



What Health Ministries Should Know and Can Do: The CardioRenal Connection

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Disclosure of Interests

Institutional Grants and Contract: NIH, HRSA, Amgen, AMAG Pharma, Akebia, AstraZeneca, DaVita, Fresenius, Hospira, Merck, NxStage, Novartis, Peer Data Coordinating Center, Onyx, ZS Pharma, Keryx, Zoll

Consulting Epidemiology: Amgen, Bayer, Hospira, NxStage, Relypsa, ZS Pharma

Clinical Trials Phase 1, 2 & Data Safety Monitoring Committee: Akros, Akebia, Bayer, Lilly

Dialysis Providers: Executive Director Peer Kidney Care Initiative with 7 NPO and 7 FP provider groups



Approaches to improve outcomes for populations: Ministries of Health Focus

- Member States within the WHO developed a consensus on Non-Communicable Disease (NCD) objectives: CVD, Cancer, DM and Chronic Respiratory Disease (CRD)
- The Political Declaration on NCDs from the UN Summit in 2011 recognized kidney disease for the first time (Item 19)
 - “19. Recognize that renal, oral and eye diseases pose a major health burden for many countries and that these diseases are preventable and treatable”
- WHO NCD objectives to reduce mortality: 10 year target

**WHO Target: 25% reduction
in NCD deaths by 2025**



NCDs & Kidney Disease in the Public Health Agenda

- The large public health initiative centers on reducing the impact of the major non-Communicable Disease (NCDs)
 - Cardiovascular Disease (CVD)
 - Diabetes (DM)
 - Cancer
 - Chronic Respiratory Disease (CRD)
- Population level initiatives have focused on Life Style changes to reduce adverse events
 - Tobacco use reduction
 - Salt intake control
 - Dietary energy control
 - Alcohol intake reduction
- Interventions include
 - Blood Pressure Control
 - Cholesterol Control
 - Glycemic control

