

Global burden of stroke 1990-2010: updates from GBD Project

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Disclosure statement

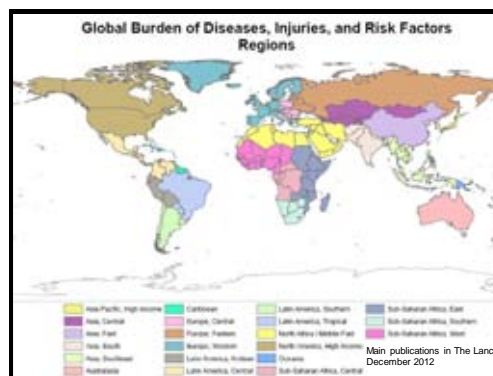
- None
- Data presented here are part of the 2 stroke GBD papers that has been accepted for publication in *The Lancet* and *The Lancet Global Health* (expected publication date - October 2013)

Learning objectives

- Methodology of the GBD 2010 Study
- The current level of the global burden of stroke in terms of incidence, prevalence, mortality and DALYs
- Differences in stroke burden in HIC and LMIC

Why bother?

- Evidence-based health care planning and resource allocation (e.g. number of ASU, rehab services etc)
- Objective measure of effectiveness of the interventions on a population level (RCTs etc)
- Informing priorities for future research to reduce stroke burden



Criteria for literature search*

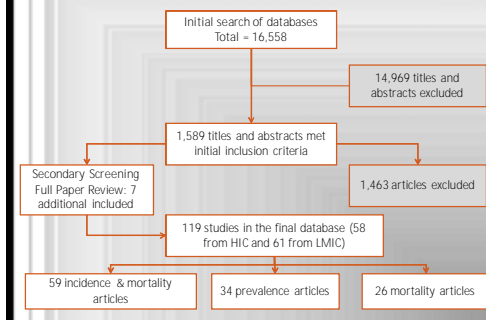
- Publications from 1990 to 2010
- Multiple data bases were searched including:
 - Medline, EMBASE, LILACS
 - Global Health Database (formerly CAB abstracts)
 - WHO library and WHO regional databases
- Broad search terms relevant to stroke
- Literature retrieval completeness check by comparing 50 key citations nominated by nine stroke experts across GBD regions

*D Bennett et al. Neuroepidemiology 2012;38:30-40

Core inclusion criteria

- WHO stroke diagnostic criteria (TIA excluded)
- Distinguish between 1st ever and recurrent stroke
- Raw data on stroke incidence, prevalence, mortality
- Reliable data on population denominator
- Incidence and case fatality studies from developed countries require a complete stroke case ascertainment
- Less rigorous stroke case ascertainment is only allowed for studies from developing (low to middle income) countries (methodologically most sound studies from such countries were given a priority)

Literature search flowchart



DisMod III Model Assumptions

Assumptions

- Relevant strokes occur after age of 10
- No remission possible
- Same Relative Risk of Mortality for different subtypes of stroke
 - Decreasing after age 50
 - Constrained to be 1.5-100

Covariates

- Ischemic Heart Disease mortality by country, sex and year (Cause of Death WG)
- Wealth Index-LDI (Common Indicators WG)

All stroke pathological types combined

Absolute numbers per year	HIC (in millions)	LMIC (in millions)	Total (millions)
Incident strokes	5.3	11.6	16.9

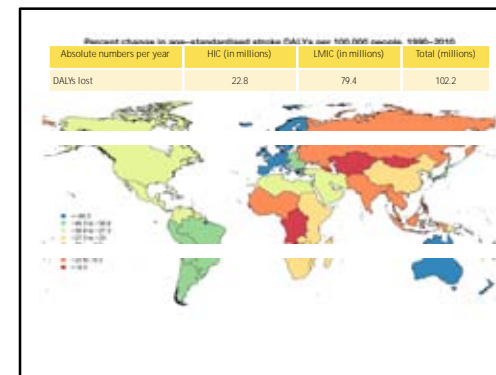
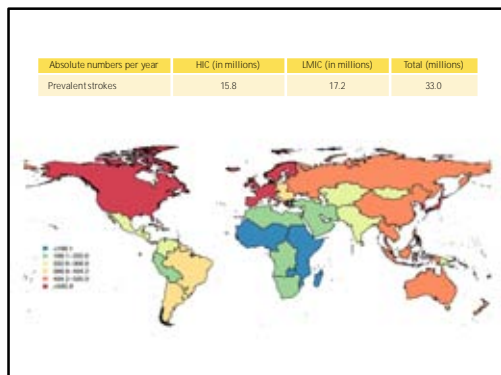
Age-standardized stroke incidence per 100,000 person-years, 2010



