

# STROKE: WORLD WIDE BURDEN



MAY 13, 2021

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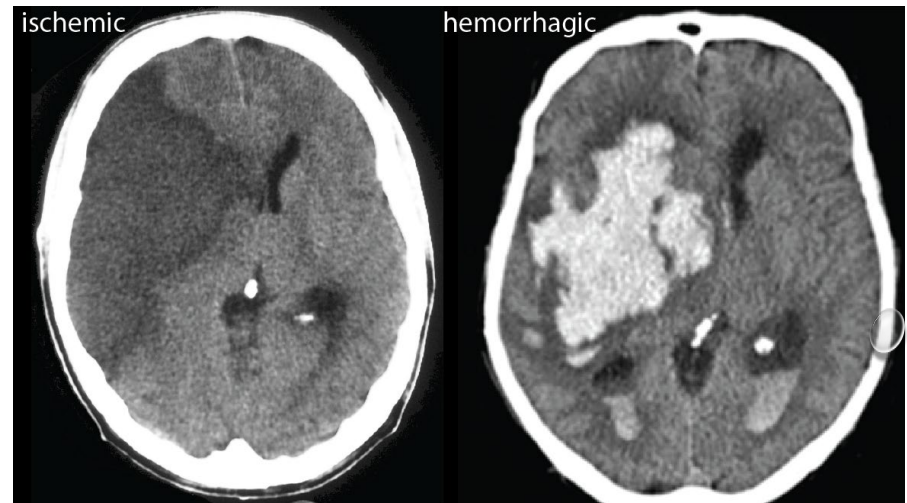
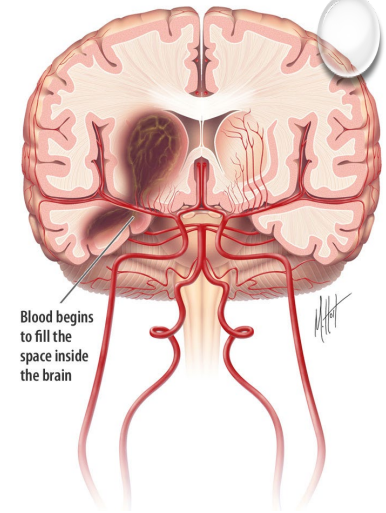
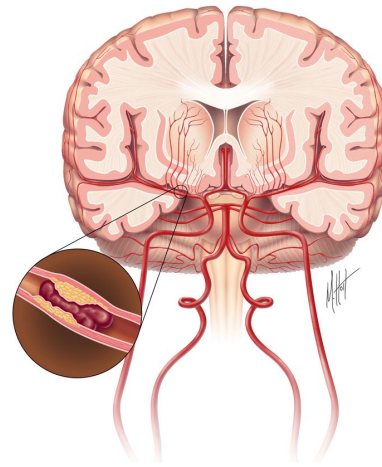
PROGRAM MANAGER

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## DEFINITIONS

- **STROKE**

- “BRAIN ATTACK”
- **ISCHEMIC:** BLOOD SUPPLY IS BLOCKED TO PART OF BRAIN
- **HEMORRHAGIC:** BLOOD VESSEL SUPPLYING PART OF BRAIN BUSTS



# DEFINITIONS, CONT.

- **YEARS OF LIFE LOST (YLL)**

- = NUMBER OF DEATHS X STANDARD LIFE EXPECTANCY AT AGE OF DEATH (YRS)

- **YEARS LOST TO DISABILITY (YLD)**

- = INCIDENCE/PREVALENCE OF CASES X DISABILITY WEIGHT X AVERAGE DURATION UNTIL REMISSION OR DEATH

- **DISABILITY ADJUSTED LIFE YEAR (DALY)**

- 1 DALY = 1 LOST YEAR OF “HEALTHY” LIFE
- $DALY = YLL + YLD$
- SUM ACROSS POPULATION/BURDEN OF DISEASE
- MEASURES GAP BETWEEN CURRENT HEALTH STATUS AND IDEAL HEALTH SITUATION (EVERYONE LIVES TO ADVANCED AGE, FREE OF DISEASE & DISABILITY)