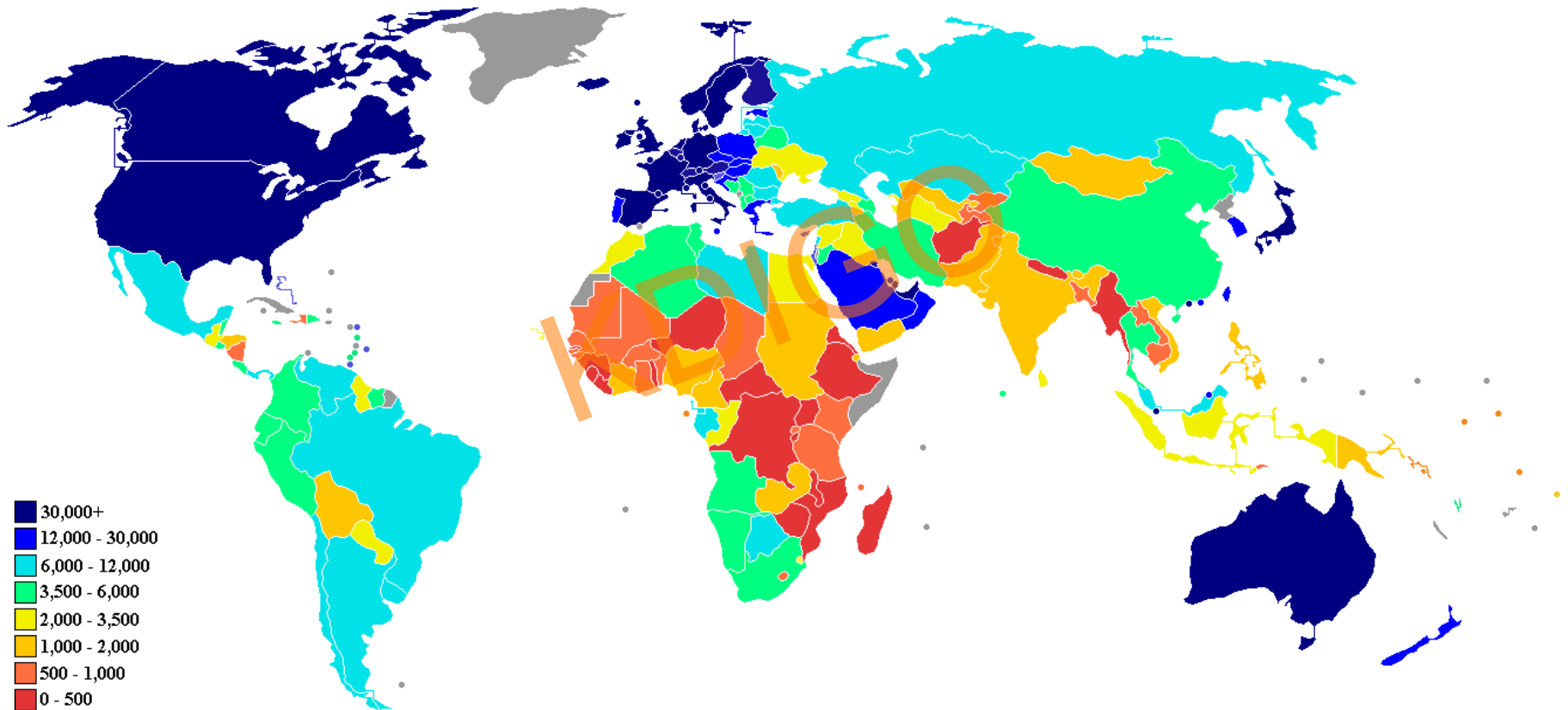


WHO newest country level data on mortality and NCD deaths

- **September 2014 a full report on 162 member States showed the level of progress**
- **The member States are divided by Gross National Income per Capita (July 2014)**
 - **Low GNI per capita <\$1,045/ yr**
 - **Low middle \$1045 to <\$4125**
 - **High middle \$4125 to <\$12,746**
 - **High income \$12,746+/yr**



GDP Per Capita: 2012



Ministries of Health and NCDs: What is known and could be done

- **Country Profiles on NCDs: Examples that highlight the issues**
 - Format will include overall proportion of deaths
 - Age Adjusted NCD death rates
 - Data by country income group
- **Blood Pressure control and kidney disease: The CardioRenal Connection**
- **ESRD burden and growth: High and Middle income country experience**
- **Kidney Detection and interventions: Kidney Disease as the multiplier disease and confounder for NCD progress**



