEALTH:

Unhealthy eating habits, smoking, lack of exercise and overweight put Kevin's organs under stress. It is only a matter of time before one of them (the weakest one) gives way. If Kevin continues on this path, hypertension, diabetes or kidney disease are looming. So are heart disease or stroke.

WHAT COULD HELP HIM?

Kevin is still in his early years. Yet, if nothing is done, he will not become a healthy young adult. **His direct healthcare costs will be significant**, and so will indirect costs translated in lack of energy, sickness and loss of productivity. **The following interventions could make a difference for Kevin:**

- A healthy and balanced school nutrition programme, without sweet beverages;
- A ban on tobacco advertising and sales to minors;
- An infrastructure that fosters physical activity, such as a cycling lane that brings him safely to school, and outdoor sports facilities in his neighbourhood;
- A systematic school screening programme (body mass index, blood pressure, smoking and other lifestyle habits, diabetes screening);
- A free counselling programme (for tobacco cessation, weight reduction).

[g] This case does not represent a specific individual but illustrates a common disease trajectory and any resemblance to a specific individual is purely coincidental.

MARIA

[h]**Maria's life is a marathon: between working full time, taking care of her house and raising three teenagers, she never seems to have a minute for herself.** To make things worse, in the past year she has been sleeping poorly, feeling constantly tired, suffering from frequent headaches, and craving food and drinks. Maria put it all on her hectic life as a single, working mum.

Recently, however, she told a friend about her constant fatigue, and was advised to visit a doctor. Maria hesitated, because going to the doctor is expensive for a struggling single mother, but was finally left with no choice.

Apart from being overweight, Maria was diagnosed with hypertension and type II diabetes and told that her kidney function was impaired, which might have been caused by her undiagnosed raised blood pressure and diabetes. She is now under medication and has to drastically change her lifestyle. Otherwise, the doctor warned that she would be a great candidate for heart disease and stroke.

IMPACT ON CIRCULATORY HEALTH:

Maria lives a hectic life and does not have much time to look after herself. Because most circulatory diseases are, at first, silent, she was asymptomatic and did not seek medical guidance. Maria has therefore been suffering from hypertension, diabetes and impaired kidney function for months or even years without being aware that her body was struggling. As a result, she is now a high-risk candidate for heart disease and stroke and will need to drastically change her lifestyle in order to maintain her quality of life and to prevent any aggravation of her circulatory diseases.

WHAT COULD HELP HER?

Maria is a very busy and active woman. However, because she delayed seeking medical guidance, she allowed her condition to worsen. The direct costs of her treatment will now be significant. There is hope, however. By strictly adhering to her treatment, Maria will be able to limit indirect costs and continue her life and work as before. **The following interventions could make a difference for Maria:**

- A free community-based screening programme (body mass index, blood pressure, diabetes screening, urine test for proteinuria screening, smoking and other lifestyle habits);
- UHC that includes screening and management of circulatory diseases;
- A free individual counselling programme to help her change her dietary habits and to quit smoking;
- Free or affordable access to medicines that will allow her to maintain her medical condition.

[h]This case does not represent a specific individual but illustrates a common disease trajectory and any resemblance to a specific individual is purely coincidental.

LETLHOGONOLO

Letlhogonolo was in her teens when she suffered a stroke during a school for a choir workshop. She did not experience any of the usual symptoms, such as face drooping, arm weakness or speech difficulties. Instead, she was about to start warming up with her friends when she suddenly started feeling strange. She ran out of the room and sat, but shortly afterwards found herself lying on the floor, with her eyes closed. Letlhogonolo heard her friends calling her mother. One of them was crying. She was brought to hospital, but a lot of time was wasted travelling to different hospitals because only one had the necessary equipment. Through it all, Letlhogonolo hoped that she would soon be discharged from hospital, where she was undergoing rehabilitation, and get back to school to finish her final year of high school. She did not think it would take years to recover from her stroke. The reality was much bleaker, though. Letlhogonolo's first three years of rehabilitation were tough: she kept struggling with what happened and thinking of her friends progressing with their education. Having a stroke at such a young age made things more difficult to understand. *"When you have plans with your friends for your future, and when you see that your dream becomes impossible, it hurts… a pain you wouldn't wish upon anyone. Without such great support from family and friends, life would have been harder and acceptance almost impossible. I probably would've taken longer to get to where I currently am in my journey to recovery. Nobody should go through this alone,"* says Letlhogonolo[i].

[i] Testimony provided by and adapted from the World Stroke Organisation.

NICK

Nick was just 39 when, just after New Year's Eve, he had to take sick leave from work. He had previously been feeling lethargic, which had only got worse over the festive period, and had been having difficulty walking up the hill to his office in Manchester. Although he had no appetite, Nick was also putting on weight. At a first visit to the general practitioner (GP), he was prescribed cough syrup. When that had no effect, a second appointment resulted in a diagnosis of chest infection and a prescription of antibiotics.

Yet his symptoms worsened to the extent that he could not walk five yards. Blood tests revealed a possible liver or kidney infection. He was feeling so unwell that he was finally admitted to hospital. Almost one week later, a doctor finally said 'It's your heart'. He was then diagnosed with heart failure.

Before, Nick was relatively fit and active, and ate a healthy diet. He had never been admitted to hospital and didn't even have a GP! When he was given the heart failure diagnosis, he felt like he had been hit by a boxer; his life felt as though it had fallen apart. *"A good analogy is: before I was diagnosed my life was a jigsaw, nearly complete. After diagnosis, it is a mess of pieces. So self-management is all about finding those corners and colour combinations,"* says Nick.

Approximately five months after he was diagnosed, he decided to set up a support organisation for people diagnosed with heart failure. This is because, while Nick received great support and advice from health professionals, he was lacking to some extent the personal patient touch. The Pumping Marvellous Foundation, the organization Nick founded, was meant to be a local patient support group but quickly grew into a national organisation which supports patients in the management of their condition and helps them to advocate for their rights[69].

JAMES

[j] **James is a 46 year-old man from rural Canada.** He developed type 1 diabetes at age 12 and since then has had to take daily measurements of his blood sugar, monitor his diet and inject himself with insulin. During his teenage years and early adulthood, James was too busy with his friends and with his construction business to worry too much about his diabetes.

He also smoked a pack of cigarettes per day. The family doctor was in a town 1.5 hours away and James did not go for health follow-ups frequently. Poor roads in the winter made access to healthcare even more challenging. In addition, James felt fine and thought his family doctor was exaggerating the risks that diabetes posed.

James developed high blood pressure in his mid-20s. By his early 30s, he developed kidney failure. He was initially treated with dialysis and then was fortunate to get a kidney transplant. The transplanted kidney lasted for more than 10 years but eventually failed, forcing James to go back on haemodialysis.

Dialysis is time consuming and means he can no longer work. After a year on dialysis, James developed a foot infection after getting a blister from a new pair of shoes and required an amputation of his lower leg. True to form, he soon learned to walk with a prosthesis and regained his independence.

He has subsequently required a cardiac bypass after noticing worsening shortness of breath when climbing stairs and is awaiting a second kidney transplant for a new chance at life.

