



World Stroke Organization (WSO): Global Stroke Fact Sheet 2019

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Keywords

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Introduction

Stroke is the second major cause of death and disability worldwide with over 13 million new cases annually.¹

Globally, the overall incidence rates of stroke decreased from 1990 to 2016, largely due to prevention and better control of risk factors such as tobacco use and blood pressure control. Among this decline, the one group that did see an increase is the younger age groups (younger than 50 years) and prevalence rates also increased exponentially since 2005 for this group. However, the absolute number of people who had a stroke, died or remained disabled from stroke has increased from 1990 to 2016 by almost two-fold.¹

The World Stroke Organization (WSO) lead many advocacy efforts through their membership, targeted efforts in low- and middle-income countries, and through the strong voice of Stroke Support Organizations (SSOs). Governments, system leaders, healthcare providers, and the general population need to increase efforts for raising awareness, educating individuals and populations of their risk factors, implementing effective and widely available stroke risk prevention strategies (for example, free Stroke Riskometer app supported by the WSO and already translated into 12 languages) and ensuring timely acute treatments to reduce the long-term burden of stroke. Advocacy efforts require reliable and consistent stroke data to build awareness of the scale of the disease and support for calls for urgent action at global, regional, and national levels.

This WSO Global Stroke Fact Sheet 2019 provides information that can be used to inform communication with all internal and external stakeholders; all statistics have been reviewed and approved for use by the WSO Executive Committee as well as leaders from the Global Burden of Disease research group. The facts endorsed

by the WSO will be updated every one to two years as new data emerges.

Methods

The values contained in this Fact Sheet have all been extracted from the most current Global Burden of Disease Stroke Statistics Worldwide for the year 2016 (<http://ghdx.healthdata.org/gbd-results-tool>).

Discussion

Efforts to reduce the burden of stroke are a global responsibility. In the 2011 United Nations declaration on non-communicable diseases and target 3.4 of the 2015 Sustainable Development Goals, ambitious targets were set for reducing the burden of non-communicable

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Table 1. Incidence, prevalence, mortality, and disability-adjusted life years (DALYs) for all stroke types combined

All stroke (B 2.3)		Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Measure: Incidence						
Ages (all, sexes (both))	13,676,761	0.03	185.01 (171.98–198.75)	203.38 (189.24–218.16)	There are over 13.7 million new strokes each year. ¹ Globally, one in four people over age 25 will have a stroke in their lifetime. ²	
1–69 years	7,994,163	–	–	–	Each year, almost 60% of all strokes occur in people under 70 years of age.	
1–44 years	1,110,311	–	–	–	Each year, 8% of all strokes occur in people under 44 years of age.	
Men (all ages)	7,192,679	0.03	193.05 (179.24–207.31)	231.02 (214.69–248.15)	Each year, 52% of all strokes occur in men.	
Women (all ages)	6,484,083	0.03	176.85 (164.32–190.01)	179.13 (166.23–192.47)	Each year, 48% of all strokes occur in women.	
Measure: Prevalence						
Ages (all, sexes (both))	80,065,453	1.12	1,083.10 (1,002.23–1,167.80)	1,180.40 (1,093.20–1,273.43)	Globally, there are over 80 million people currently living who have experienced stroke.	
1–69 years	49,693,284	–	–	–	60% of people who have experienced a stroke and	

(continued)

Table 1. Continued

All stroke (B 2.3)		Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Number	Percent of total from all causes			
7,843,913	–	–	–	are currently living are under the age of 70.
Men (all ages)	1.10	1,045.89 (970.02–1,129.92)	1,232.57 (1,143.16–1,334.35)	10% of people who have experienced a stroke and are currently living are under the age of 44. 49% of people who have experienced a stroke and are currently living are men.
Women (all ages)	1.15	1,120.90 (1,035.73–1,207.58)	1,136.08 (1,049.08–1,225.41)	51% of people who have experienced a stroke and are currently living are women. Globally, women account for just over half (51%) of all persons who have experienced a stroke.
Measure: Deaths				
Ages (all, sexes (both))	10.11	74.78 (72.16–77.58)	86.52 (83.34–89.92)	Five and a half-million people die from stroke annually.
1–69 years	–	–	–	39% of all deaths from stroke occur in people under 70 years old.
1–44 years	–	–	–	4% of all deaths from stroke occur in people under 44 years old.