V Feigin et al. *The Lancet* 2013 (accepted for publication)

Absolute numbers per year	HIC (in millions)	LMIC (in millions)	Total (millions)
Fatal strokes	1.7	4.2	5.9





Mean age of incident, prevalent and fatal strokes in 2010 by country income level

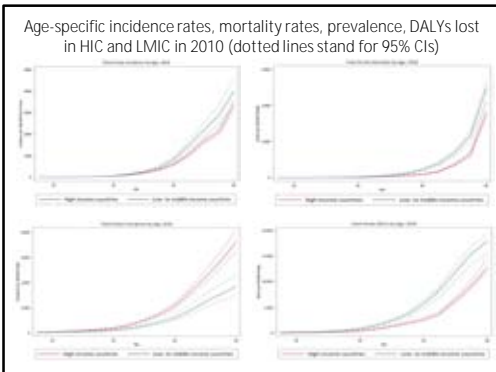
Mean age	HIC (mean age and SD)	LMIC (mean age and SD)	Total (mean age and SD)
Incidence	74.5 (0.13)	69.4 (0.17)	71.0 (0.13)
Prevalence	73.4 (0.14)	68.0 (0.16)	69.8 (0.11)
Mortality	80.4 (0.21)	72.1 (0.24)	74.5 (0.28)

Number and proportions of strokes (from total strokes in the world) in people younger than 64 years in 2010 by country income level

	HIC		LMIC		Total	
	0-20	20-64	0-20	20-64	0-20	20-64
Incident strokes, n (%)	9,503 (0.01%)	1,152,406 (6.8%)	73,940 (0.6%)	4,006,187 (34.5%)	83,443 (0.5%)	5,158,594 (30.5%)
Prevalent strokes, n (%)	74,744 (0.2%)	5,305,065 (16.1%)	53,200 (1.6%)	349,139 (51.5%)	349,139 (1.1%)	14,165,820 (42.9%)
Fatal strokes, n (%)	914 (9.6%)	188,098 (16.3%)	53,200 (53.2%)	40,278 (27.1%)	40,278 (48.3%)	1,273,299 (24.7%)

Incidence, prevalence and mortality rates per 100,000 person in people <75 yrs

Age group		High-income countries		Low to middle-income countries		Globally	
		n	Rate (95% CI)	n	Rate (95% CI)	n	Rate (95% CI)
<20	Incidence	9,503	3.27 (3.00-3.57)	73,940	3.41 (3.07-3.78)	83,443	3.40 (3.09-3.72)
	Prevalence	74,744	12.67 (11.19-14.21)	274,396	14.22 (11.19-14.21)	349,139	14.22 (12.69-16.08)
	Mortality	914	0.32 (0.24-0.37)	39,364	1.64 (1.52-1.76)	40,278	1.64 (1.20-1.95)
70-64	Incidence	1,152,406	145.47 (135.87-156.01)	4,006,187	128.48 (112.28-146.86)	5,158,594	131.93 (118.09-147.13)
	Prevalence	5,305,065	284.18 (236.48-351.47)	8,860,755	32.56 (28.18-34.96)	14,165,820	32.56 (32.18-417.06)
	Mortality	188,098	23.74 (21.54-26.19)	1,085,201	32.56 (28.18-34.96)	1,273,299	32.56 (28.18-34.96)
65-74	Incidence	1,480,593	1,354.51 (1,269.14-1,443.81)	3,746,994	1,642.37 (1,480.98-1,825.32)	5,227,587	1,642.37 (1,480.98-1,825.32)
	Prevalence	4,177,374	4,360.471 (3,488.19-5,255.77)	2,095.48 (1,746.81-2,593.74)	8,537,845	2,692.37 (2,406.39-3,049.78)	
	Mortality	279,685	255.87 (238.47-278.24)	1,075,236	1,354.921 (444.36-1,557.34)	1,354,921	425.68 (374.55-459.14)

