

Averting a global health crisis

# Pragmatic policy interventions to prevent stroke



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This policy brief outlines key challenges and opportunities to reduce the global burden of stroke through evidence-based interventions at policy and healthcare system level. The brief draws on WHO Best Buys for tackling NCDs<sup>1</sup> and the World Stroke Organization–Lancet Neurology Commission ‘Pragmatic solutions to reduce the global burden of stroke’<sup>2</sup>. These documents set out key actions that will assist governments to deliver on their commitments on non-communicable disease (NCD) reduction.

## Executive summary

Stroke happens either when the blood supply to part of the brain is cut off because of a blood clot, or because a brain artery ruptures and leads to a haemorrhage.

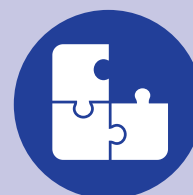
The number of people who die from stroke or are disabled by it has almost doubled in the last three decades and, worldwide, stroke is:

The **second** leading cause of death



The **third** leading cause of disability

A **significant** contributor to dementia



# The challenge

Around 12 million people will experience their first stroke this year<sup>3</sup>.

Globally 1 in 4 adults over the age of 25 will have a stroke in their lifetime<sup>3</sup>.

94 million people living in the world today have experienced stroke. 14 million of them are under 49 years of age<sup>3</sup>.

A total of 160 million years of healthy life are lost to stroke each year<sup>3</sup>.

Already a significant barrier to sustainable development, by 2050, the predicted number of deaths globally due to stroke is 12 million<sup>4</sup>. Almost all (87%) of this increased stroke burden will be borne by low- and middle-income countries<sup>4</sup>. The total projected cost of stroke to the global economy is projected to reach US\$1.59 trillion by 2050<sup>2</sup>.

Key drivers for this rise are the projected growth in the global population and an increase in the numbers of older people. But the analysis also suggests that a lack of, and unequal access to, high quality prevention, acute and rehabilitation services will be significant, especially in low- and middle-income countries.

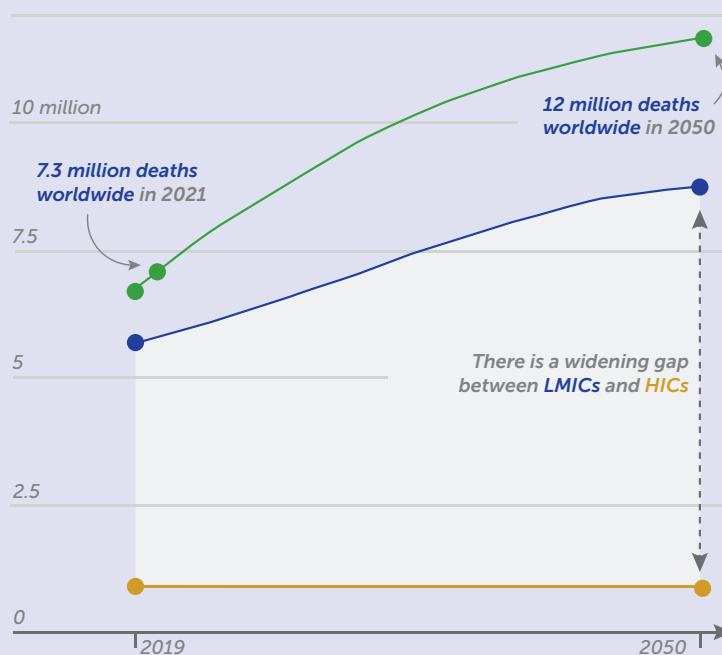
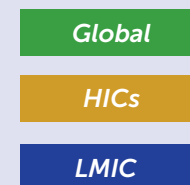


Figure 1: Stroke is the second leading cause of death worldwide and its burden is growing



Economic costs of stroke, 2017 US\$

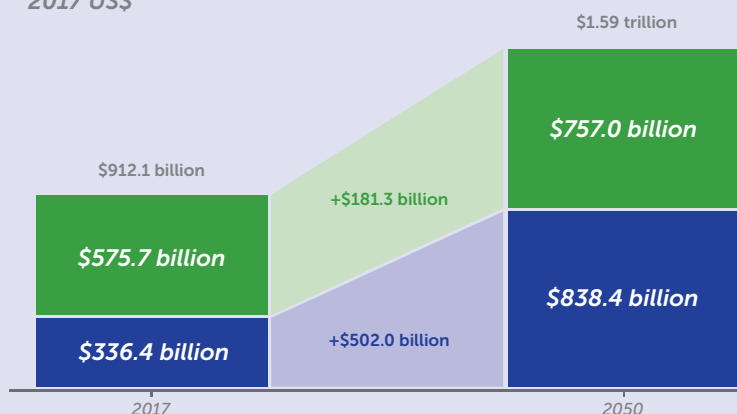
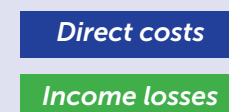