# THE UNITED STATES

STROKE DEATHS AND DISABILITY



# UNITED STATES

- **MORBIDITY (2018)**

- 3.1% / 7.8 MILLION – ADULTS WHO HAVE EVER HAD A STROKE

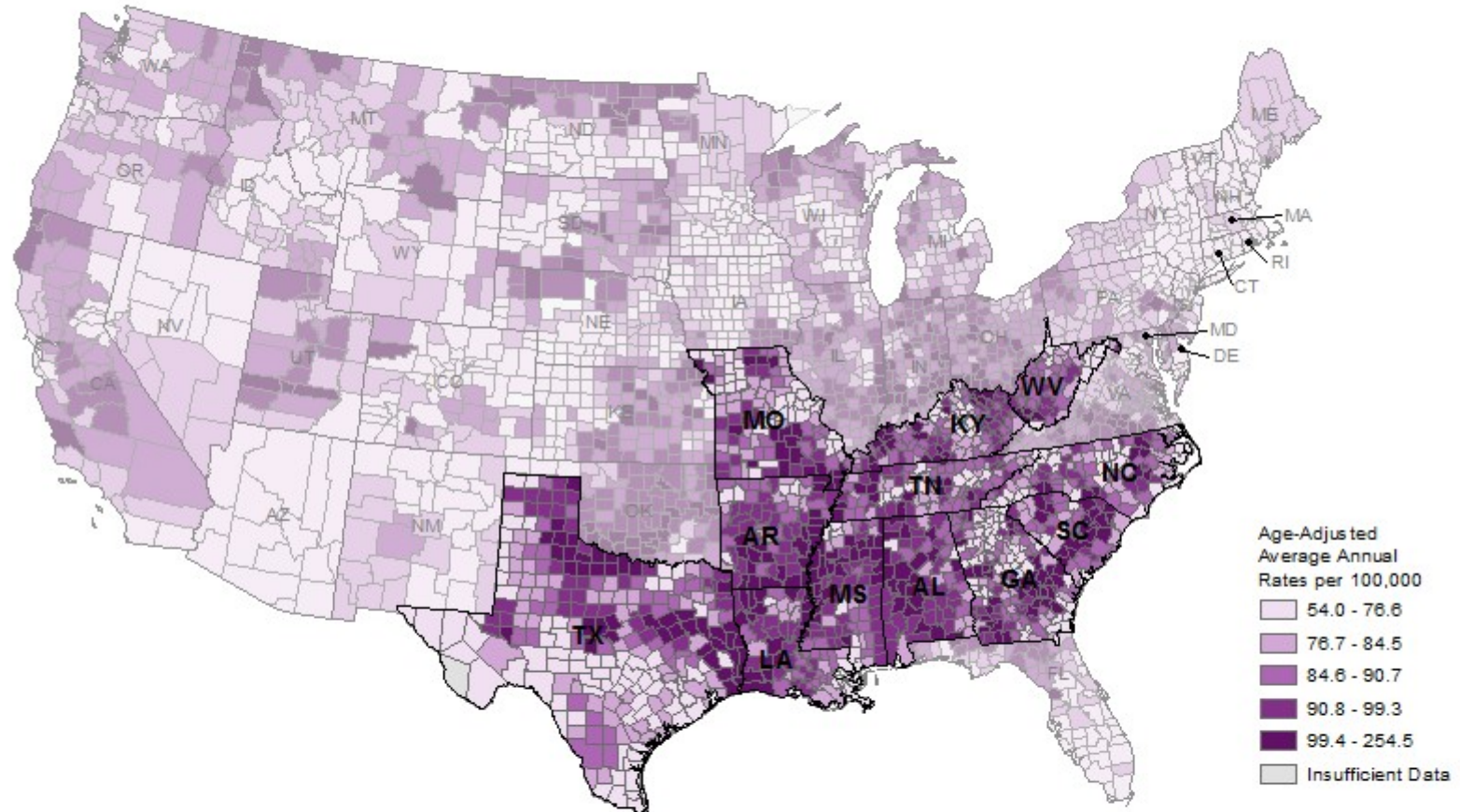
- **PRIMARY DIAGNOSIS (2018)**

- 2.2 MILLION – PCP OFFICE VISITS
- 492,000 – ER VISITS

- **MORTALITY (2019)**

- 150,005 DEATHS DUE TO STROKE
- 45.7 DEATHS PER 100,000
- #5 CAUSE OF DEATH

## Counties with High Stroke Mortality Rates are Concentrated in the South



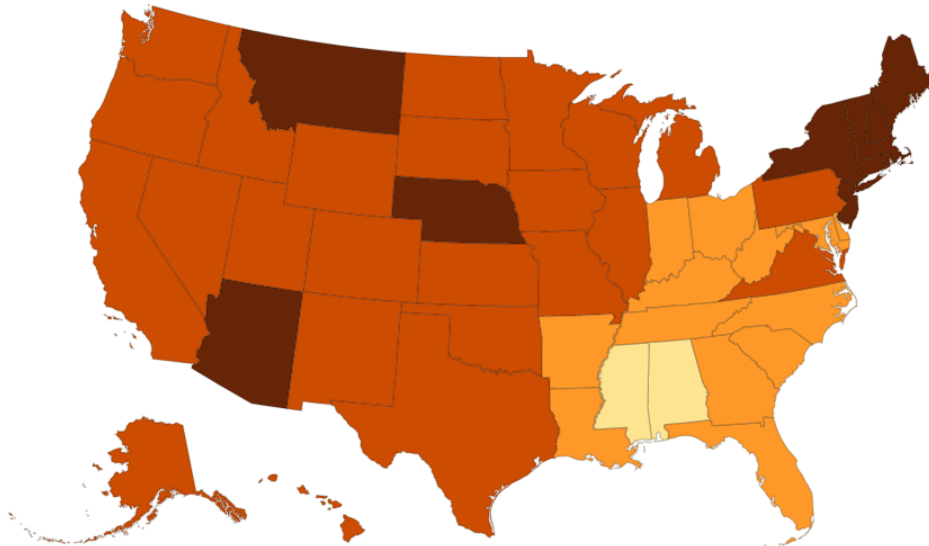
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:  
National Vital Statistics System  
National Center for Health Statistics



# STROKE MORTALITY BY STATE (2019)

## Stroke Mortality by State



### Age-Adjusted Death Rates<sup>1</sup>



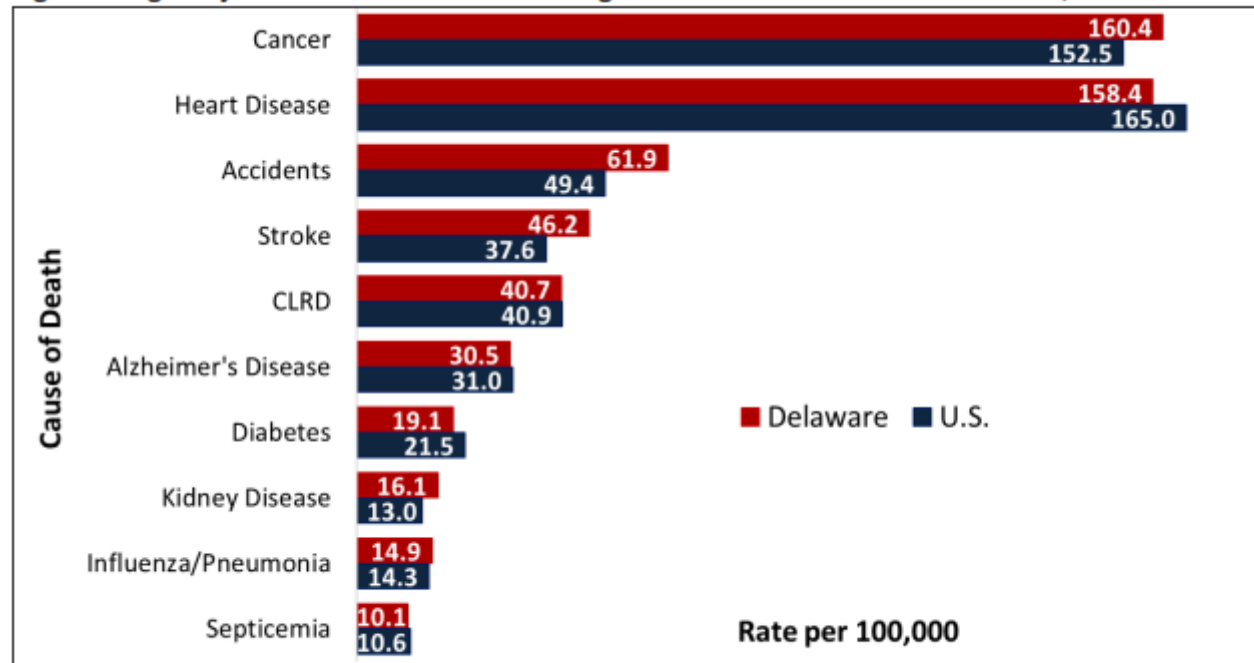
## Leading Causes of Death

1. [Cancer](#)
2. [Heart Disease](#)
3. [Accidents](#)
4. [Stroke](#)
5. [Chronic Lower Respiratory Diseases](#)
6. [Alzheimer's Disease](#)
7. [Diabetes](#)
8. [Kidney Disease](#)
9. [Influenza/Pneumonia](#)
10. [Chronic Liver Disease/Cirrhosis](#)



# STROKE IN DELAWARE

Figure 1: Age-Adjusted Death Rates for Leading Causes of Death: Delaware vs. U.S., 2017.



Note: CLRD: Chronic Lower Respiratory Diseases. Source: Centers for Disease Control and Prevention, Stats of the State of Delaware, Delaware Leading Causes of Death, 2017.