Japan

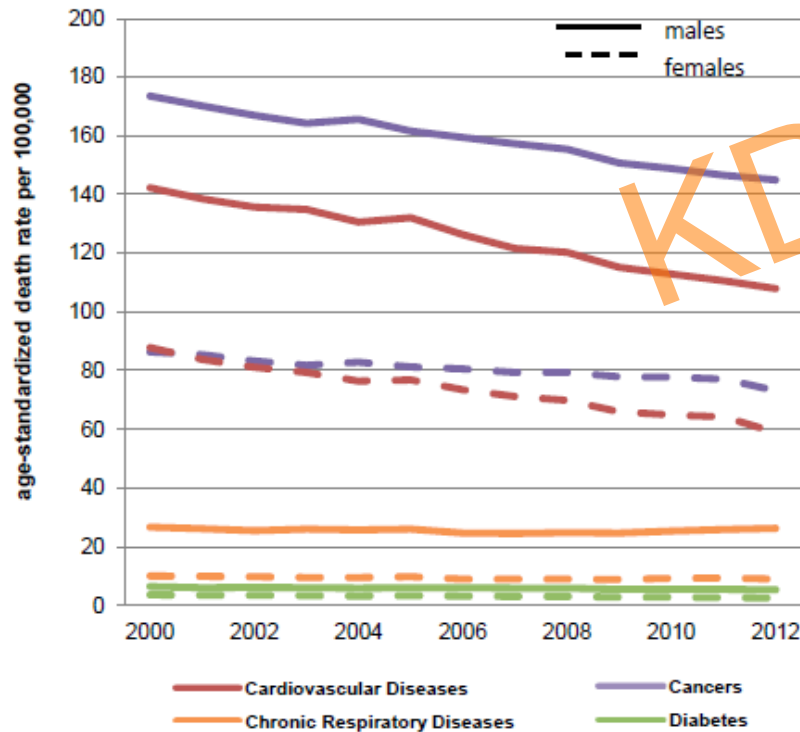
Total population: 127 000 000

Income Group: High

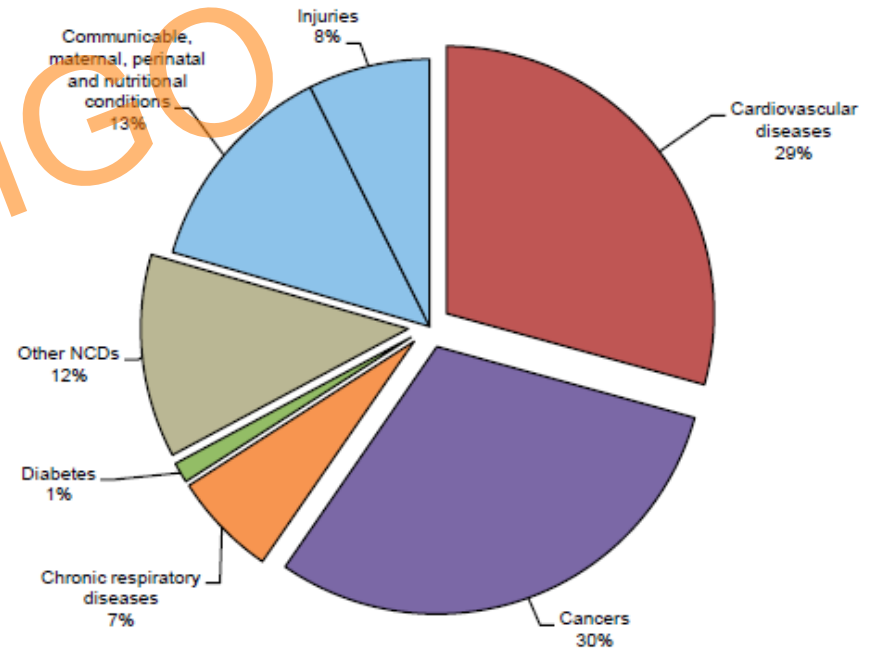
Percentage of population living in urban areas: 91.3%

Population proportion between ages 30 and 70 years: 54.0%

Age-standardized death rates



Proportional mortality (% of total deaths, all ages, both sexes)



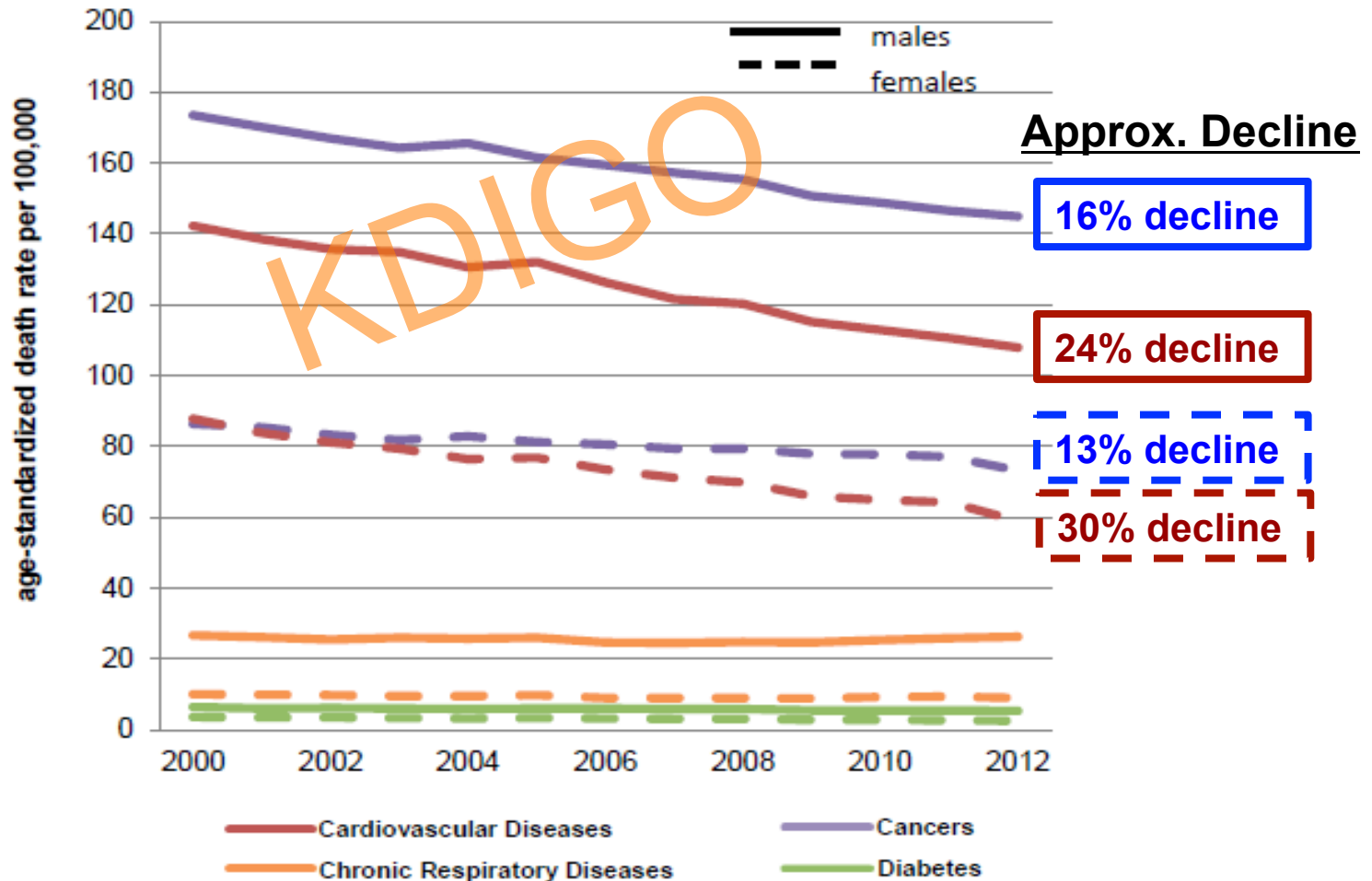
Total deaths: 1,192,000
NCDs are estimated to account for 79% of total deaths.