The following interventions could make a difference for James:

- Community and family engagement and support, especially for adolescents for whom adherence tends to be challenging;
- Early detection and management of diabetic kidney disease through urine protein screening, control of blood pressure, use of angiotensin-converting enzyme inhibitors;
- Access to frequent health follow-up;
- Tobacco control programmes;
- Promotion of deceased donation for transplantation.

[j] This case does not represent a specific individual but illustrates a common disease trajectory and any resemblance to a specific individual is purely coincidental.

4. SUCCESS STORIES

Public health interventions can be implemented at several levels, with varying degrees of impact. They range from taking action at the population level to targeting individuals.

The following case studies present a series of public health interventions that have made a positive contribution to the prevention and control of circulatory diseases in different settings. They are meant to illustrate the wide spectrum of positive initiatives around the world rather than be an exhaustive list.

SUCCESS STORY : 1

THE EXCISE TAX REFORM IN THE PHILIPPINES

CHALLENGE

Up until 2012, cigarette prices in the Philippines were very low. Falling real taxes and growing incomes meant that tobacco and alcohol products were widely accessible and affordable. In addition, the multi-tier excise regime was complicated and created perverse incentives. The system needed to be simplified and modernised.

RESPONSE

The Philippines' excise tax reform was conceived to simplify and increase tobacco and alcohol excise taxes. Simultaneously, increases in revenue were earmarked to fund universal health care.

Enacted in December 2012, the reform raised and simplified tobacco and alcohol excises, with increased government revenues and reduced smoking. Within one year, excise tax collections from tobacco and alcohol products increased by approximately US$ 2.44 billion, i.e., an 86 percent increase compared to the pre-reform years.

OUTCOMES

The reform scaled up financing for health care, nearly doubling the Department of Health's budget. It funded the extension of fully subsidized health insurance to the poorest 40 percent of the population. From 2013 to 2015, the number of poor and near-poor families enrolled expanded from 5.2 million to 15.3 million, almost tripling the coverage of the poor and near-poor. Excise tax revenues were also subsequently used to subsidize the insurance coverage of senior citizens, further expanding access to care among the most vulnerable.

Retail prices for cigarettes increased significantly because of the reform, prompting consumers to cut down and even stop smoking. Increased taxation has led to a significant decrease in smoking prevalence among adults, from 29.7 percent in 2009 to 23.8 percent in 2015 (from 49.5 percent to 41.9 percent among men; from 10.1 percent to 5.8 percent among women). This represents a 19.9 percent relative decline of the tobacco use prevalence[70,71] .

The 2012 Philippines Excise Tax Law (ETL) brought about long-overdue reforms to tobacco and alcohol taxation to promote better health. This reform exemplifies how the Philippines made a tangible difference in the lives of millions of Filipino citizens.

Country:	Philippines
Initiator:	Government
Instrument:	Fiscal policy

> *"Many thought it was impossible to pass the Excise Tax Reform Bill: the enemy is strong, loud, organized, and has deep pockets. But, as we have proven time and again, nothing is impossible with the Filipino nation rowing in one direction, heart in the right place, and ready to stand up for its principles."*
>
> **President Benigno Aquino**

SUCCESS STORY : 2

PRIMARY CARE PREVENTION OF HEART DISEASE AND STROKE IN THE SEYCHELLES

CHALLENGE

An epidemiological study conducted in the 1980s in the Seychelles revealed worrying results: the rates of cerebrovascular diseases were higher than in most European countries and the medium rates of ischaemic heart disease were similar to those in southern European countries, especially in young and middle-aged men. The prevalence of hypertension and diabetes was also high in the adult population, and a substantial proportion of children were overweight. The high burden of heart disease and stroke in the Seychelles was also associated with rapid lifestyle changes, such as increased consumption of saturated fatty foods, increased intake of salt and calories, and growing prevalence of smoking and sedentary lifestyles.

RESPONSE

A national programme on the prevention of heart disease and stroke was initiated in 1991 under the umbrella of the Unit for the Prevention and Control of Cardiovascular Disease (UPCCD) of the Ministry of Health, in collaboration with the University Institute of Preventive Medicine of Lausanne, Switzerland.

The programme was community-based and involved non-physician healthcare workers. In an attempt to prevent and control premature morbidity from heart disease and stroke, diabetes and smoking, it aimed at promoting healthy lifestyles and controlling risk factors.

The main features of this heart disease and stroke prevention programme included:

- Awareness-raising campaigns through the use of media, especially radio and television;
- Screening of risk factors in schools within routine school medical visits for children aged 5, 9, 12 and 15;
- Organising health education activities in the frame of the World No Tobacco Day, Diabetes Day and Heart Day programmes.

In a second phase, the Seychelles heart disease and stroke prevention programme was scaled up to include not only health-promotion activities, but also interventions targeting high-risk individuals such as:

- Risk-factor screening in public places and work sites, including follow-up visits for suspected cases of hypertension, diabetes and dyslipidaemia.
- Setting-up community-based health clubs for high-risk individuals in primary healthcare centres or in district community centres, to build the skills needed for the adoption of a healthy lifestyle, such as healthy cooking, and to increase adherence to treatment;

Country:	Seychelles
Initiator:	Government
Instrument:	Primary care prevention

- Establishing a national register for hypertension and diabetes, which recorded blood pressure, body mass index, total cholesterol, HDL cholesterol, glucose levels, smoking, previous stroke and myocardial infarction and fed back information to health centres. For example, the lists of diabetic patients were sent to ophthalmology departments to promote screening and treatment of eye diseases.

OUTCOMES

More than 90 percent of adults aged 35–65 years have good knowledge of heart disease and stroke and are aware of the main activities offered within the prevention programme. The prevalence of smoking decreased, and the prevention programme contributed to attenuate increases in blood pressure and cholesterol levels in the population.

In addition, the involvement of community members generated a broad coalition among the public, authorities and other organisations that will be used to develop new health interventions and policies[72,73].

SUCCESS STORY : 3

NURSING STEPPING UP TO CURB NCDS IN TONGA

CHALLENGE

NCDs accounted for 75 per cent of all deaths in Tonga in 2008. According to the Minister of Health, 99 percent of the Tongan adult population is at medium to high risk of developing a NCD.

RESPONSE

The focus on NCDs in Tonga began in 2003 with the development of a comprehensive NCD strategy (2004–2009). From the inception of the programme, nurses were seen as having a central role to play. The next NCDs strategy (2010–2015) focused on improving data collection and implementation.

Several years earlier, reproductive health nurses had been specifically educated and stationed in each community health centre, resulting in a significant reduction in maternal and infant mortality, morbidity and rise in immunisation rates. It was felt that this community–based, nursing–led model might also work with NCDs if a role could be introduced which would combine health promotion, early detection, illness prevention, treatment adherence, rehabilitation and palliation.

A pilot was set up in 2012 in five community centres which quickly confirmed the efficacy and acceptance of this programme. Funding was sought for rolling the NCD nurse programme out to 20 community centres and selected community nurses were specifically trained.

OUTCOMES

This nurse–led initiative has already enhanced the accuracy of data collection on NCDs; improved diabetes and cardiovascular disease monitoring and treatment; enhanced community participation in exercise and nutrition programmes; and reduced the need for amputations[74].