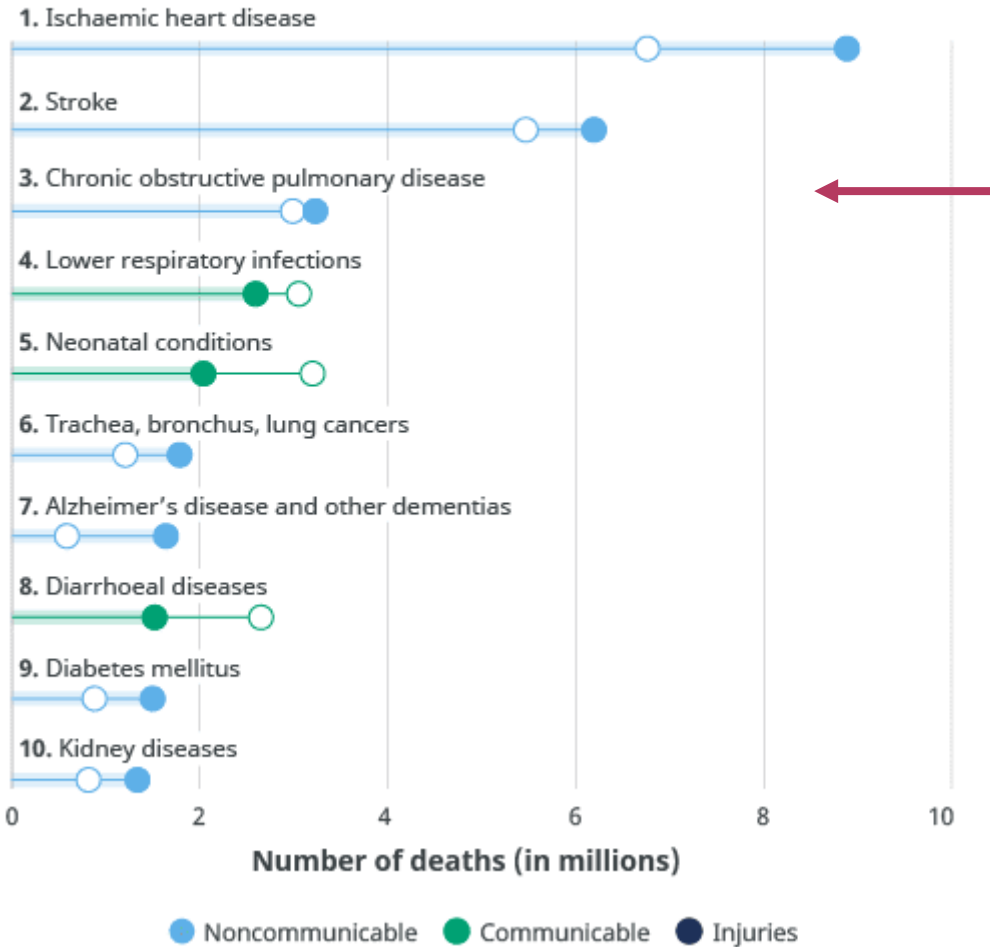


# THE WORLD

# WORLD HEALTH ORGANIZATION

## Leading causes of death globally

○ 2000 ● 2019



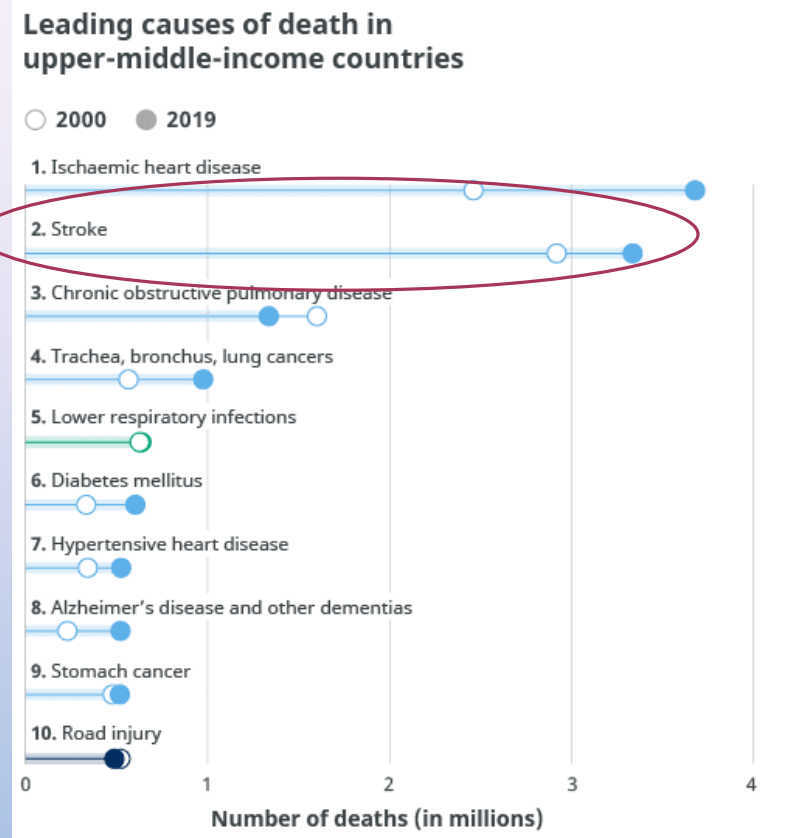
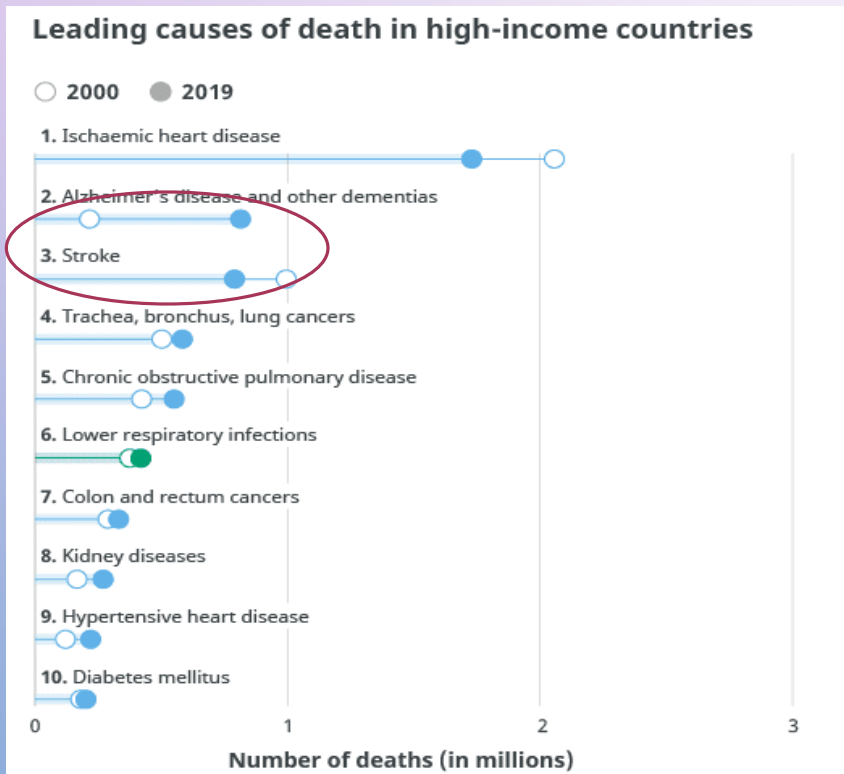
• IHD AND STROKE HAVE BEEN THE LEADING CAUSES OF DEATH IN THE LAST 15 YEARS