Figure 2: The total cost of stroke to the global economy is projected to reach US\$1.59 trillion by 2050



Sources: Lancet Neurology, 2023, Journal of American Heart Association, 2024

# The opportunity

Prevention is the most effective and cost-efficient way to reduce the stroke burden. Over 80% of strokes are associated with identifiable risk factors for which there are clear, evidence-based interventions that demonstrate strong return on investment<sup>5,6</sup>. For every \$1 invested in stroke prevention, society sees a \$10 return<sup>7</sup>.

The World Health Organization believes a fundamental strengthening of prevention (of high blood pressure and other determinants) and better monitoring strategies is paramount to reduce the global burden of stroke<sup>1</sup>. The benefits of effective prevention will take time but are significant because they will also decrease the burden of other NCDs. To be fully effective, it is also important to focus on populations from more vulnerable backgrounds.

While addressing risk factors requires change in individual behaviours, policy makers can and must deliver interventions to tackle and reduce stroke risk before they manifest in individuals as conditions such as high blood pressure, diabetes, or obesity. Healthcare policy can and should also support the identification and management of clinical risk factors that are major contributors to stroke.

WSO has identified a series of evidence-based prevention interventions for policy makers that, if implemented would reverse the trajectory of stroke through reducing healthcare, social and economic costs of stroke.



For every  
**\$1 invested**  
in stroke  
prevention,  
society sees a  
**\$10 return**

# 10 modifiable risk factors are responsible for over 80% of strokes



57%

HYPERTENSION  
(HIGH BLOOD PRESSURE)



17%

OUTDOOR AIR  
POLLUTION



14%

SMOKING



13%

HIGH  
CHOLESTEROL



11%

HOUSEHOLD AIR  
POLLUTION



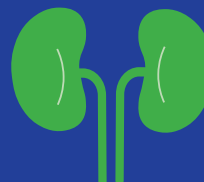
11%

TOO MUCH  
SALT



10%

DIABETES



9%

KIDNEY  
DISEASE



6%

UNHEALTHY  
DIET



5%

ALCOHOL  
USE

The sum of stroke burden attributable to the risk factor exceeds 100% because the effect of many of these risk factors overlap and are mediated partly or wholly through other risk factors. Percentages show stroke-related disability adjusted life years attributable to each risk factor.

# Policy recommendations

## Population level interventions

1

Reduce inequities and other social determinants of stroke and cardiovascular disease by implementing the WHO HEARTS package and through targeted programs that promote and support access to exercise and healthier food choices for communities with poorest health outcomes.

2

Implement taxation and control measures to address the impact of harmful substances such as tobacco, alcohol, sugar and trans-fats and use income from taxation to support NCD and stroke prevention programs.

3

Establish multi-sectoral public health partnerships that can provide integrated solutions to address the socioeconomic and environmental drivers of stroke and cardiovascular diseases.

4

Provide universal health coverage to support identification and low-cost management of clinical risk factors for stroke including high blood pressure and diabetes.

5

Establish reliable and comprehensive data collection systems for stroke that include prevalence of stroke risk factors in the population.

## Individual level interventions

1

Cardiovascular disease strategy that identifies and manages people at any level of increased risk of CVD by clinicians with screening, access to medication and supported lifestyle change.

2

Employment and training of community-based health workers supported by eHealth technologies that create linkages that allow task shifting and sharing with clinicians as well as self-management and monitoring of risk factors by the public.