Japan

Total population: 127 000 000

Income Group: High

Age-standardized death rates



United States of America

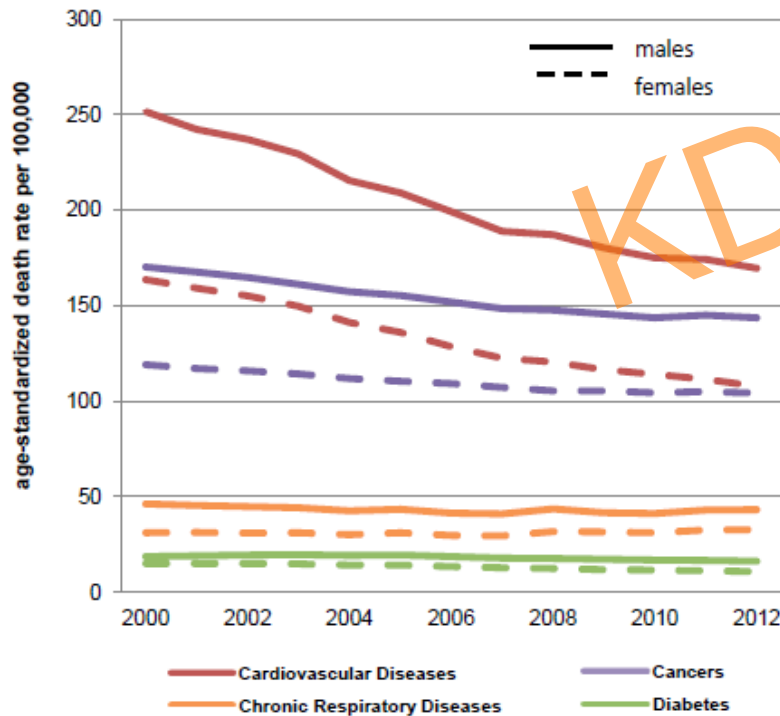
Total population: 318 000 000

Income Group: High

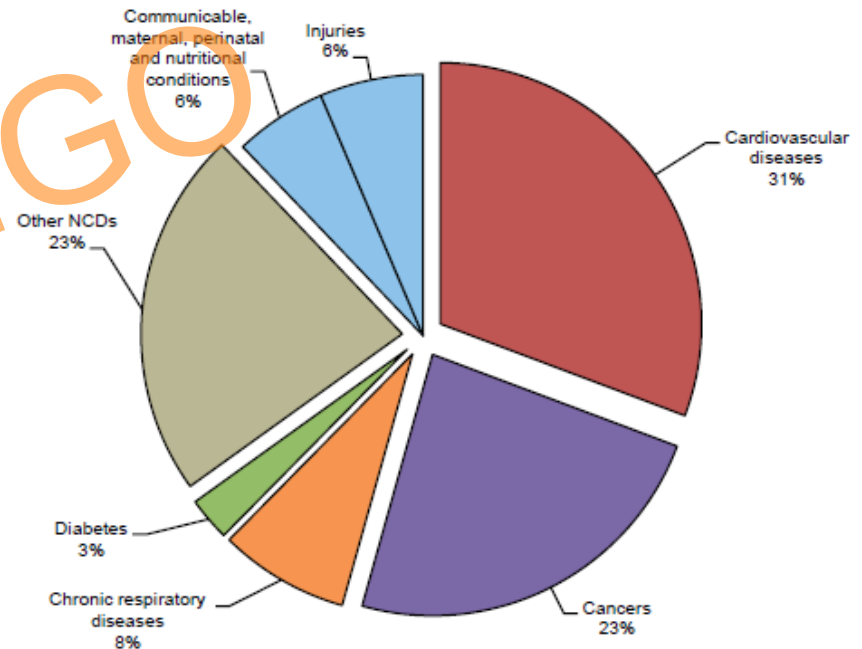
Percentage of population living in urban areas: 82.4%