• ~ 80% ARE PREVENTABLE

• IHD = 16%

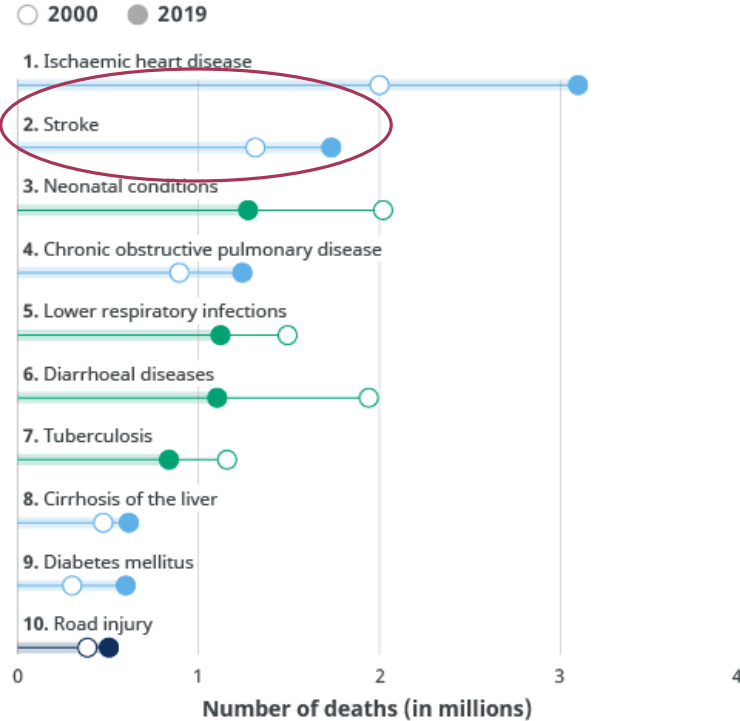
• STROKE = 11%

# LEADING CAUSES OF DEATH

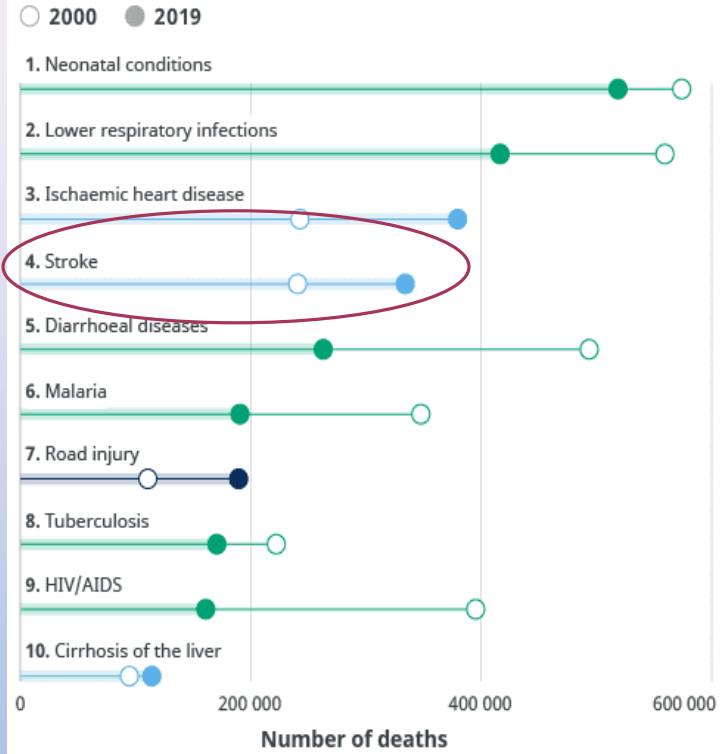


# LEADING CAUSES OF DEATH

Leading causes of death in lower-middle-income countries

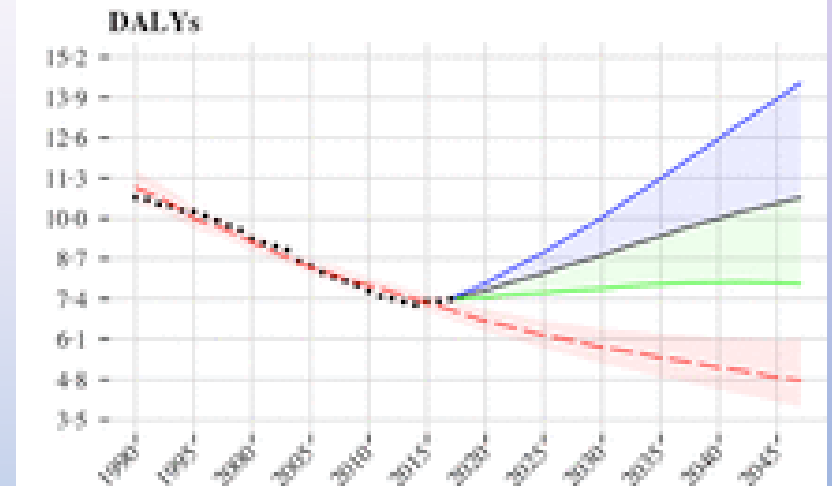
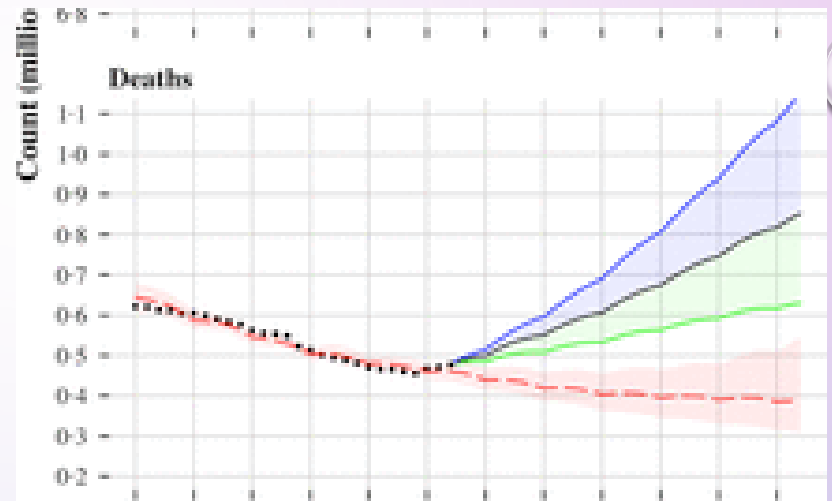
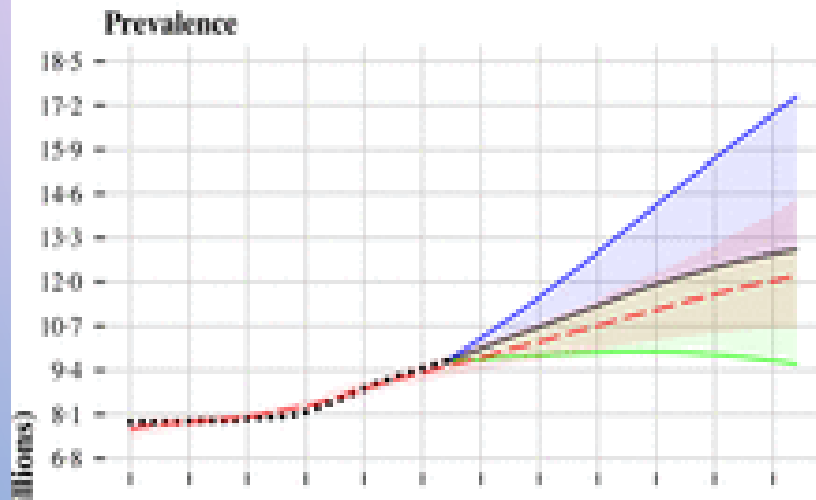
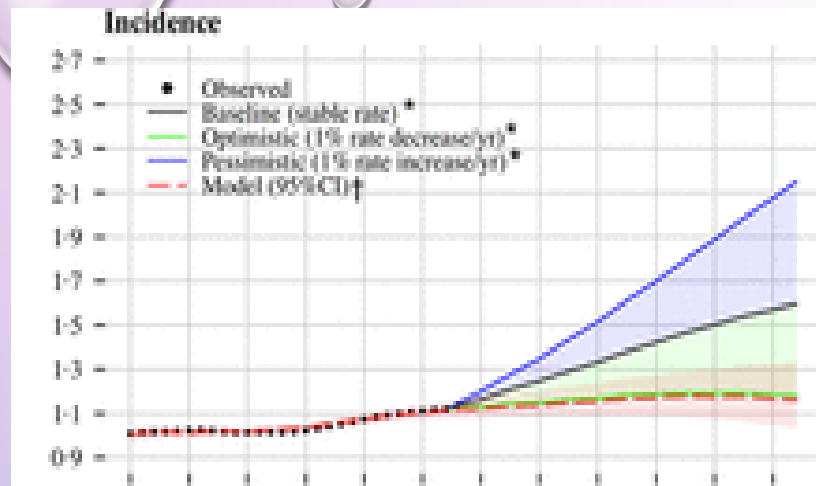


Leading causes of death in low-income countries



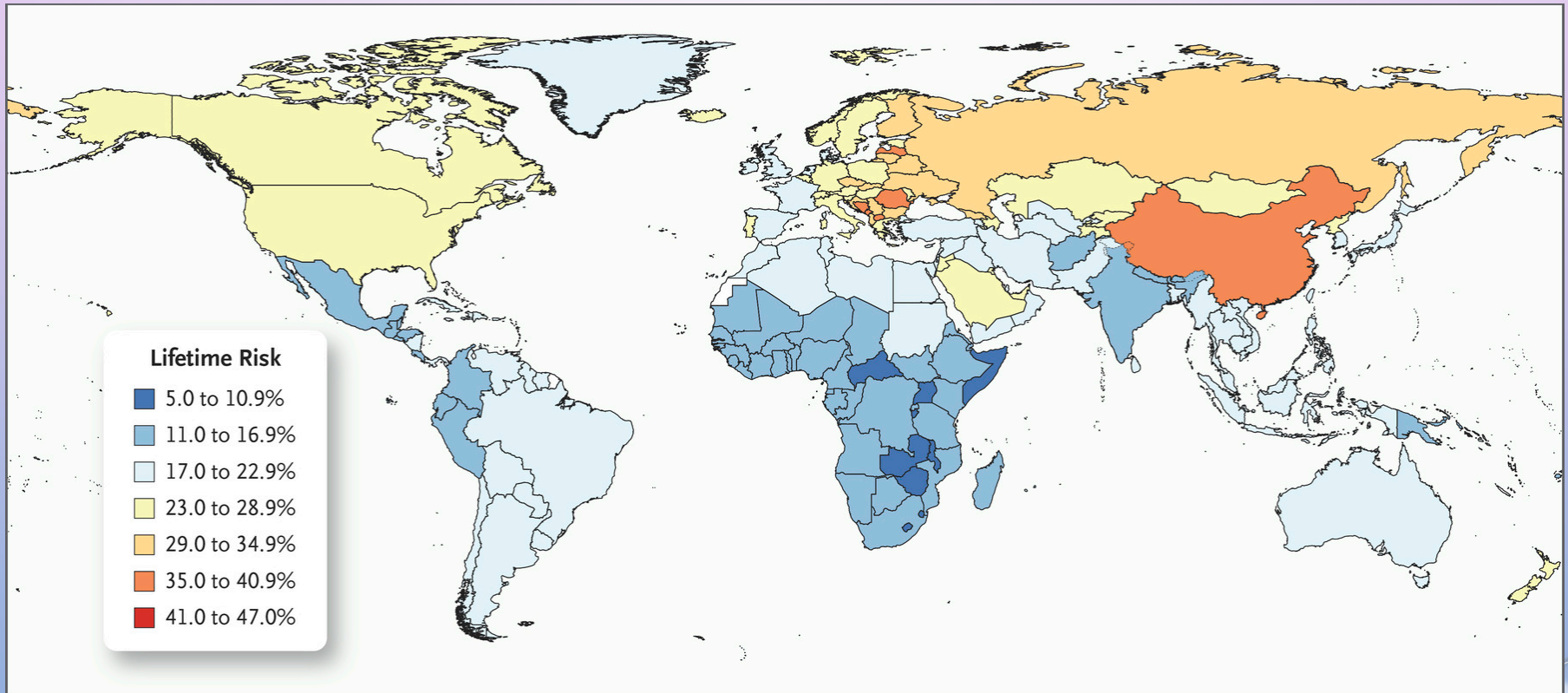
# GLOBAL BURDEN OF DISEASE

- STROKE
  - INCIDENT (NEW): 11.9 MILLION
  - PREVALENT (SURVIVORS): 104.2 MILLION
  - FATAL: 6.2 MILLION
  - STROKE-RELATED DALYS: 132.1 MILLION
- INCREASE IN STROKE BURDEN
  - ALL ABOVE DATA DECLINED 1990-2017
  - ABSOLUTE NUMBER HAS ALMOST DOUBLED
  - DEVELOPING COUNTRIES (80% INCIDENT, 77% PREVALENT, 87% DEATHS, 89 DALYS)



# EUROPE: 1990 - 2047

# GLOBAL LIFETIME RISK



# RISK FACTORS



## MODIFIABLE (~90%)

- HYPERTENSION (HIGH BLOOD PRESSURE)
- OBESITY
- HYPERGLYCEMIA (HIGH BLOOD SUGAR)
- HYPERLIPIDEMIA (HIGH BLOOD LIPIDS)
- RENAL (KIDNEY) DYSFUNCTION

## BEHAVIORAL (74%)

- SMOKING
- SEDENTARY LIFESTYLE
- UNHEALTHY DIET
- AIR POLLUTION (29%)





## WHAT ARE THE IMPORTANT HYPERTENSION STATISTICS?

**1.13**

Billion

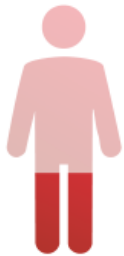
Around the world, hypertension affects about **1.13 billion** people. It is the leading global risk for death. Hypertension is responsible for **1 in 8 (12.8%) deaths** worldwide.