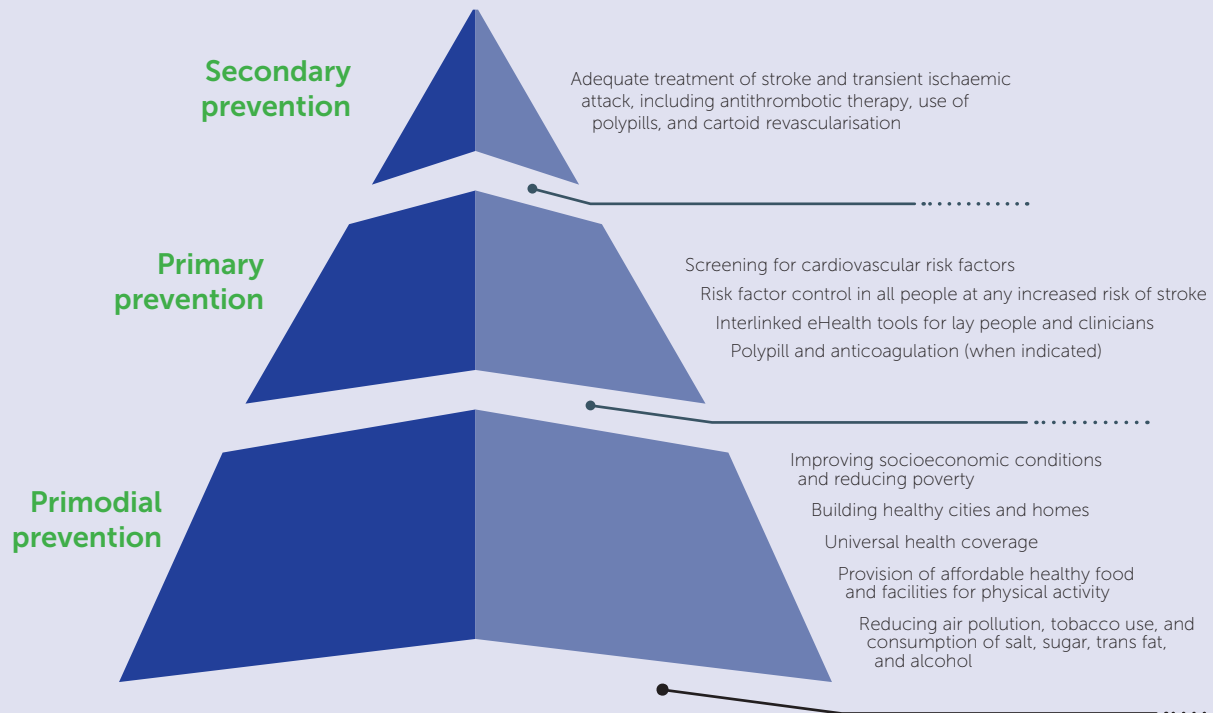
3

Develop culturally relevant individual primary and secondary prevention strategies for identification and management of people at risk of stroke using eHealth technologies.

4

Deliver on-going culturally relevant and motivational stroke awareness campaigns supported by risk factor education.

Figure 4: Dimensions of prevention policy



Source: Feigin and Owolabi, 2023

## Addressing the root causes of stroke - primordial prevention policy

**Primordial stroke prevention involves interventions to address the social and economic conditions that are linked to the emergence of stroke risk factors.**

Policies to reduce environmental pollution, implement taxation on alcohol, tobacco and sugar and improve economic and physical access to healthy food can all serve to reduce individual health risk by making the 'right thing' the 'easy thing' to do.

All governments should implement the WHO Best Buys for tackling NCDs which provide key evidence-based, cost-effective policy interventions to reduce risk factors for all NCDs, including

- taxation on harmful substances
- promotion of healthy eating
- increased physical activity
- government led mass media campaigns and community-based education initiatives to increase awareness of risks and prevention

Alongside access to behaviour modification programs including smoking cessation, community physical activity programs, nutritional support and weight management programs, governments can make a significant impact on reducing the prevalence of stroke risk factors and stroke incidence.



## Case study

### A multi-dimensional approach to healthy eating in South Africa

Being categorised as overweight increases your risk of stroke by 22% and if you are obese that risk increases by 64%. Over 50% of South African adults are overweight or obese, with 69% of obese adults living in food insecure households where families have little dietary choice and are forced to eat food with low nutritional value. The country has implemented a multi-dimensional approach, including data collection via the National Food and Nutrition Security Survey. In 2018 the government introduced a 10% tax on sugary soft drinks (SSBs) as part of a strategy to reduce obesity and NCD risk in the population. Following implementation of the tax in 2018, the country has seen a 29% average reduction in purchases of SSBs. The impact on those in low-income urban households has been even more pronounced with purchases in these households dropped by 57%<sup>8</sup>.