Population proportion between ages 30 and 70 years: 50.3%

Age-standardized death rates



Proportional mortality (% of total deaths, all ages, both sexes)

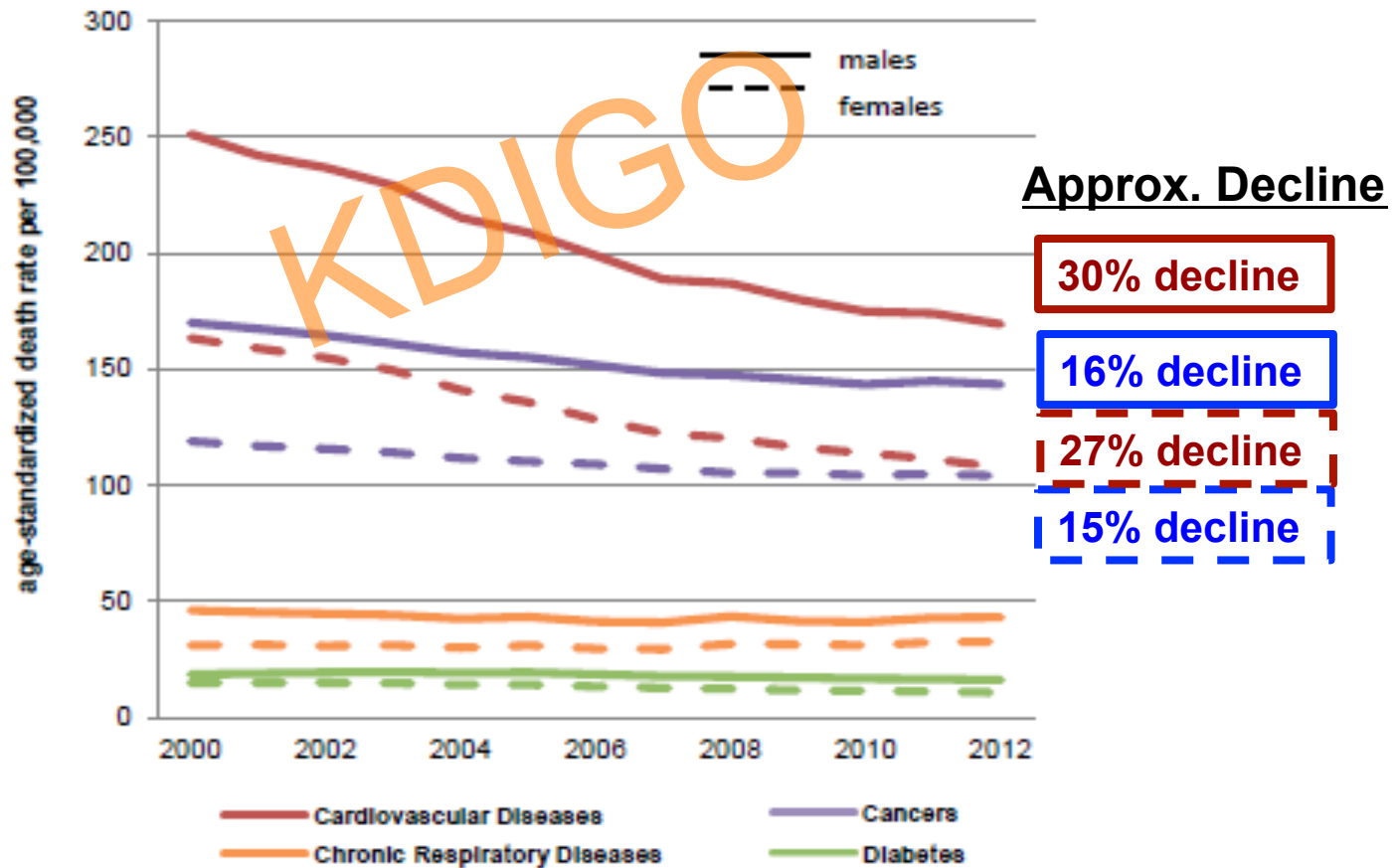


Total deaths: 2,656,000
NCDs are estimated to account for 88% of total deaths.