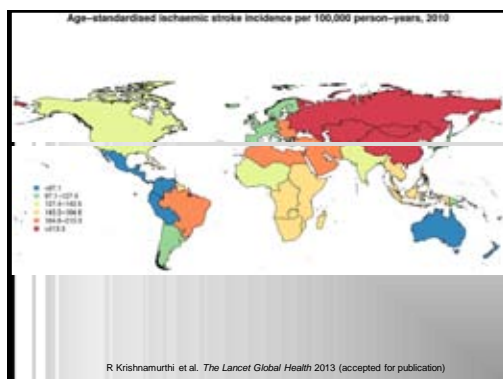


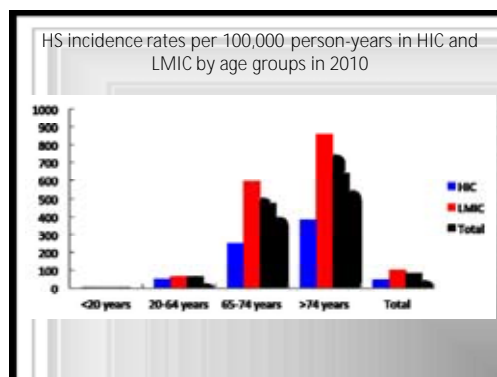
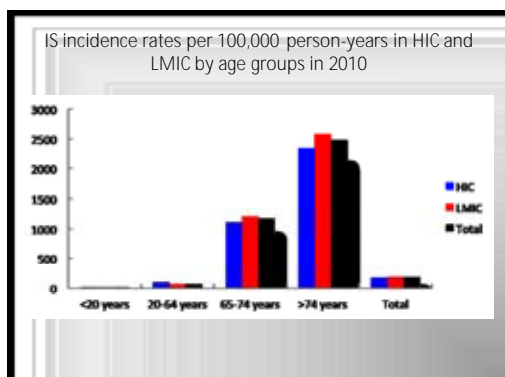
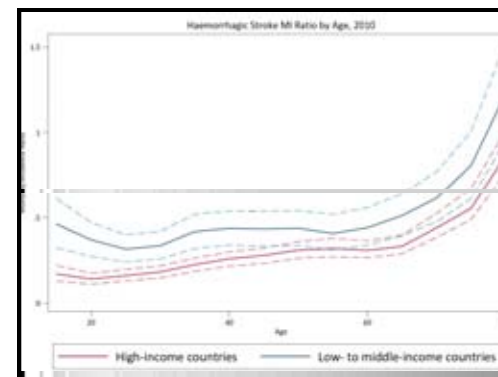
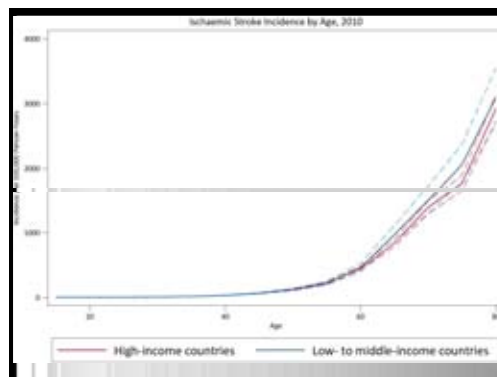
Summary of total stroke burden

- In 2010, there were 16.9 million incident strokes worldwide, 33.0 million stroke survivors, 5.9 million deaths from stroke and over 102 million DALYs lost due to stroke, with the bulk of the stroke burden borne by the low and middle-income countries (69% of new strokes, 52% of prevalent strokes, 71% of deaths from stroke and 78% DALYs lost)
- Stroke accounted for 11.1% of all deaths and 4.1% of all DALYs lost in the world
- Age-specific incidence, mortality, MIR and DALYs lost in LMIC were significantly greater than those in HIC, but age-specific stroke prevalence was significantly greater in HIC
- The bulk of stroke burden (61.9% of new strokes, 69.8% of prevalent strokes, 45.4% of deaths from stroke and 71.5% DALYs lost) is bearing by people younger than 75 years, especially in LMIC

Ischaemic stroke (IS) and haemorrhagic strokes (ICH+SAH)

R Krishnamurthi et al. *The Lancet Global Health* 2013 (accepted for publication)






Summary of IS and HS burden

- The bulk of the IS and HS burden is borne by LMIC (63.2% of incident IS and 80.3% of incident HS; 57.3% fatal IS and 83.6% fatal HS; 63.8% and 86.4% of DALYs lost due to IS and HS, respectively).
- In 2010, IS and HS constituted 68.5% and 31.5%, respectively (in HIC – 80.2% and 19.8%; in LMIC – 63.1% and 36.9%, respectively)
- Approximately 24% of all IS and 47% of all HS currently occur in people less than 65 years, with 73% and 83% of them, residing in LMIC respectively

GBD Stroke Experts Group ACKNOWLEDGEMENTS

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- V Feigin et al. GLOBAL AND REGIONAL BURDEN OF STROKE IN 1990-2010: Incidence, mortality, prevalence, and disability-adjusted life-years lost. *The Lancet* 2013 (paper in press for October publication)
- R Krishnamurthi, V Feigin et al. GLOBAL AND REGIONAL BURDEN OF ISCHAEMIC AND HAEMORRHAGIC STROKES IN 1990-2010: Incidence, mortality, and disability-adjusted life-years lost. *The Lancet Global Health* 2013 (paper in press for October publication)