(continued)

Table 1. Continued

All stroke (B 2.3)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Men (all ages)	2,931,769	9.77	78.69 (76.0–81.30)	103.21 (99.44–106.89)	53% of all deaths from stroke are in men.
Women (all ages)	2,596,464	10.51	70.82 (67.00–74.86)	72.49 (68.60–76.54)	47% of all deaths from stroke are in women.
Measure: DALYs					
Ages (all), sexes (both)	116,445,136	4.88	1,575.23 (1,506.78–1,642.35)	1,711.17 (1,635.32–1,784.40)	Over 116 million years of healthy life is lost each year due to stroke-related death and disability.
1–69 years	73,083,785	–	–	–	63% of healthy life lost due to stroke-related death and disability affects people under the age of 70 years.
1–44 years	13,249,535	–	–	–	18% of healthy life lost due to stroke-related death and disability affects people under the age of 44 years.
Men (all ages)	65,640,112	5.05	1,761.72 (1,692.60–1,829.59)	2,045.51 (1,960.85–2,126.23)	Men account for 56% of healthy life lost due to stroke-related disability.
Women (all ages)	50,805,025	4.68	1,385.70 (1,299.04–1,465.54)	1,407.74 (1,320.23–1,489.36)	Women account for 44% of healthy life lost due to stroke-related disability.

WSO: World Stroke Organization.

*Uncertainty Interval (UI) represents a range of values that reflects the certainty of an estimate. In GBD, every estimate is calculated 1,000 times, each time sampling from distributions rather than point estimates for data inputs, data transformations and model choice.

The 95th uncertainty interval is determined by the 25th and 975th value of the 1,000 values after ordering them from smallest to largest. Larger uncertainty intervals can result from limited data availability, small studies, and conflicting data, while smaller uncertainty intervals can result from extensive data availability, large studies, and data that are consistent across sources.

Table 2. Incidence, prevalence, mortality, and disability-adjusted life years (DALYs) for all ischemic stroke

Ischemic Stroke (B 2.3.1)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Measure: Incidence					
Ages (all), sexes (both)	9,556,444	0.02	129.28 (117.08–142.21)	142.34 (129.10–156.60)	There were over 9.5 million new cases of ischemic stroke in 2016.
1–69 years	5,524,967	–	–	–	Almost 60% of all new cases of ischemic stroke occur in people under 70 years.
1–44 years	698,335	–	–	–	7% of all new cases of ischemic stroke occur in people under 44 years.
Men (all ages)	5,012,911	0.02	134.54 (121.30–147.89)	161.74 (146.12–177.57)	52% of new cases of ischemic stroke occur in men.
Women (all ages)	4,543,533	0.02	123.92 (112.56–136.54)	125.49 (113.82–138.40)	48% of new cases of ischemic stroke occur in women.
Measure: Prevalence					
Ages (all), sexes (both)	67,595,368	0.95	914.40 (822.65–1,008.78)	999.33 (899.23–1,105.91)	Over 67.5 million people had a new ischemic stroke in 2016 or have had one previously.
1–69 years	41,173,654	–	–	–	61% of the people currently living with the effects of ischemic stroke are under the age of 70.
1–44 years	6,453,559	–	–	–	10% of the people currently living with the effects of ischemic of stroke are under the age of 44.
Men (all ages)	32,837,417	0.92	881.33 (796.33–979.77)	1,043.96 (945.71–1,163.46)	49% of the people currently living with the effects of ischemic stroke are men.