To support public understanding and promote healthier nutritional choices, the Heart and Stroke Foundation South Africa established a Nutrition Science Team, ensuring that all nutritional information communicated to the public is evidence-based, understandable, practical and cost effective. The Nutrition Science and Health Promotion teams present health talks for the School Health Promotion Initiative, the Mended Hearts and Stroke Group, in community-based settings, and are also engaged in private sector employee wellness work. They send monthly CVD updates with peer-reviewed articles to health professionals and respond to public health-related and nutrition questions. The team also works with all Foundation programs for key public health events, including health promotions, disease prevention activities, virtual talks, and health risk assessments.

**School Health Promotion Initiative (SHPI)** The aim of the “all of the school” programme is to raise awareness among young South Africans on the importance of adopting healthy behaviours and to encourage all staff at the targeted schools to know their health status. The Health Promotion team at a SHPI event conduct Health Risk Assessments [screening]. A typical SHPI event adopts a holistic approach and includes a Health Talk for all the learners at the school, which focuses on the importance of a “healthy heart and brain” and what behaviours to adopt to stay healthy.



South Africa has implemented a **multi-dimensional approach** to primordial prevention.



# Identification and management of stroke risk factors

**Primary prevention interventions focus on early detection and control of risk factors such as hypertension, dyslipidaemia (high cholesterol), atrial fibrillation, and diabetes, to avoid a first stroke event.**

For decades, primary stroke prevention efforts have focused on the classification of individual stroke risk, with resources and effort focused on the management of individuals in the high-risk category. This approach has presided over a continuing rise in stroke incidence globally and with 90% strokes occurring in individuals classified as medium to low-risk categories.

Primary prevention activity needs to be aimed at the whole population, and primary individual level primary prevention interventions by health professionals need to be aimed at everyone with increased risk of stroke, regardless of the level of the risk<sup>9</sup>. However, it is important to maintain risk stratification to enhance treatment strategies for higher-risk patients, such as adding statins to their treatment plan.

Individual assessments should focus on clinical and lifestyle factors, and while primary stroke prevention emphasises individual lifestyle “choices”, government policy to improve access to primary health care systems as part of universal health coverage can empower and support individuals and healthcare professionals alike to take action that will reduce stroke risk.

Identification and management of hypertension, atrial fibrillation, pre-diabetes/ diabetes and high cholesterol has the potential to reduce stroke incidence by at least 50%. Screening, diagnostics and access to affordable medications including anti-hypertensives, statins, anticoagulation and diabetes medication will accelerate progress on stroke prevention. Countries with universal health coverage can provide a wide range of stroke prevention services free or at low cost. The absence of universal health care exacerbates inequalities in access to stroke prevention services, and people tend to prioritise out-of-pocket costs for treatment rather than prevention, with few or no regular health checks for stroke risk factors.



**Primary prevention interventions by health professionals need to be aimed at everyone with increased risk of stroke, regardless of the level of the risk.**

# Quality data collection is essential to successful primary prevention

**Trained staff collect data** using established and **universal nationwide system** for monitoring stroke.

Trained staff perform **data analysis and diagnostic checks** for risk factors that predict stroke, e.g. blood pressure, physical activity, lipid profile, diet, bodyweight, smoking, diabetes.

Individuals with conditions that increase stroke risk **are given access to affordable medicines, regular health checks, advice and expertise** to address their individual risk factors.

## Extensive quality data collection is key to stroke prevention

Effective identification of risk factors requires extensive data gathering and population level diagnostic checks. Once identified, individuals with conditions that increase stroke risk need access to affordable medicines, regular health checks, advice and expertise to address their individual risk factors.

Good quality data requires enough adequately trained people to collect and analyse it. Where resources are limited, efforts should be focused on collecting high-quality data for risk factors that strongly predict stroke (e.g. blood pressure, physical activity, lipid profile, diet, bodyweight, smoking, diabetes). Resources should be focused on risks that are highly prevalent and amenable to both individual and population intervention.

Governments should establish comprehensive and universal nationwide systems for monitoring stroke, through registries, electronic health records, and vital statistics systems. Governments need to ensure enough adequately trained people to collect and analyse the data. Protocol-based and regulated systems for task-shifting from doctors to nurses and from nurses to community health workers can support efficient use of specialist clinical staff within the healthcare system.