Country:	Tonga
Initiator:	Government
Instrument:	Community-based NCD nurses

PART 4_Success stories

SUCCESS STORY : 4

SMART HEALTH FOR BETTER CARDIOVASCULAR HEALTH IN INDIA

CHALLENGE

Rural India is home to 750 million people living in 650,000 villages. Most premature deaths in adults are due to chronic conditions, such as heart disease and stroke. The doctor to patient ratio in rural India is 10 times greater than that for India as a whole. As a result, most people with chronic conditions have little or no access to simple, affordable preventive treatments. Efforts are therefore necessary to diagnose individuals at high risk of heart disease and stroke and offer treatments to lower that risk.

RESPONSE

SMART Health (Systematic Appraisal Referral and Treatment system) has been developed by the George Institute of Public Health researchers in India, Australia and the UK to strengthen the capacity of primary care physicians and community health workers. The intervention employed a mobile device-based, clinical decision, support system that uses a guideline-based screening and management algorithm aimed at improving blood pressure control in high risk individuals.

In short, community health workers screen individuals in the community using the SMART Health application which has been previously loaded on a tablet device. The information collected is then uploaded via a 2G or 3G network to a secure, cloud-based, open-source electronic medical record system. Community health workers can then make electronic referrals to primary care physicians.

Physicians can share their diagnosis and management plan with community health workers through their devices. In addition, the system can also disseminate text or voice messages to promote healthy behaviours and treatment adherence, which helps overcome illiteracy/language barriers.

OUTCOMES

The use of technology has helped overcome system level barriers such as workforce shortage via task-shifting.

The availability of a uniform, evidence-based clinical decision support mechanism, electronic medical records and a reliable community-based disease registry have contributed to improvements in quality assurance.

The tool was easy to integrate into the workflow of healthcare workers, making it a feasible and acceptable mobile technology. The clinical impact of the mHealth platform is currently being evaluated based on over 16,000 individuals at high risk of heart disease and stroke who have been screened[75,76].

Country:	India
Initiator:	George Institute for Global Health
Instrument:	Mobile technology

SUCCESS STORY : 5

REDUCED MORTALITY THROUGH SYSTEMATIC SCREENING AND TREATMENT[77]

CHALLENGE

Australian Aborigines in remote areas have high rates of all-cause mortality, of cardiovascular deaths and of end-stage kidney failure. People living in the Tiwi Islands were particularly exposed. In the 1990s, the Tiwi community had a three- to five-fold increase in death rates and an annual incidence of treated end-stage kidney disease (ESKD) of 2,760 per million. 25 percent of natural deaths in Tiwi adults were renal deaths, 42 percent had a primary or underlying cardiovascular cause, and 43 percent were of neither renal nor cardiovascular cause. Costs for treating ESKD in particular were spiraling out of control.

RESPONSE

In order to halt this negative spiral, a formal programme was introduced to alter renal and cardiovascular disease outcomes. A systematic screening and treatment programme was introduced for adults with confirmed hypertension, diabetics with microalbuminuria or overt albuminuria, and people with overt albuminuria, regardless of blood pressure and diabetes. Aside from a health education component, the programme mostly focused on providing adequate treatment to all adults affected. Treatment focused on the use of angiotensin-converting enzyme inhibitors with other medications as needed to reach defined blood pressure goals and attempts at control of glucose and lipid levels.

OUTCOMES

The introduction of a systematic screening and treatment programme led to an estimated 50 percent reduction in the rate of natural deaths and 57 percent reduction in the rate of renal failure.

Increased awareness, improved health education and better metabolic management all contributed to the success of the programme. However, what made the programme successful was the provision of adequate medication for renal and cardiovascular protection. The fall in blood pressures, the reduced progression of albumin-to-creatinine ratio and the reduction in the loss of GFR led to a reduction in renal and all-cause natural deaths.

In addition, looking at the avoidance of dialysis alone, millions of dollars were saved. More generally, the reduction in premature death is the greater benefit. This chronic disease programme was shown to be highly effective in such a high-risk community, leading to a significant reduction in all-cause mortality and in considerable savings due to the avoidance of costly treatments like dialysis.

Country:	Australia, Tiwi Islands
Initiator:	University of Queensland
Instrument:	Systematic screening and treatment

THE INTRODUCTION OF A SYSTEMATIC SCREENING AND TREATMENT PROGRAMME LED TO AN ESTIMATED 50 PERCENT REDUCTION IN THE RATE OF NATURAL DEATHS AND 57 PERCENT REDUCTION IN THE RATE OF RENAL FAILURE.

SUCCESS STORY : 6

TAXING SUGAR-SWEETENED BEVERAGES IN MEXICO [78, 79, 80]

CHALLENGE

In Mexico, one in three children and adolescents aged 2-18 is overweight. Among adults, the prevalence of overweight and obesity is higher than 70 percent. The prevalence of diabetes in Mexico is the highest among countries belonging to the Organization for Economic Co-operation and Development (OECD) and ischemic heart disease and diabetes are the two leading causes of mortality. Concomitant with the rise in obesity and diabetes are significant increases in the consumption of sugar-sweetened beverages (SBB) among Mexicans. In 2011, Mexico had the largest per capita (163 litres) consumption of soft drinks.

RESPONSE

In September 2013, as part of the federal budget, the Mexican congress passed an excise tax on sugar-sweetened beverages and a sales tax on several energy dense foods.

A specific excise tax of 1 peso/L (approximately a 10 percent price increase) on non-dairy and non-alcoholic beverages with added sugar and an ad valorem tax of 8 percent on a defined list of non-essential highly energy dense foods (containing ≥275 calories (1151kJ) per 100 g) came into effect on 1 January 2014. Agencies collect the excise tax on sugar-sweetened beverages from the manufacturers, and this tax is passed on to consumers at the point of sale.

OUTCOMES

Following the introduction of the tax on SSB, the price of sugary drinks increased by around 10 percent and consumption fell by around 6 percent. By December 2014, soda sales were down 12 percent from December 2013, and the drop was greatest among the poorest Mexicans.

While all socioeconomic groups bought fewer taxed beverages, households of low socioeconomic status decreased their beverage purchases by 17 percent by December 2014 compared with pre-tax trends. Over the same period, sales of bottled plain water increased by 4 percent.

A 2016-modelling study projected that a reduction of 10 percent in the consumption of sugar-sweetened beverages among adults in Mexico would prevent 189,000 cases of type 2 diabetes, 20,400 incidents of stroke and myocardial infarctions, and 18,900 deaths between 2013 and 2022[81]. Encouragingly, the study estimated the biggest health gains from the SSB tax in young adults aged 35 to 44 years old.

Similar trends were observed in other countries which also introduced excise taxes:

- In France, a 6.7 percent decline in demand for regular cola was observed in the first two years after the SSB tax was introduced.
- In low-income neighbourhoods in Berkeley, USA, sugary drink consumption declined by 21 percent after an SSB tax was introduced. Conversely, sales of untaxed beverages rose.