(continued)

Table 2. Continued

Ischemic Stroke (B 2.3.1)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Women (all ages)	34,757,951	0.97	948.02 (849.81–1,043.14)	961.79 (861.23–1,059.64)	51% of the people currently living with the effects of ischemic stroke are women. Globally, women account for just over half (51%) of all persons living with the effects of ischemic stroke.
Measure: Deaths					
Ages (all), sexes (both)	2,690,171	4.92	36.39 (34.79–38.12)	43.40 (41.43–45.47)	Over 2.7 million people die from ischemic stroke each year.
1–69 years	708,472	–	–	–	25% of deaths due to ischemic stroke occur in people under the age of 70.
1–44 years	34,019	–	–	–	1% of deaths due to ischemic stroke occur in people under the age of 44.
Men (all ages)	1,343,464	4.48	36.06 (34.37–37.72)	50.22 (47.89–52.64)	49% of deaths due to ischemic stroke occur in men.
Women (all ages)	1,346,707	5.45	36.73 (34.45–39.45)	37.72 (35.34–40.48)	51% of deaths due to ischemic stroke occur in women. Each year, women account for more than half of the ischemic stroke-related deaths.
Measure: DALYs					
Ages (all), sexes (both)	51,897,437	2.17	702.05 (647.93–751.70)	787.55 (728.37–843.24)	51.9 million years of healthy life is lost each year due to ischemic stroke-related death and disability.
1–69 years	26,161,786	–	–	–	50% of healthy life lost due to ischemic stroke-related death and disability affects people under the age of 70 years.

(continued)

Table 2. Continued

Ischemic Stroke (B 2.3.1)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000 per year (UI)	Approved statement for use in WSO materials
1–44 years	2,740,408	–	–	–	5% of healthy life lost due to ischemic stroke-related death and disability affects people under the age of 44 years.
Men (all ages)	27,528,703	2.12	738.85 (688.39–788.17)	908.40 (849.21–968.50)	Men account for 53% of healthy life lost due to ischemic stroke-related death and disability.
Women (all ages)	24,368,735	2.24	664.65 (601.14–721.29)	681.27 (616.67–739.22)	Globally, women account for just under half (47%) of healthy life lost due to ischemic stroke-related death and disability. Women account for 47% of healthy life lost due to ischemic stroke-related death and disability.

WSO: World Stroke Organization.

*Uncertainty Interval (UI) represents a range of values that reflects the certainty of an estimate. In GBD, every estimate is calculated 1,000 times, each time sampling from distributions rather than point estimates for data inputs, data transformations and model choice.

Table 3. Incidence, prevalence, mortality, and disability-adjusted life years (DALYs) for all hemorrhagic stroke Hemorrhagic stroke (intracerebral and subarachnoid hemorrhage combined) (B 2.3.2)

	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO Materials
Measure: Incidence					
Ages (all), sexes (both)	4,120,318	0.01	55.74 (50.92–60.99)	61.04 (55.79–66.73)	There were 4.1 million new hemorrhagic strokes in 2016.
1–69 years	2,469,197	–	–	–	60% of new hemorrhagic strokes occur in people under 70 years.
1–44 years	411,976	–	–	–	10% of new hemorrhagic strokes occur in people under 44 years.
Men (all ages)	2,179,769	0.01	58.50 (53.43–63.83)	69.28 (63.51–75.40)	53% of new hemorrhagic strokes occur in men.
Women (all ages)	1,940,550	0.01	52.93 (48.26–57.93)	53.64 (48.91–58.69)	47% of new hemorrhagic strokes occur in women.
Measure: Prevalence					
Ages (all), sexes (both)	15,310,197	0.22	207.11 (187.45–229.34)	222.68 (201.54–246.33)	Over 15 million people globally live with the effect of hemorrhagic stroke.
1–69 years	10,319,487	–	–	–	67% of people living with the effect of hemorrhagic stroke are under 70 years.
1–44 years	2,237,325	–	–	–	15% of people living with the effect of hemorrhagic stroke are under 44 years.
Men (all ages)	7,565,942	0.21	203.06 (183.11–224.78)	233.29 (210.04–258.82)	49% of people living with the effect of hemorrhagic stroke are men.
Women (all ages)	7,744,255	0.22	211.22 (191.53–233.78)	213.27 (193.31–235.95)	51% of people living with the effect of hemorrhagic stroke are women.