Tools such as the World Health Organisation's STEPS programme are valid and reliable systems for the surveillance of risk factors. Mobile technologies such as the Stroke Riskometer and PreventS-MD for health professionals can support both individual risk identification and data collection on risk factor prevalence in the community.



## Case study

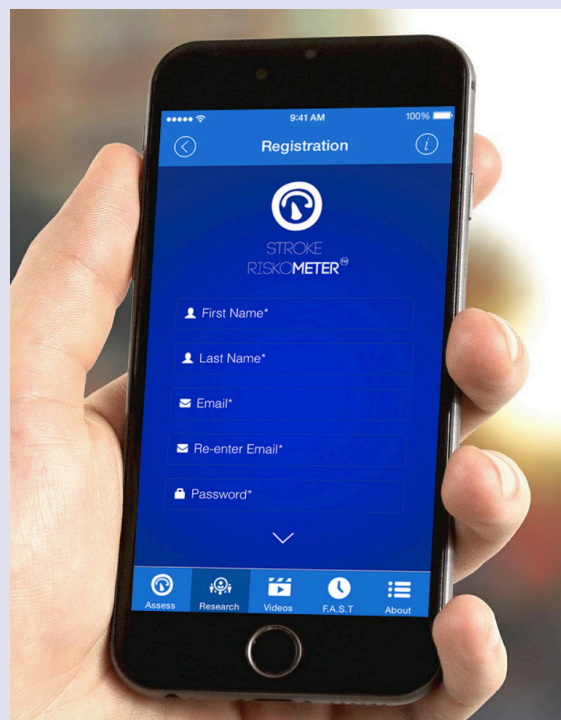
### Mobilize!BRAZIL

In 2022 under the leadership of Prof Sheila Martins, and with support from the government of Brazil and industry partners, a program of training and task-shifting population primary prevention the training and deployment of hundreds of community health workers in Brazil. Supported by mobile technology Mobilize!Brazil complemented a government supported research program to establish the effectiveness of low dose combined prevention medication for those with two or more stroke risk factors.

Community health workers from across the country joined online training on stroke risk factors and prevention, behaviour modification, screening and management of hypertension and atrial fibrillation (irregular heartbeat). The training layered onto existing WHO HEARTS and Better Cities initiatives to provide a holistic approach to prevention. Community health workers were provided with translated public information resources developed by WSO and sensitized to the use of mobile technologies to measure, track stroke risk factors in the community and motivate individual behaviour change.

Following the training, the StrokeRiskometer was used with communities to conduct assessments and familiarize individuals with their lifetime risk of stroke, highlighting where this can be reduced, and sharing information on relevant risk factors and prevention. Motivational push notifications were designed to help keep 3350 participating individuals engaged over the course of the program. A follow up survey with a sample of program participants was conducted at 6 months with 79% indicating increased knowledge of stroke risk factors and 62% indicating that participation had led them to take action to modify their risks.

The StrokeRiskometer was used to **conduct assessments** and familiarize individuals with their **lifetime risk of stroke**, highlighting where this can **be reduced**.





## Case study

### India Hypertension Control Initiative

Hypertension is associated with almost half of all strokes and is a serious, and growing health issue in India. One in five young Indians have high blood pressure and first strokes occur a decade earlier than the global average. An estimated 200 million adults in India have hypertension, of whom approximately only 20 million have it under control.

The India Hypertension Control Initiative (IHC) aims to accelerate progress towards the Government's 25% reduction in hypertension by 2025 NCD target, by supplementing and intensifying evidence-based strategies to strengthen the building blocks of hypertension management and control.

Launched in November 2017 and initially covering 26 districts across five states, by December 2020 IHC was expanded to 52 districts across ten states. The Initiative deploys five core strategies: standard treatment protocol, reliable supply of free antihypertensive medications, team-based care, patient-centered care, and an information system to track individual patient treatment and blood pressure control.

IHC activities are supported by a cadre of Cardiovascular Health Officers (CVHOs) and Senior Treatment Supervisors (STs). CVHOs are public health professionals recruited under the project at the state and district level, who work closely with the Government in the operationalisation of the project. They provide supportive patient supervision, monitoring and evaluation and advocacy at the state. STs are non-medical graduates deployed under the project at sub-district level to support CVHOs in supervision and monitoring.

