

for discussion by delegates attending the forthcoming World Intracranial Haemorrhage Conference.

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## The global burden of stroke: persistent and disabling

According to a report from the Global Burden of Disease (GBD) 2016 Lifetime Risk of Stroke Collaborators,<sup>1</sup> the estimated global lifetime risk of stroke in 2016 for those aged 25 years or older was 24.9%, an increase from 22.8% in 1990. The estimate includes an almost equal risk of stroke among women and men, and an 18.3% risk of ischaemic stroke and 8.2% risk of haemorrhagic stroke.<sup>1</sup> Furthermore, the lifetime risk varies by Socio-demographic Index (SDI); 23.5% for high SDI, 31.1% for high-middle SDI, and 13.2% for low SDI countries; the low risk in the low SDI group is attributed to the high numbers of competing causes of mortality. Additionally, the prevalence of stroke is expected to increase. In a policy statement crafted by an American Heart Association working group, it was concluded that, by 2030, almost 4% of US adults will have had a stroke, accounting for total direct annual stroke-related medical costs increasing from US\$71.55 billion in 2012 to \$183.13 billion by 2030.<sup>2</sup> Driving the upswing in stroke prevalence rates is a projected increase in stroke attributed to a growing and ageing population and lower stroke case fatality rates associated with better acute ischaemic stroke care and improved recurrent stroke prevention strategies.<sup>2</sup> These findings point to the importance of continued surveillance of stroke case fatality, incidence, and recurrence rates.<sup>1,2</sup>

In *The Lancet Neurology*, the GBD 2016 Stroke Collaborators<sup>3</sup> provide a systematic analysis of the global, regional, and national burden of stroke from 1990 to

2016 in terms of incidence, prevalence, deaths, years lived with disability, years of life lost, and disability-adjusted life-years (DALYs). Improvements on previous GBD stroke estimates include new approaches to collect inpatient hospital data, extension of the oldest age group for study (up to 95 years or older), a more comprehensive literature review, and the addition of expected values for all measures on the basis of socioeconomic development.

Notably, stroke remains the second leading cause of death worldwide, with 5.5 million (95% uncertainty interval [UI] 5.3–5.7) deaths attributed to this cause in 2016. Fewer women (2.6 million [2.5–2.7]) than men (2.9 million [2.8–3.0]) died from stroke.<sup>3</sup> Deaths due to ischaemic stroke were slightly less frequent than those due to haemorrhagic stroke. Stroke was also the second most common cause of DALYs. The highest incidence of stroke occurred in east Asia, followed by the eastern European region, whereas the lowest rates were in central Latin America. Women and men had similar age-specific incidences at ages up to 55 years, but the rates were greater in men at 55–75 years, levelling out at ages older than 75 years.

Most of the stroke burden was attributable to risks measured in GBD. For example, metabolic factors (high systolic blood pressure, body-mass index, fasting plasma glucose, and total cholesterol and low glomerular filtration rate) accounted for 72% of stroke DALYs, behavioural factors (smoking, poor diet, and physical inactivity) accounted for 66%, and environmental risks



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(air pollution and lead exposure) accounted for about 28%. Although most of the risk attribution information is not novel, many of the risks are modifiable and have been shown to reduce stroke, and thus, are important to track and emphasise in relation to continued stroke prevention efforts.

Despite the reduction in age-standardised stroke death rates and a decrease in stroke incidence in most regions, with the exception of east Asia and southern sub-Saharan Africa, stroke is still prevalent and remains disabling, with more than 80 million stroke survivors worldwide and an increasing absolute number of DALYs. It has become apparent that population growth and ageing have the potential to result in a greater absolute pool of people at risk of stroke and people who will have a stroke, despite the current declining stroke incidence. A forecast in the USA up to year 2050 suggests a doubling of the number of strokes, largely occurring in people aged 75 years and older and in minority ethnic groups such as Hispanic people.<sup>5</sup> Additionally, improved stroke survival portends a higher prevalence of chronic stroke.<sup>3</sup>

Based on the current forecasts, prevention of stroke in people aged 75 years and older will be an important target to relieve future global burden of stroke. Additionally, we will need to continue to support efforts to prevent stroke by risk factor modification, make stroke prevention available in low-income areas of the world where

stroke incidence might be high, and discover novel stroke prevention and rehabilitation strategies.<sup>5,6</sup> Promotion of a healthy environment, which is often overlooked, also might pay substantial dividends.<sup>7</sup>

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My employer receives payment for work as a major cardiovascular event adjudicator for a number of pharmaceutical companies. I have received personal fees for serving on the Bayer ARRIVE study steering committee, outside the submitted work.

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## The global burden of neurological disorders

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The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2016 on neurological disorders published in *The Lancet Neurology* is another milestone in the history of global health metrics.<sup>1</sup> The GBD enterprise, as it has been referred to, grew from the 1990 World Bank study that was commissioned to comprehensively measure the status of world health. Coauthored by the now head of the Institute of Health Metrics Evaluations (IHME), Chris Murray, the 1990 study set the benchmark for successive studies. The 2010 study published in *The Lancet* in 2012 established not only new methods and estimates of global burden of diseases from 1990 to 2010 in a series of papers, but also the successful cooperative arrangement between *The Lancet*, WHO, IHME, and the Bill & Melinda Gates Foundation, with annual updates of GBD. The 2015 study introduced a more meaningful and broader measure of

socioeconomic demographics than previously, the Socio-demographic Index (SDI). Further expansion by inclusion of more diseases and risk factors occurred with GBD 2016.

The neurological diseases GBD overview in *The Lancet Neurology* is the latest update on specific categories of neurological disorders. With the acknowledgment of stroke as a neurological disorder in the International Classification of Diseases (ICD) 11,<sup>2</sup> the impact of neurological diseases can now be more fully appreciated. In the neurological diseases GBD, the prevalence, deaths, years of life lost (YLLs), years lived with disability (YLDs), and disability-adjusted life-years (DALYs) by age and sex have been estimated from 195 countries from 1990 to 2016 for 15 neurological disorder categories, which now also include brain and spinal cord trauma. With 9.0 million (95% uncertainty interval [UI] 8.8–9.4) deaths and

For previous GBD publications see <https://www.thelancet.com/gbd>