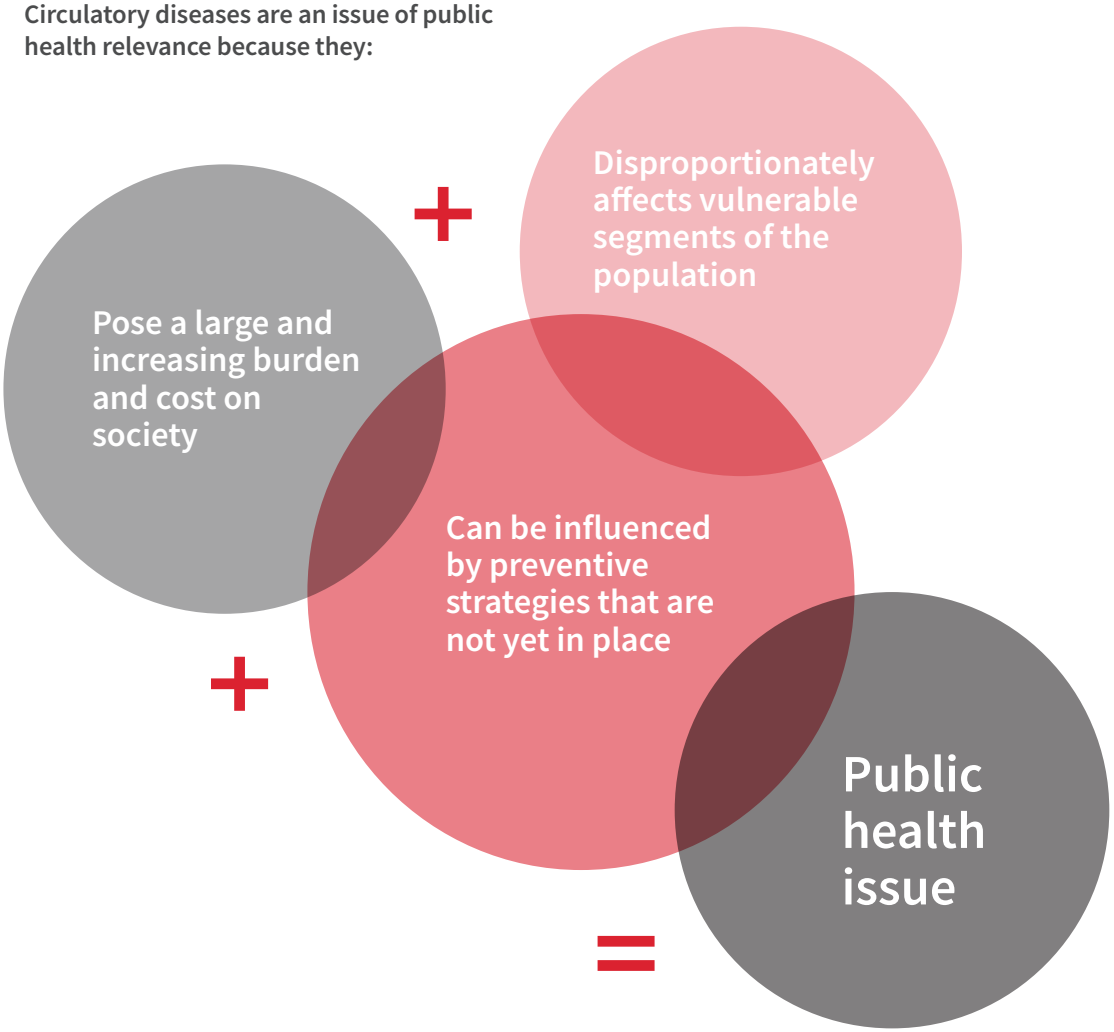
FOR MORE SUCCESS STORIES CLICK HERE

Country:	Mexico
Initiator:	Government
Instrument:	Tax on sugar-sweetened beverages

TAKING ACTION

5. WHY ARE HEART DISEASE & STROKE A PUBLIC HEALTH ISSUE?

Circulatory diseases are an issue of public health relevance because they:



TAKING ACTION

Heart disease, stroke, diabetes, hypertension, kidney disease, and other NCDs share a range of modifiable risk factors. Policies that include comprehensive and inclusive strategies to reduce the risk of NCDs and create environments that are conducive to healthy habits are needed. In addition, health systems must be shaped in a way that allows early detection and management of heart disease, stroke and related NCDs. Promoting and maintaining good circulatory health necessitates a combination of both prevention and treatment approaches.

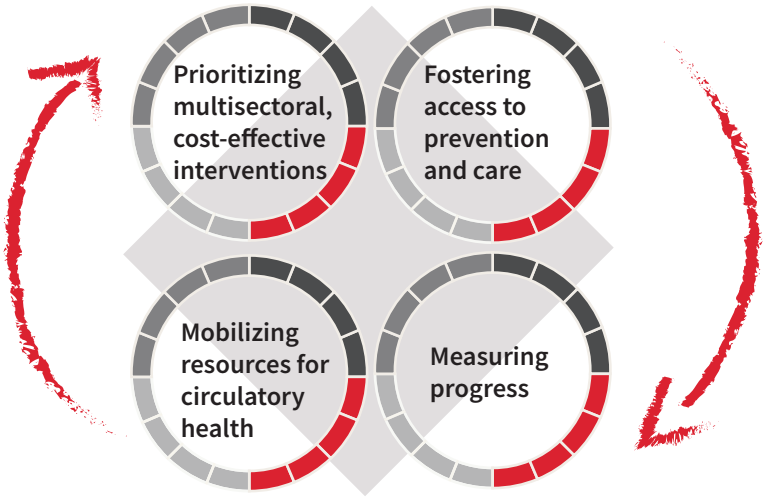
In 2015, the United Nations Member States have adopted the Sustainable Development Goals (SDGs) for 2030. Those include several targets that are related to NCDs, and hence to circulatory health. Specifically, Goal 3 "Good Health and Well-being" include several targets that are closely linked with NCDs and circulatory health. Beyond Goal 3, circulatory diseases are affected by, and can contribute to, each and every SDG.

The recommendations below rely on four main pillars. Together, they aim to drive action to achieve the health-related SDG objectives. Based on these four top-line fields of action, the Global Coalition has identified selected strong recommendations which governments are called upon to implement as a priority.

These recommendations:

- Are grounded in evidence with regard to their effectiveness and cost-effectiveness;
- Are globally relevant, taking into account that regional or national differences may exist;
- Reinforce recommendations that stem from the Third High-level Meeting on NCDs, but also look beyond the UN HLM to drive action on circulatory health for the years to come;
- Can be acted upon by members of the Global Coalition for Circulatory Health and their global, regional and national networks;

Each recommendation is accompanied by a range of actions which the Global Coalition and its members can undertake to support governmental authorities and intergovernmental agencies in their implementation efforts.



SUSTAINABLE DEVELOPMENT GOALS

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.

3A Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate.

3B Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines.

3C Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States.

3D Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

PILLAR 1: PRIORITIZING MULTISECTORAL, COST-EFFECTIVE INTERVENTIONS

Circulatory diseases can largely be prevented and managed through effective and efficient prevention and early detection mechanisms. Priority actions should therefore focus on fostering circulatory disease prevention and early detection as well as on promoting affordable medications for the prevention and treatment of heart attacks, strokes, hypertension, diabetes and kidney disease.