**50%**

of people with hypertension don't know they have it.

**27 397**

Deaths/day



In men, the prevalence is around 24%.



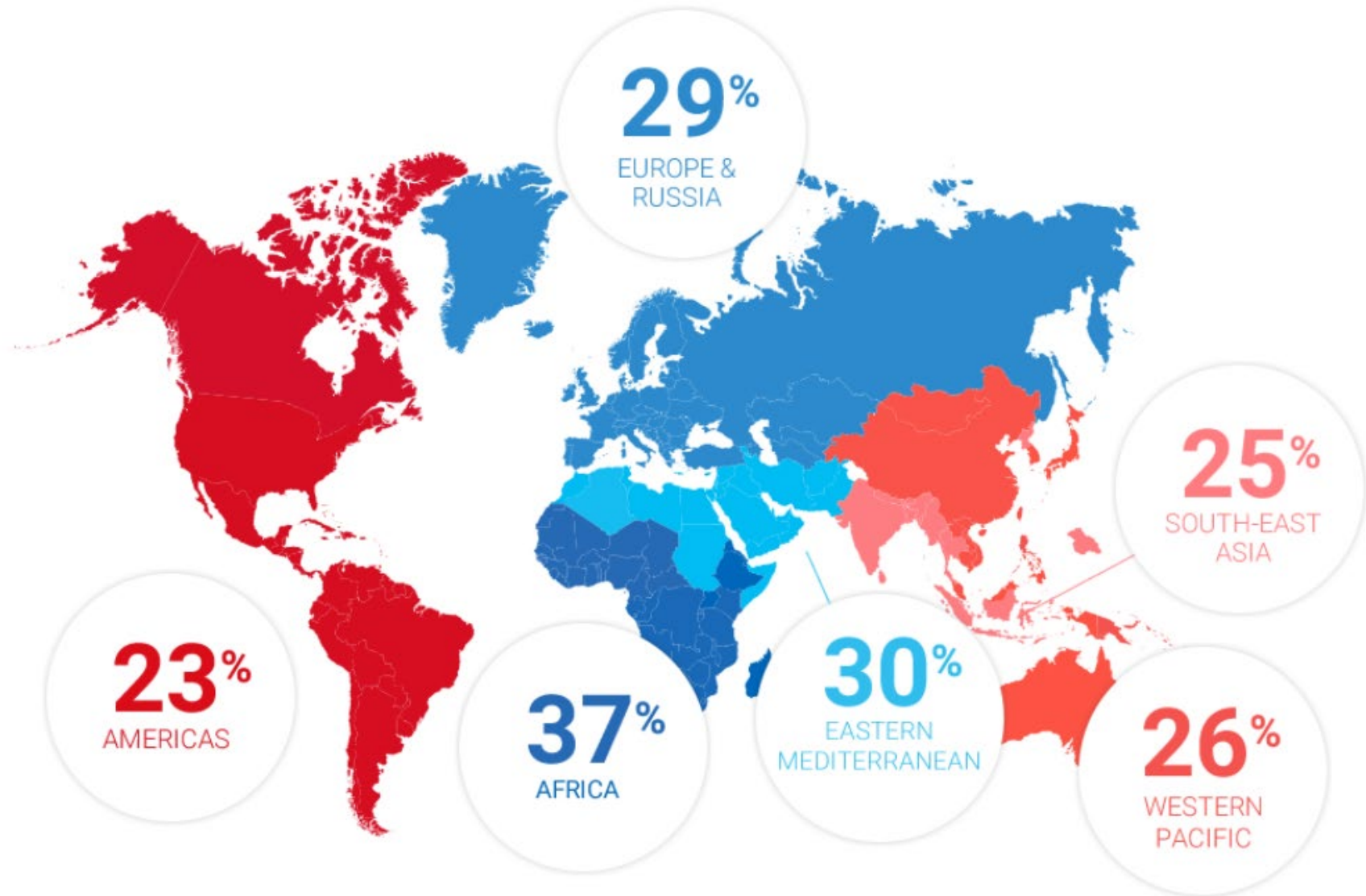
The prevalence of hypertension is around 20% in women.



In patients over 60 years old, the prevalence increases to 60%.

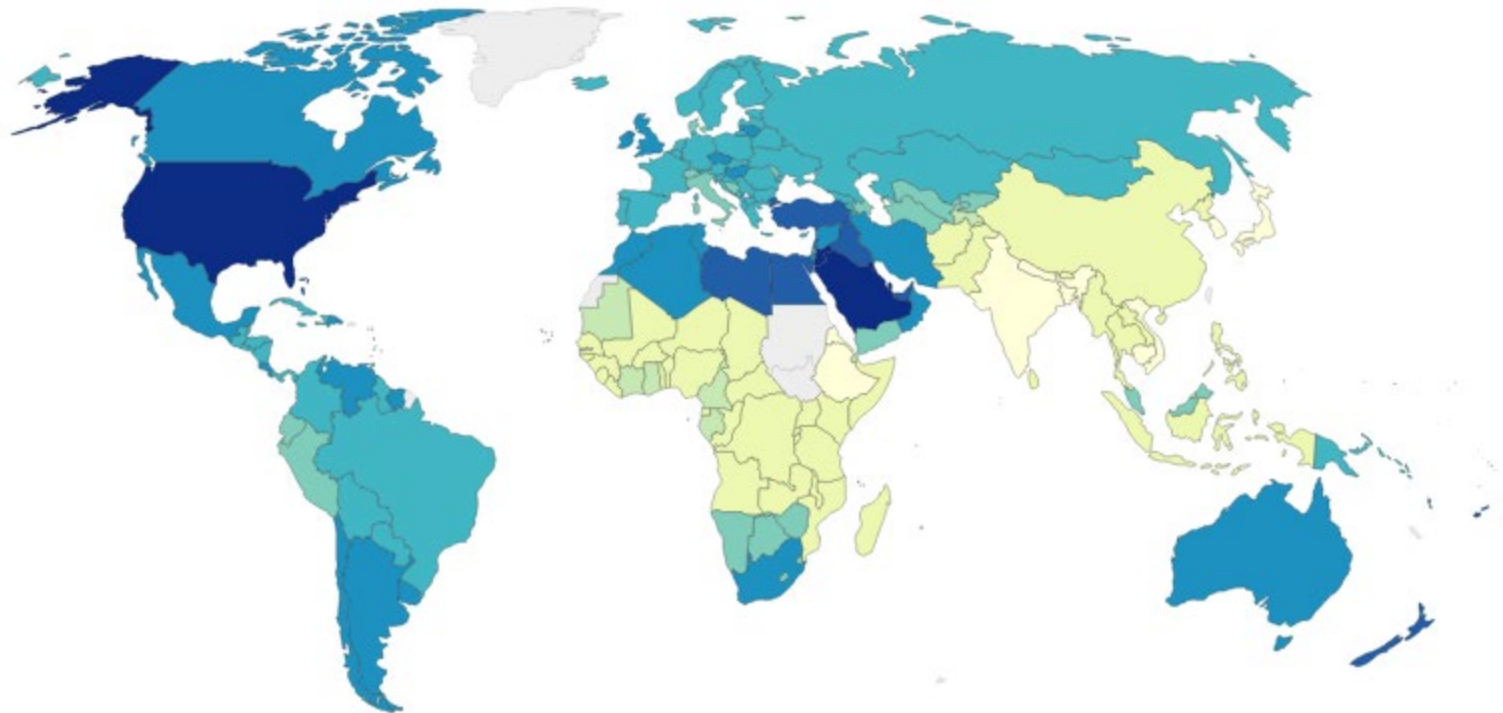
Williams B et al. *Eur Heart J*. 2018;39(33):3021-3104.

World Health Organisation. A global brief on hypertension Silent killer, public health crisis.. Published April 2013. Accessed December 16, 2019.



# Share of adults that are obese, 2016

Obesity is defined as having a body-mass index (BMI) equal to or greater than 30. BMI is a person's weight in kilograms divided by his or her height in metres squared.