United States of America

Total population: 318 000 000
Income Group: High

Age-standardized death rates

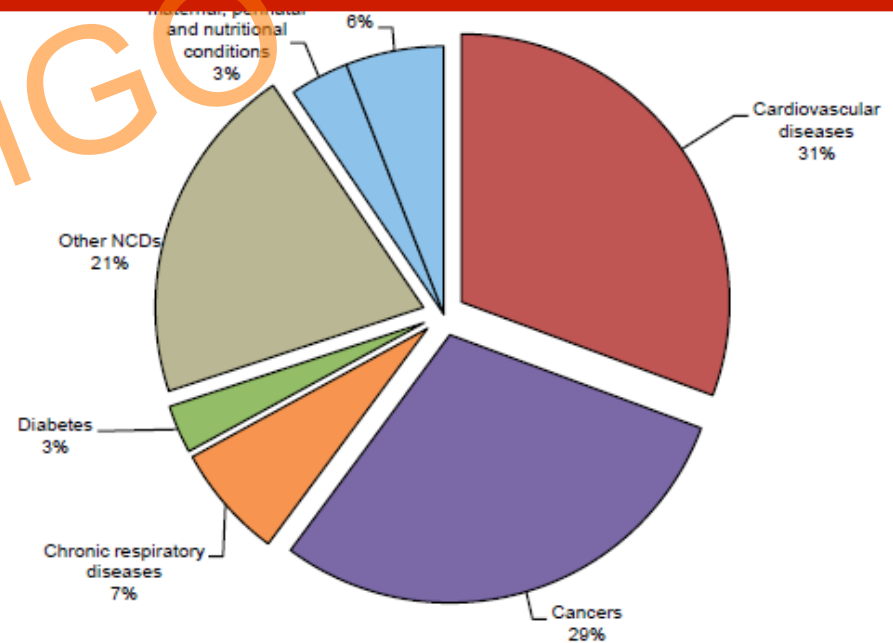
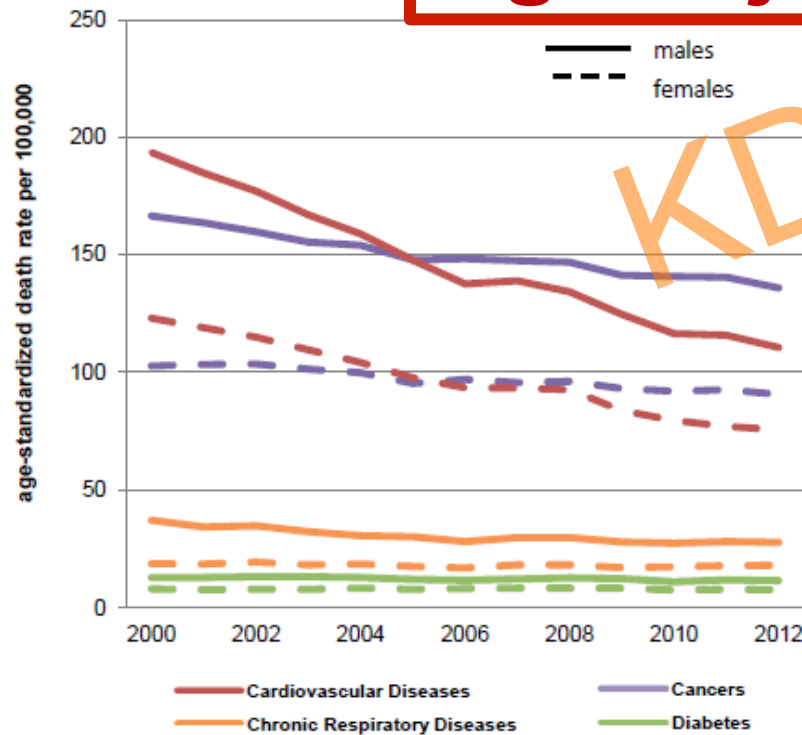


Australia

Total population: 23 050 000
Income Group: High

Age-standardized death rates

40% decline in CVD Deaths!
Cancer is the leading age adjusted cause of death!