(continued)

Table 3. Continued

Hemorrhagic stroke (intracerebral and subarachnoid hemorrhage combined) (B 2.3.2)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000 per year (UI)	Approved statement for use in WSO Materials
Measure: Deaths					
Ages (all), sexes (both)	2,838,062	5.19	38.39 (37.18–39.69)	43.13 (41.71–44.67)	51% of all deaths from stroke are due to hemorrhagic stroke.
1–69 years	1,426,687	–	–	–	50% of deaths due to hemorrhagic stroke occur in people under the age of 70.
1–44 years	196,006	–	–	–	7% of deaths due to hemorrhagic stroke occur in people under the age of 44.
Men (all ages)	1,588,305	5.30	42.63 (41.02–44.23)	52.99 (50.95–55.10)	56% of deaths due to hemorrhagic stroke occur in men.
Women (all ages)	1,249,757	5.06	34.09 (32.51–35.79)	34.77 (33.15–36.53)	44% of deaths due to hemorrhagic stroke occur in women.
Measure: DALYs					
Ages (all), sexes (both)	64,547,700	2.71	873.18 (847.13–899.55)	923.62 (896.18–951.85)	Hemorrhagic strokes are responsible for over 64.5 million years of healthy life lost each year.
1–69 years	46,921,999	–	–	–	Almost three-quarters (73%) of healthy years of life lost due to hemorrhagic stroke occur in people under the age of 70 years. 73% of healthy years of life lost due to hemorrhagic stroke occur in people under the age of 70 years.
1–44 years	10,509,128	–	–	–	16% of healthy years of life lost due to hemorrhagic stroke occur in people under the age of 44 years.
Men (all ages)	38,111,410	2.93	1,022.88 (986.61–1,060.75)	1,137.11 (1,097.49–1,179.49)	Men account for 59% of all years of healthy life lost due to hemorrhagic stroke.
Women (all ages)	26,436,290	2.43	721.05 (689.95–754.35)	726.48 (695.29–760.07)	Women account for 41% of all years of healthy life lost due to hemorrhagic stroke.

WSO: World Stroke Organization.

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Table 4. Incidence and prevalence for major stroke risk factor of atrial fibrillation

Atrial fibrillation and flutter (B 2.6)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Measure: Incidence					
Ages (all), sexes (both)	3,841,072	0.01	51.96 (45.71–59.35)	57.92 (51.07–66.26)	There are almost 4 million new cases of atrial fibrillation diagnosed each year.
Men	1,925,572	0.01	51.68 (45.61–59.05)	62.18 (54.85–71.12)	Half of all new cases of atrial fibrillation each year occur in men.
Women	1,915,501	0.01	52.25 (45.93–59.67)	53.87 (47.32–61.70)	Half of all new cases of atrial fibrillation each year occur in women.
Measure: Prevalence					
Ages (all), sexes (both)	46,310,600	0.65	626.47 (560.60–703.62)	715.47 (637.51–806.78)	There are over 46 million people who have atrial fibrillation.
Men	23,197,500	0.65	622.60 (557.83–697.20)	796.41 (713.46–893.79)	Half of all people living with atrial fibrillation globally are men.
Women	23,113,101	0.65	630.41 (560.08–711.11)	648.24 (575.37–733.34)	Half of all people living with atrial fibrillation globally are women.