The Global Coalition therefore urges governments to shape policies that ensure an environment that is conducive to healthy living. Governments can do so through legislative action, policies and programmes that encompass tobacco, alcohol and unhealthy foods, that promote clean air and a built environment which fosters safe physical activity.

In the field of primary prevention, the Global Coalition considers that the following actions should be prioritized:

- Fully implement the WHO Framework Convention on Tobacco Control (FCTC). Actions include raising tobacco taxes, comprehensive bans on tobacco advertising and sponsorship, placing large health warnings on packaging and legislating for smoke-free environments;
- Combat obesity, with a particular focus on implementing recommendations from the WHO Ending Childhood Obesity (ECHO) report;
- Introduce taxation on unhealthy products;
- Support food reformulation efforts, in particular with regard to reducing sodium and eliminating artificial trans-fat.

With regard to secondary prevention, the Global Coalition strongly supports the following actions:

- Prioritise the WHO best-buy of providing counselling and multi-drug therapy (including glycaemic control for diabetes mellitus and control of hypertension using a total risk approach) for people with a high risk of developing heart attacks and strokes (including those with established CVD[82]).
- Advance the implementation of the HEARTS package, which provides a comprehensive approach to improving circulatory health in primary health care settings using an integrated approach to the management of NCDs that promises to reduce deaths from hypertensive disorders such as heart disease, stroke, kidney disease and others.
- Treat all patients with hypertension and high-risk patients with statins and aspirin.
- Acknowledge the importance of integrated management of CVD and associated NCDs to improve access to care and efficiency, as well the need to reinforce integration with existing communicable disease programmes (e.g. HIV, Tuberculosis).

[k]The Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP1; OP2; OP3; OP4; OP5; OP6; OP7; OP15; OP16; OP18; OP20; OP23; OP26; OP28.

[k] The recommendations and clauses refer to the draft Political Declaration released in August 2018.

PILLAR 2: FOSTERING ACCESS TO THE PREVENTION AND CARE OF CIRCULATORY DISEASES

To live full and healthy lives, people at-risk of or living with circulatory diseases need strong health systems that are designed to deliver universal health coverage and to ensure access to prevention, screening, and care for all. But strengthening health systems in not enough in the absence of financial protection, good nutrition, education, and affordable transportation to healthcare, to name just a few.

Putting all these in place requires an innovative, multi-sectoral approach which turns every minister — be it in Finance, Agriculture, Education or Transportation — into a health minister. An effective health-in-all policy approach extends beyond the walls of governments into collaborations with external organizations, from carefully selected private sector partners to civil society and community-based organizations.

Therefore, the Global Coalition recommends that governments initiate and sustain collaborations between all of their relevant departments, as well as work together with civil society and the private sector to address the social determinants of health. One key area is that of Access to Medicines.

This is why the Global Coalition **strongly supports** the recommendation that governments and private sector entities should **ensure access to affordable, quality-assured essential medicines.**

Priority actions therefore include:

- Improving access to proven drugs, including low-cost combination pills, as part of a package of essential treatment and services to control heart disease and stroke. **Specifically, aspirin, clopidogrel, ACE inhibitors, angiotensin receptor antagonists, beta-blockers, calcium channel antagonists, diuretics, statins and a basic range of short and long-acting insulins and oral anti-diabetics must be generally available and affordable;**
- Fostering access to relevant technology, notably by increasing the availability of basic and evidence-supported diagnostic tools, such as blood pressure measurement, basic blood laboratory tests, urine protein testing, ECG, cardiac and arterial/carotid ultrasound, brain-CT;
- Fostering the implementation of innovative information systems, such as mobile-health technologies and telehealth programmes.

As an entity which represents millions of healthcare workers, the Global Coalition emphasizes that access to essential medicines also means that medicines are prescribed by adequately trained staff. Therefore, specific attention should be given to optimizing the health workforce and enabling health workers to work to their full scope of practice, i.e., in the areas where they are educated, authorized and competent to perform.

Recommended actions include:

- Reinforcing education and training programmes to build the national capacity of health professionals and non-physician health workers in circulatory health and disease prevention;
- Strengthening and stressing the fundamental role of primary health care in circulatory health at all levels, from self-care to palliative care to ensure continuity over time;
- Strengthening the contribution of interdisciplinary primary care and task sharing with non-physician and community-based health workers;
- Developing locally applicable practical guidelines for both specialist and non-specialist health professionals. In addition, clinical support systems can be used to improve drug prescriptions and promote cost-effective treatment;
- Building local research capacity to determine local health burdens, risk factors and provide data for regional and local prioritization of services.

The Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP1; OP2; OP14; OP19; OP20; OP22; OP24; OP25.

PILLAR 3:

MOBILIZING RESOURCES FOR CIRCULATORY HEALTH

INVESTING

$1.27

per person per year in low- and middle-income countries until 2030 can save an estimated

8.2 million

lives

Once every minister starts thinking like a health minister, the financial argument becomes clear: investing in the fight against circulatory diseases and associated conditions is paramount for a healthy and productive population. For one, it is strikingly affordable: investing US$ 1.27 per person per year in low- and middle-income countries until 2030 can save an estimated 8.2 million lives, decrease premature mortality from NCDs by 15 percent, and yield a return on investment of at least US$ 7 [83].

And it also helps:[84,85,86.]

- Save US$ 47 trillion, the estimated lost gross domestic product globally attributed to underfunding programmes to prevent and manage NCDs between 2011 and 2025, of which 50 percent is attributable to CVD;
- Prevent catastrophic health expenditure for low-income patients suffering from CVD and stroke. For example, in Tanzania and China, investing in the fight against CVD could prevent catastrophic health expenditure among 92 and 72 percent of patients respectively.
- Keep 100 million people a year from falling into extreme poverty because of unaffordable health costs;
- Avoid loss of employment and productivity, measured in gross domestic product, household income and number of working days.

The Global Coalition strongly encourages governments and intergovernmental agencies to mobilise sufficient resources to combat NCDs, and circulatory diseases in particular.

- Specifically, the Global Coalition **strongly supports** the **taxation of unhealthy products** such as alcohol, tobacco, unhealthy foods and non-alcoholic beverages (such as sugar-sweetened beverages), and encourages the use of these revenues for advancing the prevention and control of circulatory diseases.

The evidence in support of taxation and redistribution of revenues in overwhelming, as the success of the excise tax reform in the Philippines, the sugar tax in Mexico or the tobacco tax in the Gulf countries and in South Africa have demonstrated. When designed and implemented effectively, taxation programmes reduce consumption of unhealthy products and allow governments to expand national insurance programmes and enhance financial protection for the most vulnerable [87].

Evidence from China and Thailand suggests that, in doing so, taxation programmes benefit low-income consumers [88].

- Further, the Global Coalition for Circulatory Health encourages the development of innovative financing mechanisms to ensure that sufficient funds are available to achieve objectives. One such example is the creation of a multi-donor fund for non-communicable diseases and mental health, consisting of WHO, the World Bank, the United Nations Development Programme (UNDP), the United Nations Children's Fund (UNICEF) and the United Nations Populations Fund (UNFPA), which would "seek to scale-up support to LMICs in their efforts to meet SDG 3.4"[89].
- Lastly, the Global Coalition encourages each country to mobilise sufficient resources at national level, in particular by enforcing adequate taxation policies and by entering into carefully selected public-private collaborations.

The Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP3; OP5; OP8; OP30.

SAVE

$47 trillion

estimated lost product globally due to underfunding programmes to prevent and manage NCDs

PILLAR 4: MEASURING AND TRACKING PROGRESS

Measuring and tracking progress are essential elements in order to shape priorities, adapt strategies, programmes and projects, identify what works and what doesn't, justify the allocation of resources, among others. This is why the Global Coalition for Circulatory Health strongly supports the introduction of instruments which reinforce accountability mechanisms to track progress on NCDs in general, and on circulatory diseases in particular, in a clear, timely and transparent fashion.

The Coalition strongly supports:

- **The implementation of reliable, simple, and fit-for-purpose surveillance systems for monitoring the burden of circulatory diseases, prevalence of risk factors, and treatment of circulatory diseases at national and global levels**. At national level, these systems could leverage existing monitoring mechanisms for non-communicable diseases, such as population-based registries. Globally, accountability systems for NCDs in general and circulatory diseases in particular could be modelled on the *Countdown to 2030 for Women's, Children's and Adolescents' Health*, a multi-sector initiative that tracks progress and drives action to achieve the SDG targets for ending preventable maternal, new born, and child mortality.
- The development of **reliable health information systems** to monitor health behaviours, risk factors, and morbidity and mortality;
- The implementation of the WHO Global Monitoring Framework;
- An agreement among governments and intergovernmental agencies upon international standards.

The Recommendations refer to the following clauses in the Political Declaration of the Third United Nations High-Level Meeting on Non-Communicable Diseases: OP10; OP11; OP29; OP32.

THE GLOBAL COALITION FOR CIRCULATORY HEALTH COMMITS TO:

PILLAR 1

Prioritizing cost-effective interventions

- Action our network of members and partners to advocate for the implementation of these recommendations at global, regional and national levels.
- Support staff education and training through its wide network of members and partners.
- Foster and support optimal health workforce utilization.
- Collect and disseminate education materials, best practices and success stories across disciplines and regions.
- Contribute to raising awareness through international disease days and other impactful events.

PILLAR 2

Fostering access to prevention and care for circulatory diseases

- Action our networks of members and partners to advocate for the improved availability and affordability of essential circulatory disease medicines at global, regional and national levels.
- Advocate for a prioritization of circulatory diseases in Universal Health Coverage plans.
- Support the education and training of healthcare workers to foster optimal prescription of essential medicines and adherence to treatment.
- Seek collaborations with potential donors, to implement integrated programmes aimed at improving circulatory health.
- Collect and disseminate examples of best practices and success stories across disciplines and regions.

PILLAR 3

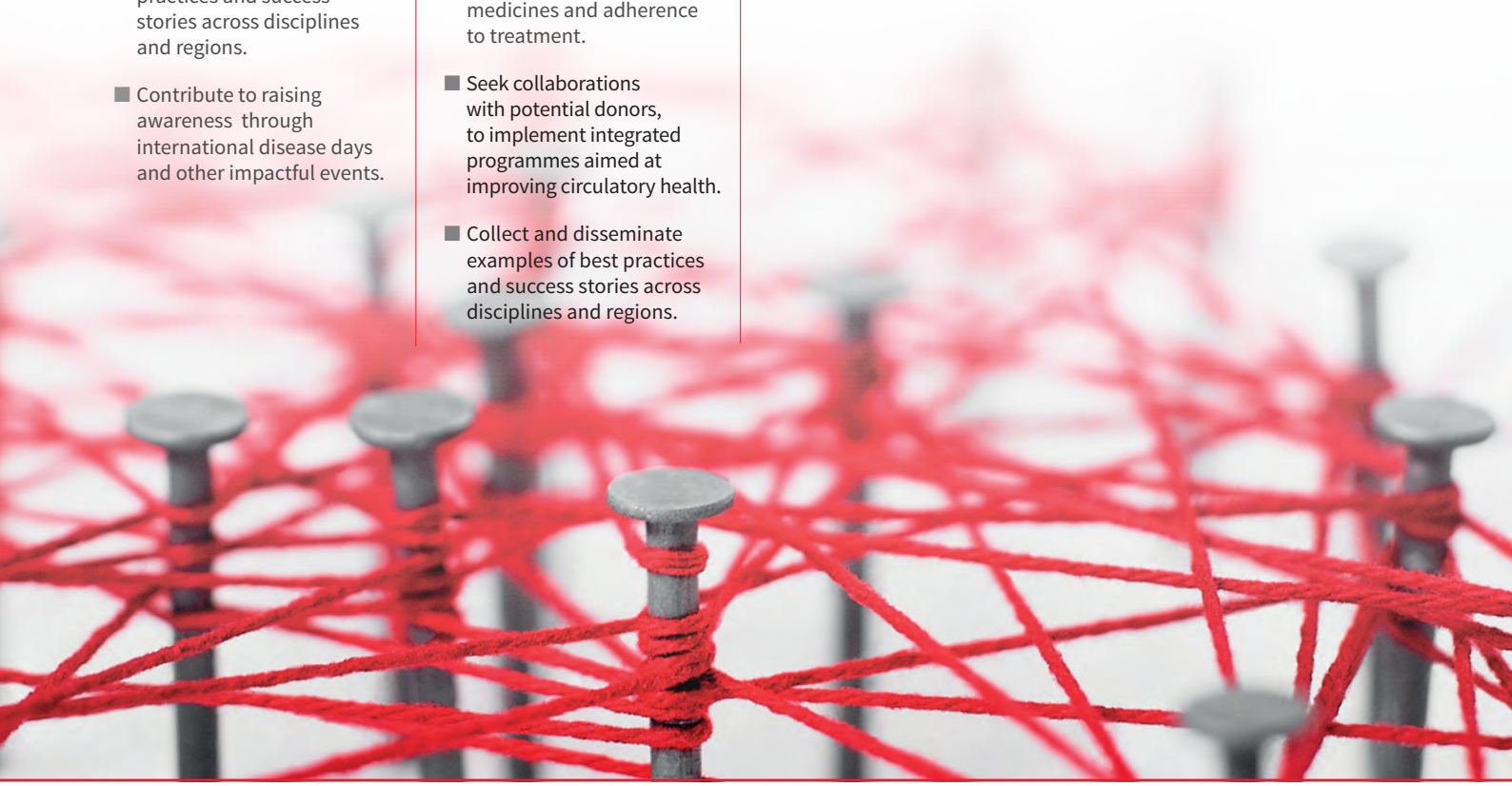
Mobilising resources for circulatory health

- Advocate for the taxation of unhealthy products (tobacco, alcohol, sugar) at global, regional and national levels through its network of members and partners.
- Collect and disseminate examples of best practices and success stories with regard to taxation issues and innovative financing mechanisms.