All states implemented simple treatment protocols; medication supplies were adequate to support at least one month of treatment. From 2018-19, 570,365 individuals with hypertension were enrolled in the initiative. The proportion of people with hypertension who had it controlled and documented in public clinics was estimated to have increased three-fold.

**The Hypertension Control Initiative (IHC) aims to accelerate progress towards the Government's target of 25% reduction in hypertension by 2025.**



Source: IHC <https://www.ihci.in>

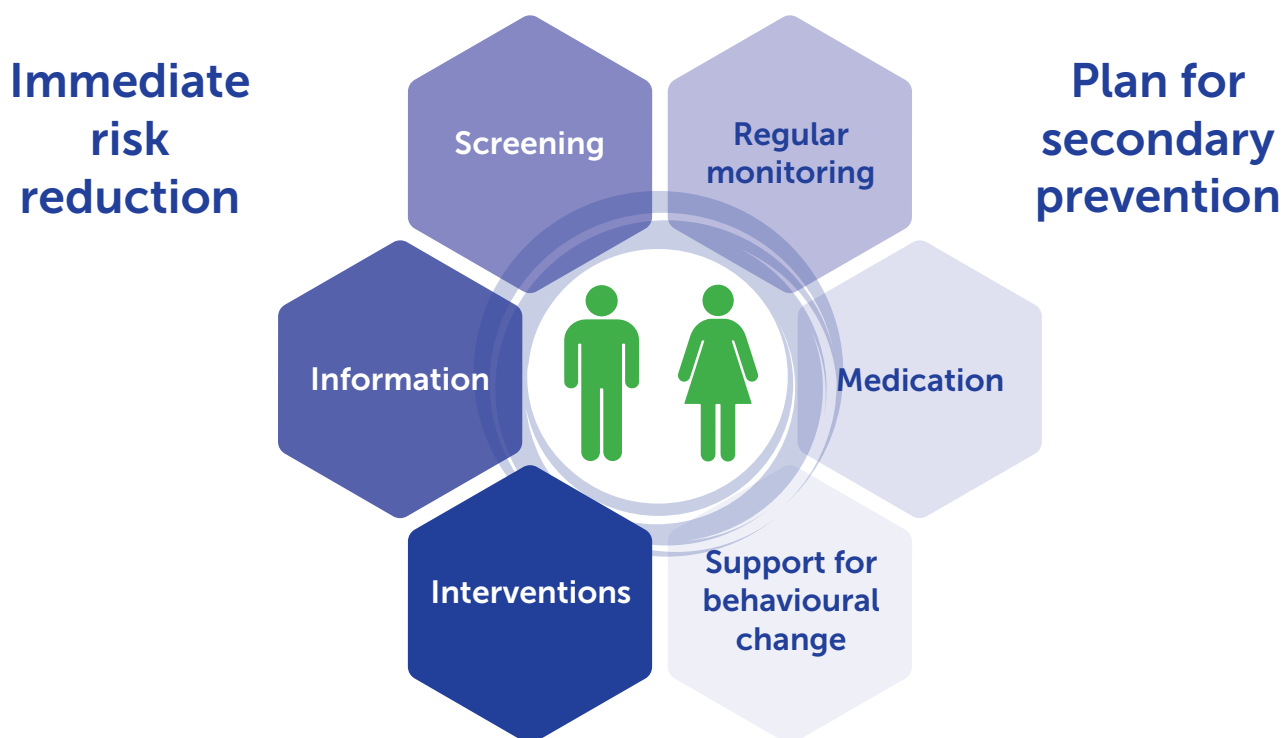
# Reducing the risk of repeat stroke – secondary stroke prevention

**Secondary stroke prevention is focused on reducing the risk of having another stroke after someone has had a first stroke or transient ischemic attack (TIA).**

People who have had a stroke or TIA are at much higher risk of having a second one. 2–3% of survivors of a first stroke have another stroke within the first 30 days, 9% in the first 6 months and 10–16% within a year. After a year the figure is 5%<sup>10</sup>.

It is vital that everyone who has a stroke or TIA has all the interventions and information needed to reduce their risk of a recurrent stroke. Most stroke survivors already have an underlying medical condition that increased their risk of stroke. These underlying conditions remain a risk after the first stroke event and must be treated. They are modifiable, so secondary prevention interventions can make a big difference. Most of these risk factors are symptomless and require tests and investigations to diagnose. Assessment of stroke risk factors should begin as soon as possible after the initial stroke or TIA. Everyone should have access to screening and appropriate management of underlying conditions such as hypertension, diabetes, carotid stenosis, and atrial fibrillation.