WSO: World Stroke Organization.

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Table 5. Incidence and prevalence for major stroke risk factor of diabetes

Diabetes (B 2.6)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Measure: Incidence					
Ages (all), sexes (both)	20,827,783	0.05	281.75 (259.20–307.54)	280.05 (258.16–305.35)	There were 20.8 million new cases of diabetes diagnosed in 2016.
Men	10,744,013	0.05	288.36 (264.90–314.98)	289.99 (266.91–315.61)	52% of new cases of diabetes diagnosed in 2016 were men.
Women	10,083,771	0.04	275.03 (252.41–300.87)	269.79 (248.11–295.02)	48% of new cases of diabetes diagnosed in 2016 were women.

(continued)

Table 5. Continued

Diabetes (B 2.6)					
	Number	Percent of total from all causes	Crude rate per 100,000 per year (UI)*	Age-adjusted rate per 100,000, per year (UI)	Approved statement for use in WSO materials
Measure: Prevalence					
Ages (all), sexes (both)	383,453,016	5.38	5,187.21 (4,769.67–5,608.23)	5,334.83 (4,908.60–5,759.71)	Over 383 million people have diabetes.
Men	198,739,364	5.60	5,333.99 (4,907.77–5,779.51)	5,672.49 (5,225.48–6,136.63)	Among people living with diabetes globally, 52% are men.
Women	184,713,652	5.17	5,038.04 (4,625.33–5,441.08)	5,009.53 (4,612.78–5,412.94)	Among people living with diabetes globally, 48% are women.

WSO: World Stroke Organization.

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Table 6. 2016 Global Burden of Disease estimates for stroke burden (as measured by DALYs) attributable to risk factors*

1. Metabolic risks (high systolic blood pressure (SBP), high body-mass index (BMI), high fasting plasma glucose (FPG), high total cholesterol, and low glomerular filtration rate) account for 72.1% (66.4–77.3) of stroke burden.
2. Behavioral factors (smoking, poor diet, and low physical activity) account for 66.3% [59.3 to 73.1] of stroke burden, and environmental risks (air pollution and lead exposure) 28.1% [25.3 to 30.9].
3. Globally, high systolic blood pressure is the largest single risk for stroke (57.3% [49.8–64.4]) followed by dietary risk factors (51.1% [40.7–61.2]), high BMI (23.6% [15.1–33.3]), smoking (23.4% [20.2–26.6]), high fasting glucose (17.3% [11.6–24.7]), alcohol use (11.9% [9.4–14.6]), high LDL cholesterol (10.0% [5.9–16.7]), impaired kidney function (8.6% [7.1–10.2]), and low physical activity (4.5% [0.8–8.6]).
4. All risk factors combined account for 88.8% (86.5–90.9) of the global stroke burden.

*From the GBD viz <http://ghdx.healthdata.org/gbd-results-tool>

diseases, including stroke. The WSO has developed a set of guidelines for stroke care leaders and frontline providers offering easy access to current evidence-based recommendations to guide stroke care planning and delivery across the continuum of care (<https://www.world-stroke.org/2016-12-19-10-55-24/roadmap-to-delivering-quality-stroke-care>). In addition, a road map has

been developed to provide additional details on implementation strategies (https://www.world-stroke.org/images/GSGAAP/Global_Stroke_Guidelines_and_Action_Plan_All_in_one.pdf) and metrics to monitor progress and identify opportunities for ongoing improvement efforts at the local, regional, and national levels. With these combined efforts, progress will be made towards the non-communicable disease targets, and achieve a measurable decrease in stroke burden worldwide.

Contributions

Patrice Lindsay and Valery Feigin conducted the literature reviews, calculated the statistics, and developed the draft Fact Sheet. Bo Norrving, Ralph L Sacco, Michael Branin, Werner Hacke, Sheila Martins, and Jeyaraj Pandian provided guidance, input, and edits throughout the development of this work.



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