PILLAR 4

Measuring and tracking progress

- Advocate for the use of evidence-based approaches whenever data is collected, analysed and disseminated.
- Help collect, monitor and disseminate data to track progress of circulatory disease-related objectives through our wide networks of members and partners.
- Actively support a Countdown to 2030 for NCDs and contribute as deemed fit.



THE GLOBAL COALITION FOR CIRCULATORY HEALTH

The Leadership Group sets the strategy and workplan for the Coalition. It comprises partner organizations with an interest in heart disease and stroke, which also hold Official Relations Status with the World Health Organization.

The Leadership Group is currently made up of the following organizations:

Framework Convention Alliance for Tobacco Control
International Alliance of Patients' Organizations
International Council of Nurses
International Diabetes Federation
International Society of Nephrology
World Federation of Public Health Associations
World Heart Federation
World Hypertension League
World Organization of Family Doctors
World Stroke Organization

The following organizations are the current members of the Global Coalition:

Cuban Society of Cardiology
European Heart Network
European Primary Care Cardiovascular Society
FemSansCancer
Health Related Information Dissemination Amongst Youth (HRIDAY)
Heart Friends Around the World
Heart & Stroke Foundation of Canada
Instituto Nacional Cardiovascular Incor EsSalud
InterAmerican Heart Foundation
International Atherosclerosis Society
International Society of Hypertension
International Council of Cardiovascular Prevention and Rehabilitation
International Primary Care Cardiovascular Society
International Society of Behavioural Medicine (ISBM)
Iranian Heart Foundation
Nepal Development Society
Polish Lipid Association
Preventive Cardiovascular Nurses Association
Rural Clinical School, University of New South Wales
Shenyang First People's Hospital
South African Heart Association
Stroke Association Support Network-Ghana
Ukrainian Association of Cardiology

[1 10 15] Lackland DT, Roccella EJ, Deutsch AF, Fornage M, George MG, Howard G, et al. Lackland DT, Roccella EJ, Deutsch AF, Fornage M, George MG, Howard G, et al. Factors influencing the decline in stroke mortality: a statement from the American Heart Association/American Stroke Association. Stroke. 2014 Jun; 45(1):2.

[2 50] Campbell NRC, Lackland DT, Lisheng L, Zhang XH, Nilsson PM, Redburn KA, et al. The World Hypertension League challenges hypertension and cardiovascular organizations to develop strategic plans for the prevention and control of hypertension. J Clin Hypertens. 2015; 17(5):325.

[3 11] Lackland DT. Controlling hypertension to prevent target organ damage: perspectives from the World Hypertension League President. Ethnic Dis. 2016; 26(3):267–270.

[4 7 31] World Health Organisation. Factsheet on cardiovascular disease. Geneva, Switzerland: WHO; 2017. Available from: http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds).

[5 46 47 55 59] Institute for Health Metrics and Evaluation (IHME). Seattle, United States: IHME; 2017. GBD Results tool: Global Burden of Disease Collaborative Network. Global burden of disease study 2016 results. Available from: http://ghdx.healthdata.org/gbd-results-tool.

[8 24 25 27] International Diabetes Federation. Diabetes and cardiovascular disease. Brussels, Belgium: IDF; 2016. Available from: www.idf.org/cvd.

[12] Tonelli M, Muntner P, Lloyd A, Manns BJ, Klarenbach S, Pannu N, et al. Risk of coronary events in people with chronic kidney disease compared with those with diabetes: a population-level cohort study. Lancet. 2012 Sep 1; 380(9844):807–14.

[13] Ene-Iordache B, Perico N, Bikbov B, Carminati S, Remuzzi A, Perna A, et al. Chronic kidney disease and cardiovascular risk in six regions of the world (ISN-KDDC): a cross-sectional study. Lancet Glob Health. 2016 May 4(5):e307-319.

[14] Go AS, Hsu CY, Yang J, Zheng S, Ordonez JD, and Liu KD, Acute Kidney Injury and Risk of Heart Failure and Atherosclerotic Events. Clin J Am Soc Nephrol. 2018 Jun 13(6): 833–841.

[16 63 64] Bloom DE, Cafiero ET, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S, et al. The global economic burden of non-communicable diseases. Geneva, Switzerland: World Economic Forum. 2011.

[17 62] World Heart Federation. Champions Advocate Programme. Geneva, Switzerland: WHF. Available from: http://www.championadvocates.org/en/champion-advocates-programme/the-costs-of-cvd.

[18 49 66] International Diabetes Federation. Diabetes Atlas, 8th edition. Brussels, Belgium: IDF; 2017. Available from: http://www.diabetesatlas.org.

[19]Kishore SP, Vedanthan R and Fuster V. Promoting global cardiovascular health: ensuring access to essential cardiovascular medicines in low- and middle-income countries. JACC. 2011; 57 (20): 1980–7.

[20 40 41 82 83] World Health Organization. Saving lives, spending less: a strategic response to non-communicable diseases. Geneva, Switzerland: WHO; 2018.

[21 42] Luyckx VA, Perico N, Somaschini M, Manfellotto D, Valensise H, Cetin I, et al. A developmental approach to the prevention of hypertension and kidney disease: a report from the Low Birth Weight and Nephron Number Working Group. Lancet. 2017 Jul; 390(10092):424–428.

[22 75] Joshi R, Alim M, Kengne AP, Jan S, Maulik PK, Peiris D, et al. Task shifting for non-communicable disease management in low and middle-income countries-a systematic review. PLoS ONE. 2014; 9(8):e103754.

[23 37 45] Mackay J and Mensah GE. The Atlas of Heart Disease and Stroke. Geneva, Switzerland: World Health Organisation; 2004.
[26] Callinan JE, Clarke A, Doherty K, Kelleher C. Legislative smoking bans for reducing second-hand smoke exposure, smoking prevalence and tobacco consumption. Cochrane Database Syst Rev. 2010 Apr; (4):CD005992.

[28]Singh SS, Pilkerton CS, Shrader CD, Frisbee SJ. Subclinical atherosclerosis, cardiovascular health, and disease risk: is there a case for the Cardiovascular Health Index in the primary prevention population? BMC Public Health. 2018 Apr; 18(1):429.

[29]Jha V, Garcia-Garcia G, Iseki K, Li Z, Naicker S, Plattner B, et al. Chronic kidney disease: global dimension and perspectives. Lancet. 2013 Jul 20; 382(9888):260–72.

[30] Global Hearts initiative. Geneva, Switzerland: World Health Organization. Available from: http://www.who.int/cardiovascular_diseases/global-hearts/en/.

[32] PubMed Health. How does the blood circulatory system work? Bethesda, USA: PM; 2016. Available from: https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0072434/.

[33 38] World Heart Federation. Hypertension factsheet. Geneva, Switzerland: WHF; 2017. Available from: https://www.world-heart-federation.org/resources/key-facts/.

[34 54] GBD 2016 Causes of Death Collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017 Sep; 390(10100):1151–210.

[35]Dad T and Weiner DE. Stroke and chronic kidney disease: epidemiology, pathogenesis, and management across kidney disease stages. Semin Nephrol. 2015 Jul; 35(4):311–22.