People who have had a stroke should have a plan for secondary stroke prevention, including access to regular monitoring, medication and support for behavioural change.



## Clinicians, medical practitioners and stroke support organization's roles are to support people

Helping people understand the medical conditions that may have caused their stroke will help them to know how they can reduce the risk of a further stroke. Ensuring stroke survivors have access to advice from health professionals is vital.

Stroke survivors need specific advice and support for healthy lifestyle measures, such as diet considerations when there is swallowing limitations, and exercise and activity levels especially if they have been disabled by their stroke. Clinicians, medical practitioners and stroke support organizations have a vital opportunity and role to play in supporting people to manage behaviours to reduce the risk of having another stroke. Regular post-stroke reviews and check-ups are very important, especially as many stroke survivors feel they do not get the support they need to stay healthy. Stroke survivors need to understand the way they can tackle the modifiable lifestyle risk factors they face. Ensuring stroke survivors have access to ongoing support, resources and opportunities to sustain lifestyle changes is crucial.

As with primary stroke prevention, secondary stroke prevention services should be free and easily accessed as part of universal health coverage. National and regional health budgets should be allocated to primary and secondary stroke prevention



## Case study

### Australians Living Well After Stroke

The Australian Stroke Foundation's Living Well After Stroke (LWAS) program is an evidence based, 8-week group intervention designed to help stroke survivors make lasting health behaviour changes, such as healthy eating, increasing physical activity, and managing medication. Based on the Health Action Process Approach (HAPA) model, it equips participants with a 'toolkit' of skills and strategies to sustain these changes.

**LWAS was piloted in 2023.** Of the 62 participants, 94% reported the program exceeded their expectations. Not only did participants implement their chosen behaviour, but they also independently applied the LWAS 'toolkit' to change an additional behaviour after the program. Furthermore, a significant and sustained improvements in wellbeing was observed.

**The program is currently being run in Tasmania, with many participants from areas of the state with little to no access to health services post stroke.** LWAS will be expanded nationally in 2025.

*"I gained access to this programme at a time when I was scared, lost, felt unsupported. From the first session the above feelings were reversed. I felt heard, understood and was given access to other supportive programmes. I have been energised, am taking more responsibility for my health, feel empowered to continue with my goal and am excited to begin a new goal, adding better health and enjoyment to my life. I am extremely grateful for my mentor, for her compassionate manner, knowledge, skill in implementing the programme and understanding. Thank you."* Tasmanian LWAS Participant, aged 62.

# Conclusion

The global stroke burden is rising. As the second largest cause of death and third largest cause of disability worldwide, achievement of the United Nations Sustainable Development Goal 3.4<sup>11</sup> to reduce by one third premature mortality from NCDs through prevention is not possible without coordinated action and investment in stroke.

Prevention is the most effective and cost-efficient ways to reduce the increasing stroke burden which has devastating impacts an individual and societal level.

Moreover, impactful prevention initiatives can be implemented in low- and middle-income countries which experience the greatest stroke burden and the most significant challenges in relation to providing acute stroke care. By enacting stroke prevention policies at social, healthcare and individual levels countries can significantly reduce their healthcare costs and support sustainable development of stroke care across the care pathway.

## At population level, governments must act to:

- 1 Reduce inequities and other social determinants of stroke and cardiovascular disease
- 2 Promote and support access to healthy lifestyles
- 3 Implement taxation and control measures to address the impact of harmful substances
- 4 Establish multi-sectoral public health partnerships to address the socioeconomic and environmental drivers
- 5 Provide universal health coverage to support management of clinical risk factors for stroke
- 6 Establish reliable and comprehensive data collection systems for stroke

## At individual level, governments must support:

- 1 Strategies that identify and manage people at any level of increased risk of CVD
- 2 Employment and training of community-based health workers supported by eHealth technologies
- 3 Development of culturally relevant primary and secondary prevention strategies
- 4 The delivery of on-going stroke awareness campaigns

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**World Stroke Organization**

7, Rue Francois Versonnex, PO Box 6053

CH-1211 Geneva 6, Switzerland

Tel: +41 22 906 9125

Email: [admin@world-stroke.org](mailto:admin@world-stroke.org)

[www.world-stroke.org](http://www.world-stroke.org)

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