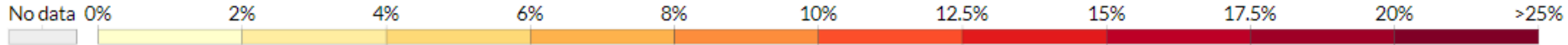
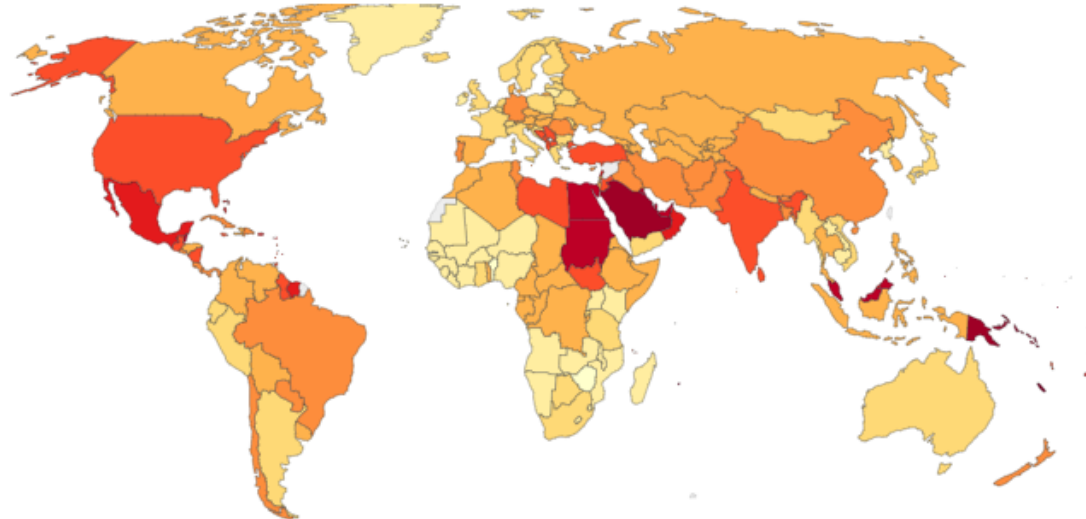


Source: WHO, Global Health Observatory

OurWorldInData.org/obesity • CC BY

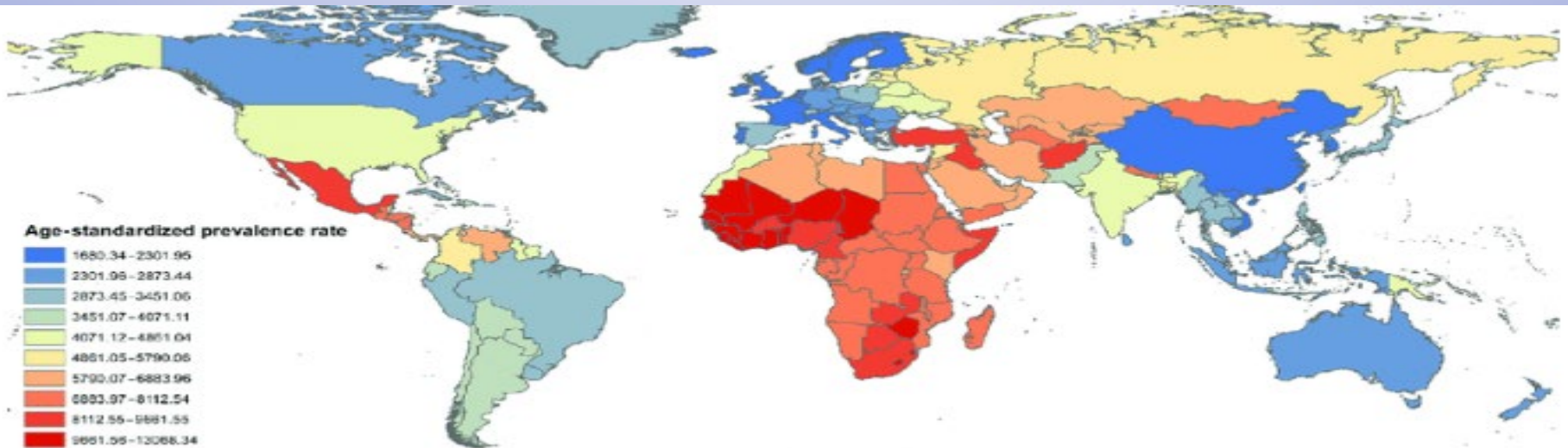
# DIABETES

Our World, 2017

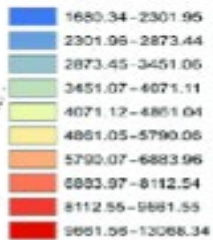


# CHRONIC KIDNEY DISEASE

Xie, et al, 2018



Age-standardized prevalence rate



# RISK FACTORS



## MODIFIABLE (~90%)

- HYPERTENSION (HIGH BLOOD PRESSURE)
- OBESITY
- HYPERGLYCEMIA (HIGH BLOOD SUGAR)
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## BEHAVIORAL (74%)

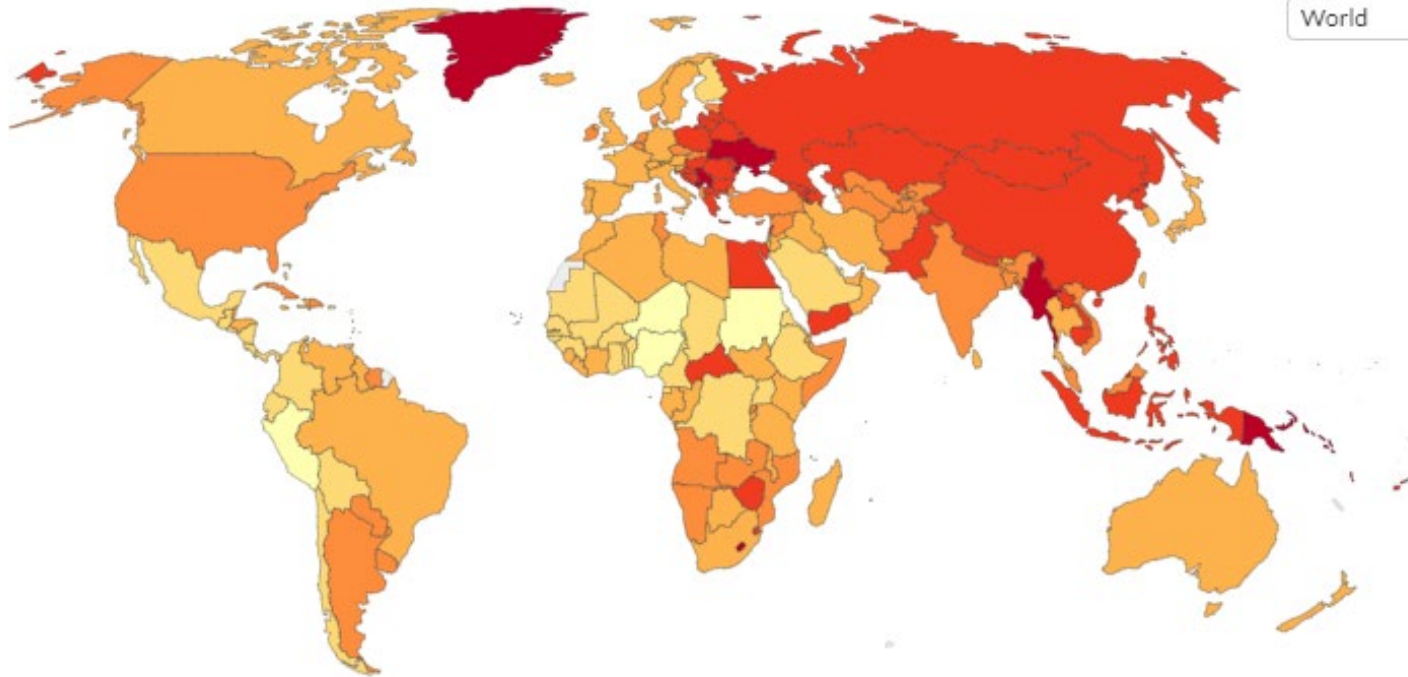
- SMOKING
- SEDENTARY LIFESTYLE
- UNHEALTHY DIET
- AIR POLLUTION (29%)

# Death rate from smoking, 2017

The annual number of deaths attributed to smoking per 100,000 people.

Our World  
in Data

World



Source: IHME, Global Burden of Disease (GBD)  
Note: To allow comparisons between countries and over time this metric is age-standardized.