[36] Coutinho T, Lamai O and Nerenberg K. Hypertensive disorders of pregnancy and cardiovascular diseases: current knowledge and future directions. Curr Treat Options Cardiovasc Med. 2018 Jun; 20(7):56.

[39] Yang Q, Zhang Z, Gregg EW, Flanders WD, Merritt R and Hu FB. Added sugar intake and cardiovascular diseases mortality among US adults. JAMA Intern Med. 2014 Apr; 174(4):516–24.

[43] Chowdhury R, Lawrence R, van Daalen K, Hawkes S, Feldmann J, Research Councils UK-CAPABLE Programme on Environmental Hazards and Non-communicable Diseases. Reducing NCDs globally: the under-recognised role of environmental risk factors. Lancet. 2018 Jun.

[44] Luyckx VA, Tonelli M, Stanifer JW. The global burden of kidney disease and the sustainable development goals. Bull World Health Organ. 2018 Jun; 96(6):414–422D.

[48 56] World Health Organisation and the Centres for Disease Control. Global Hearts initiative: working together to beat cardiovascular disease. Geneva, Switzerland and Atlanta, USA: WHO and CDC; 2016. Available from: http://www.who.int/cardiovascular_diseases/global-hearts/GHI_Brochure.pdf?ua=1.

[51] Lackland DT. Implications of new high blood pressure guidelines for stroke primary and secondary prevention. Stroke. 2018; 49: 511–512.

[52]Lackland DT, Beilin LJ, Campbell NRC, Jaffe MG, Orias M, Ram CV et al. Global implications of blood pressure thresholds and targets: guideline conversations from the World Hypertension League. Hypertension. 2018 Jun; 71(6):985–987.

[53 60] Bikbov B, Perico N, Remuzzi G, on behalf of the GBD Genitourinary Diseases Expert Group. Disparities in chronic kidney disease prevalence among males and females in 195 countries: analysis of the global burden of disease 2016 study. Nephron. 2018 May;1–6.

[57] IHME. Seattle, United States: IHME; 2016. Global, regional, and national burden of cardiovascular diseases for 10 causes, 1990-2015. Available from: http://www.healthdata.org/research-article/global-regional-and-national-burden-cardiovascular-diseases-10-causes-1990-2015.

[58]World Health Organization. Geneva, Switzerland: WHO. Health statistics an information systems. Metrics: Disability-Adjusted Life Year (DALY). Available from: http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/.

[61]Forouzanfar MH, Liu P, Roth GA, Ng M, Biryukov S, Marczak L et al. Global burden of hypertension and systolic blood pressure of at least 110 to 115 mm hg, 1990-2015. JAMA. 2017; 317 (2): 165–182.

[65] Kishore et al. Promoting global cardiovascular health: ensuring access to essential cardiovascular medicines in low- and middle-income countries.

[67] United States Renal Data System. 2017 Annual Data Report. Ann Arbor, USA: USRDS; 2016. Available from: https://www.usrds.org/adr.aspx.

[68] Kerr M, Bray B, Medcalf J, O'Donoghue DJ and Matthews B. Estimating the financial cost of chronic kidney disease to the NHS in England. Nephrol Dial Transpant. 2012; 27 (suppl 3):iii73–80.

[69] Pumping Marvellous. Living with heart failure. Preston, United Kingdom: PM. Available from: pumpingmarvellous.org/heart-failure-guide/living-with-heart-failure/.

[70] World Health Organization Regional Office for the Western Pacific. Global Adult Tobacco Survey. Fact sheet: Philippines 2015. Manila, Philippines: WHO; 2017. Available from: http://www.who.int/tobacco/surveillance/survey/gats/fact-sheet-2015.pdf.

[72] Bovet P, Viswanathan B, Shamlaye C, Romain S, Gedeon J. Addressing non-communicable diseases in the Seychelles: towards a comprehensive plan of action. Glob Health Promot. 2010 Jun; 17(suppl 2): 37–40.

[73] Ojji DB, Lamont K, Ojji OI, Egenti BN and Sliwa K. Primary care in the prevention, treatment and control of cardiovascular disease in sub-Saharan Africa. Cardiovasc J Afr. 2017 Aug; 28(4):251–6.

[74] International Council of Nurses. Geneva, Switzerland: ICN; 2018. Health is a human right access, investment and economic growth.

[f] The George Institute for Global Health. SMART Health India help create a new model of healthcare for rural India. Newton, Australia. Available from: https://www.georgeinstitute.org/philanthropic-opportunities/smarthealth-india-help-create-a-new-model-of-healthcare-for-rural-india.

[77] How WE, Wang Z, Baker PRA, Kelly AM. Reduction in natural death and renal failure from a systematic screening and treatment program in an Australian Aboriginal community. Kidney international. 2013; 63 (suppl 832003): S66–S73.

[78] Colchero MA, Popkin B, Rivera JA, and NG SW. Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. BMJ 2016; 352:h6704.

[79] Silver LD, Ng SW, Ryan-Ibarra S, Taille LS, Induni M, Miles DR and Poti JM. Changes in prices, sales, consumer spending, and beverage consumption one year after a tax on sugar-sweetened beverages in Berkeley, California, US: A before-and-after study. PLoS Medicine. 2017; 14(4):e1002283.

[80] World Health Organization. Fiscal Policies for diet and prevention of non-communicable diseases. Geneva, Switzerland: WHO; 2016. Available from: http://www.who.int/dietphysicalactivity/publications/fiscal-policies-diet-prevention/en/.

[81] Sánchez-Romero LM, Penko J, Coxson PG, Fernández A, Mason A, Moran AE, Ávila-Burgos L, Odden M, Barquera S and Bibbins-Domingo K. Projected impact of Mexico's sugar-sweetened beverage tax policy on diabetes and cardiovascular disease: a modeling study. PLoS Med. 2016 Nov; 13(11):e1002158.

[84] The Lancet. Acting on NCDs. 2018 Apr; (391): 1973.

[85] Bertram MY, Sweeney K, Lauer JA, Crisholm D, Sheehan P, Rasmussen B, et al. Investing in non-communicable diseases: an estimation of the return on investment for prevention and treatment services. The Lancet Taskforce on NCDs and Economics. The Lancet. April 2018; 391: 2071–72.

[86 88] Jan S, Laba TL, Essue BM, Gheorghe Adrian, Muhunthan J, Engelgau M, Mahal Ajay et al. Action to address the household economic burden of non-communicable diseases. The Lancet Taskforce on NCDs and Economics 3. The Lancet. 2018 Apr; 391: 2049–50.

[87] Nugent R, Bertram MY, Jan S, Niessen LW, Sassi F, Jamison DT, Pier Gonzales, E et al. Investing in non-communicable disease prevention and management to advance the sustainable development goals. The Lancet Taskforce on NCDs and Economics. The Lancet. 2018 Apr; 391:2032.

[89] United Nations Interagency Task Force on NCDs, Innovative Financing for NCDs. United Nations Non-Communicable Diseases and Mental Health Catalytic Trust Fund. 2018.

WHITE PAPER

GLOBAL COALITION FOR CIRCULATORY HEALTH

GLOBAL COALITION FOR CIRCULATORY HEALTH
Secretariat
32, Rue de Malatrex
1201 Geneva
Switzerland