OurWorldInData.org/smoking • CC BY

# SEDENTARY LIFESTYLE

## Global inactivity

MOST INACTIVE

**Kuwait**

**67%**

of adults inactive

MOST ACTIVE

**Uganda**

**5.5%**

of adults inactive

Inactive adults

0 - 15%

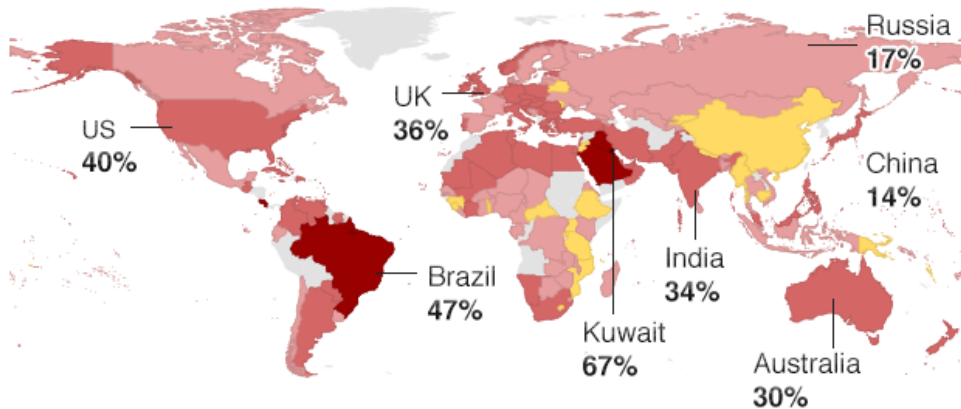
15 - 30%

30 - 45%

45 - 60%

> 60%

No data



Source: The Lancet

BBC

# AIR POLLUTION

Air Quality Scale

Good

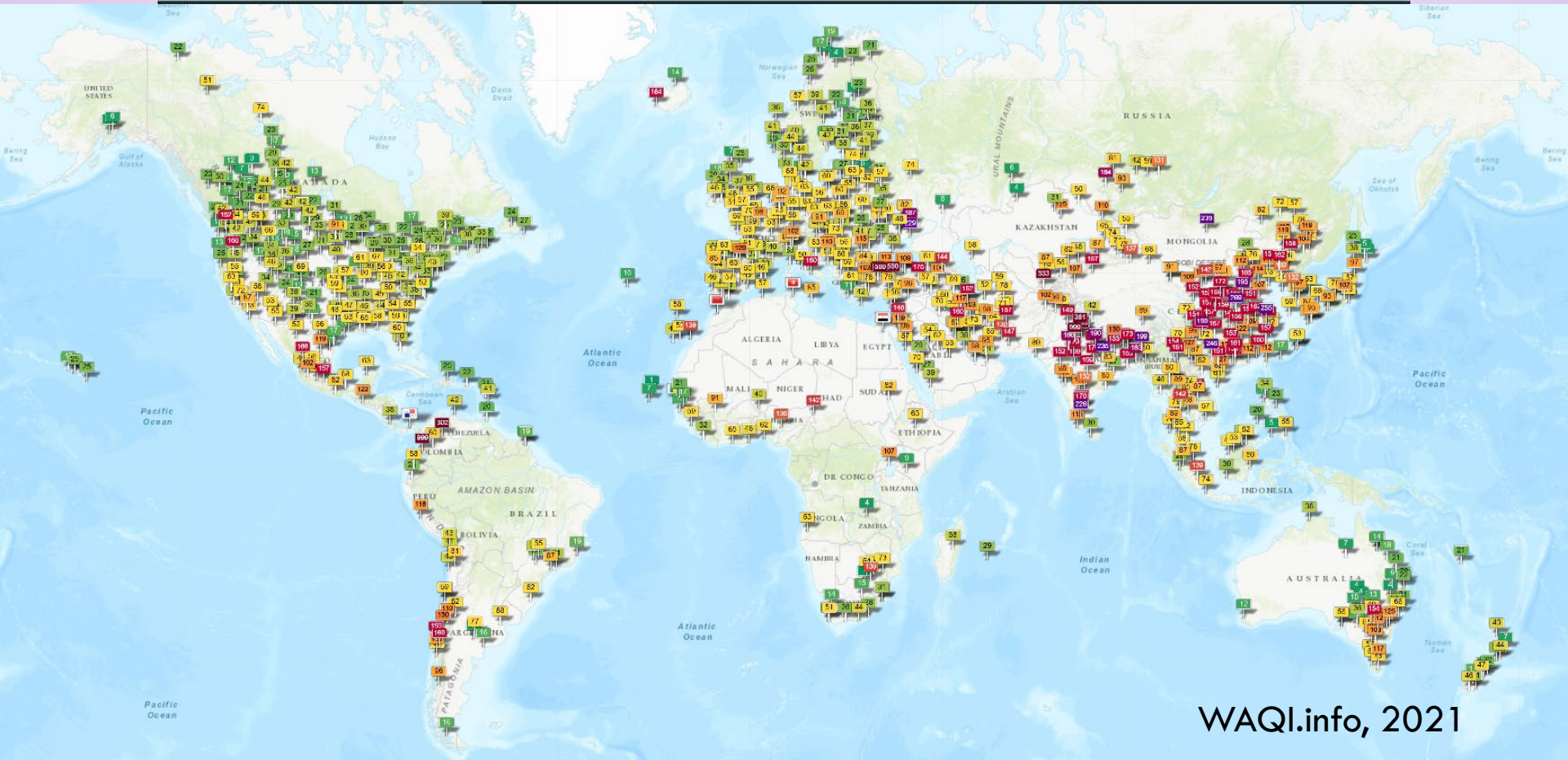
Moderate

Unhealthy  
for sensitive groups

Unhealthy

Very  
Unhealthy

Hazardous



WAQI.info, 2021



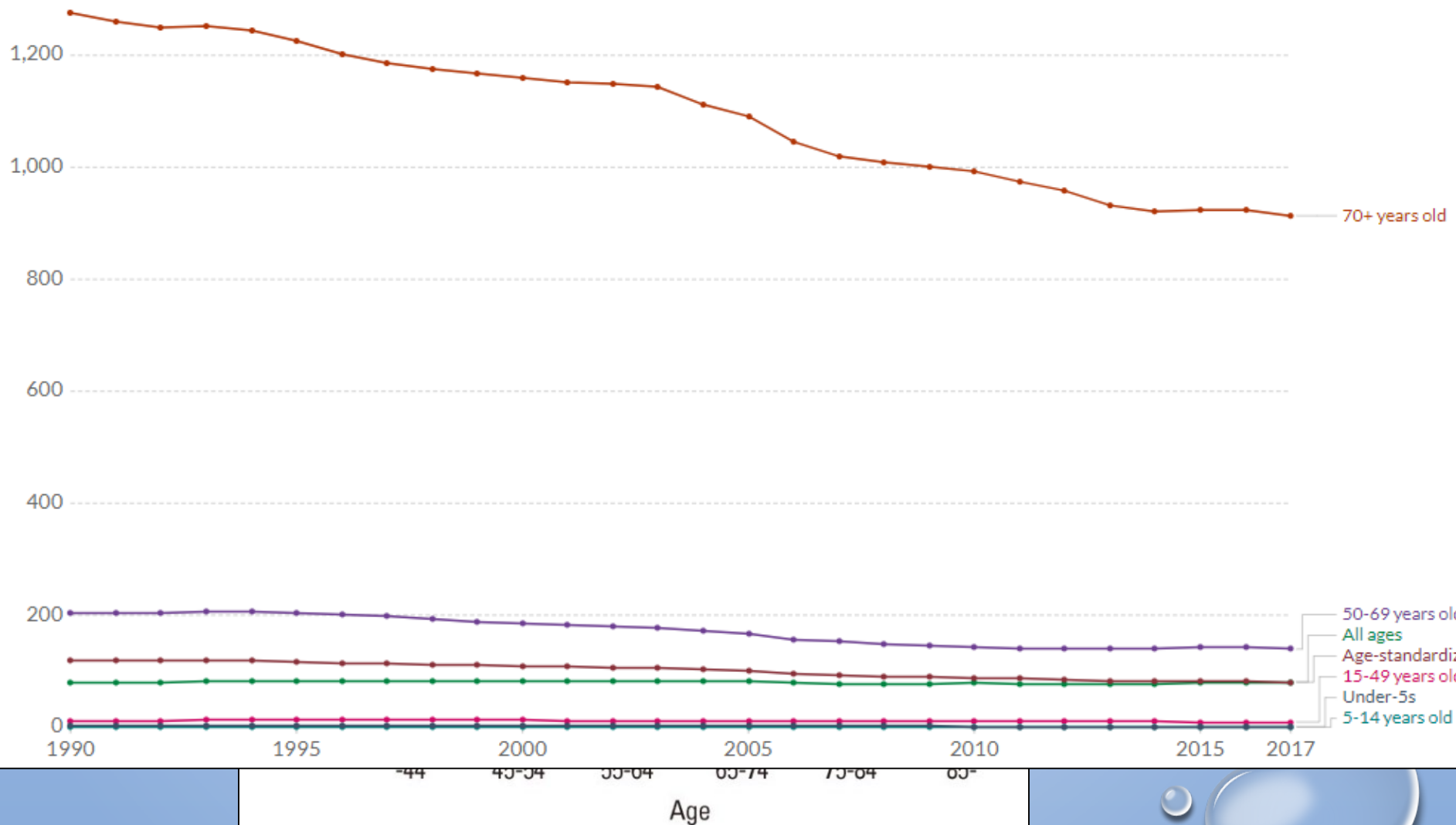
# AGE

NUMBER ONE NON-MODIFIABLE RISK FACTOR

# Stroke death rates by age, World, 1990 to 2017

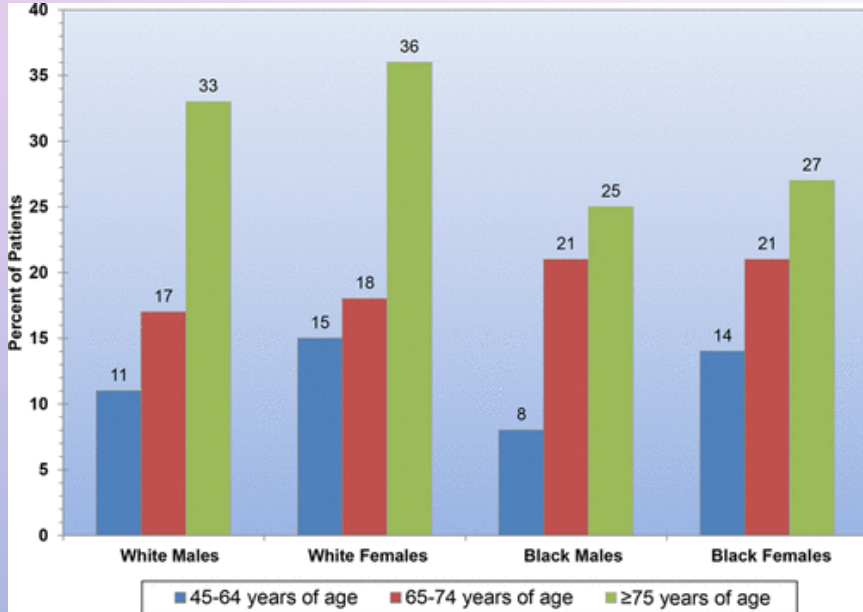
Death rates from stroke by age group, measured as the number of deaths per 100,000 individuals. Age-standardization assumes a constant population age & structure to allow for comparisons between countries and with time without the effects of a changing age distribution within a population (e.g. aging).

⇄ Change country □ Relative change

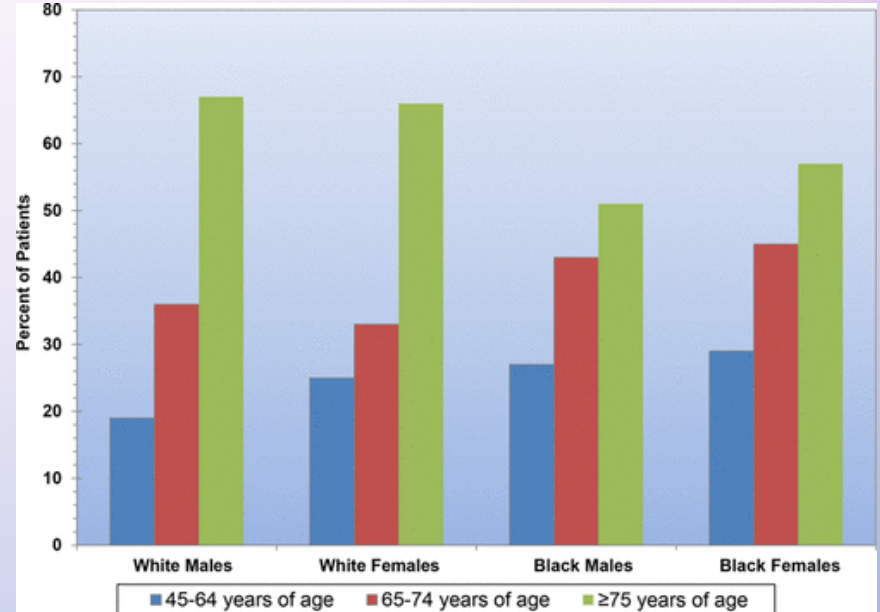




# STROKE SURVIVORS

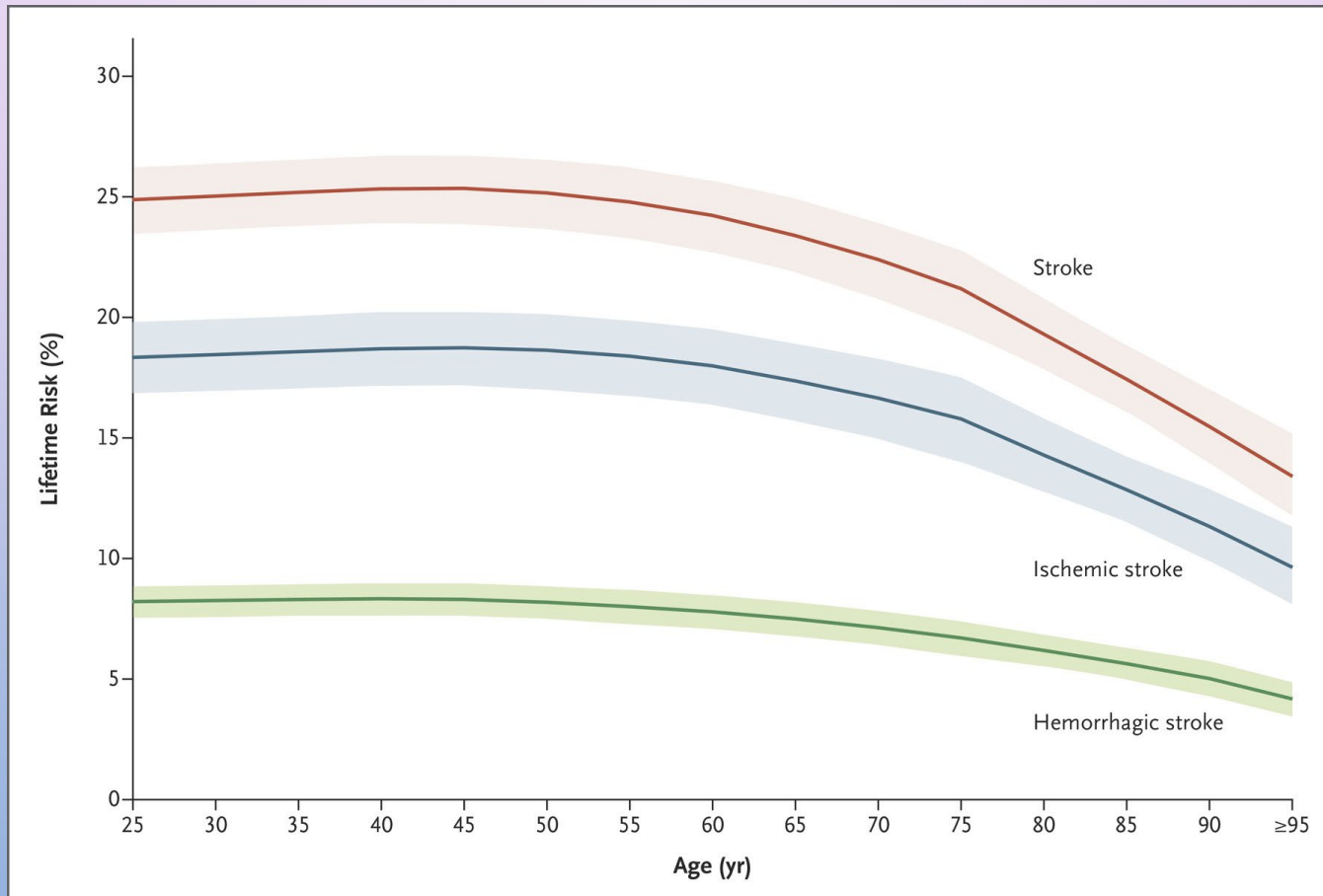


Probability of death within 1 year after first stroke



Probability of death within 5 years after first stroke

# GLOBAL LIFETIME RISK, 2016





# STROKE PREVENTION

# KEYS TO PREVENTION

- CANNOT CONTROL
  - AIR POLLUTION
  - AGE
  - GENETICS
- MODIFY RISK FACTORS
  - CONTROL BLOOD PRESSURE, GLUCOSE, LIPIDS
  - HEALTHY DIET (FRUITS, VEGETABLES, WHOLE GRAIN, LEAN MEAT, FISH; RESTRICT SALT, SUGAR, FAT; ALCOHOL IN MODERATION)
  - PHYSICAL ACTIVITY (30 MINUTES EVERY DAY, MINIMUM)
  - AVOID TOBACCO



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