Total deaths: 147,000
NCDs are estimated to account for 91% of total deaths.

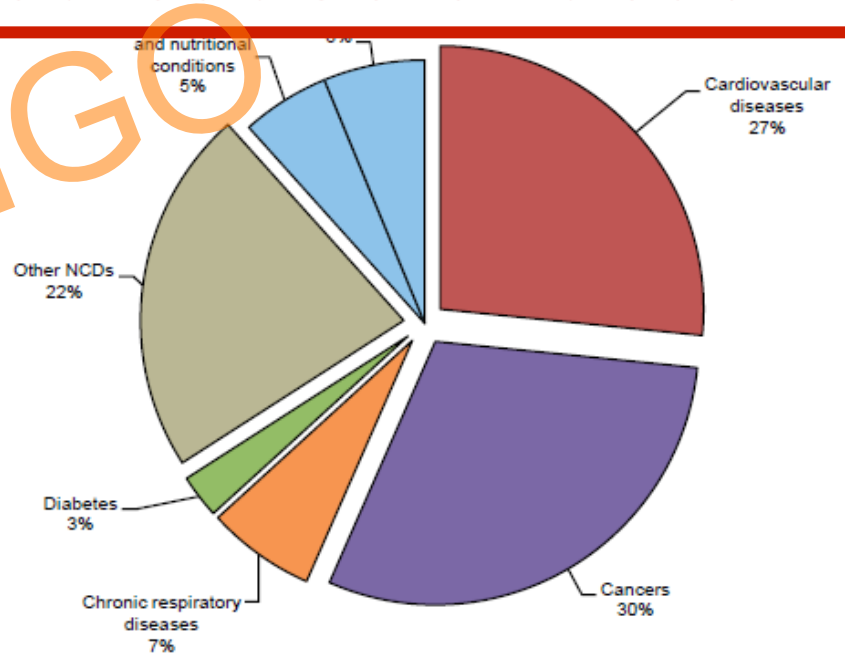
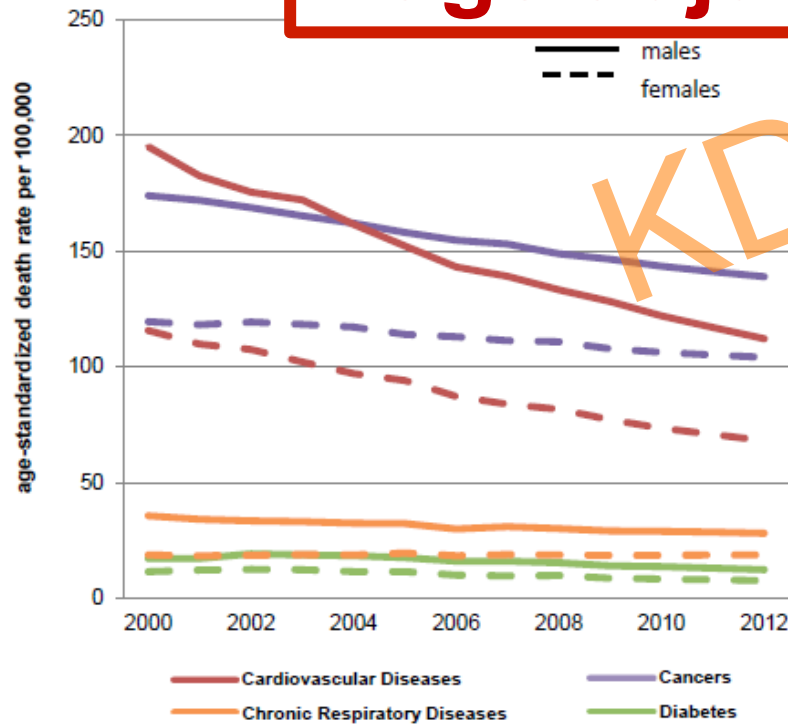
Canada

Total population: 34 8

Income Group: High

Age-standardized death

**40% decline in CVD Deaths!
Cancer is the leading age adjusted cause of death!**



Total deaths: 248,000
NCDs are estimated to account for 88% of total deaths.





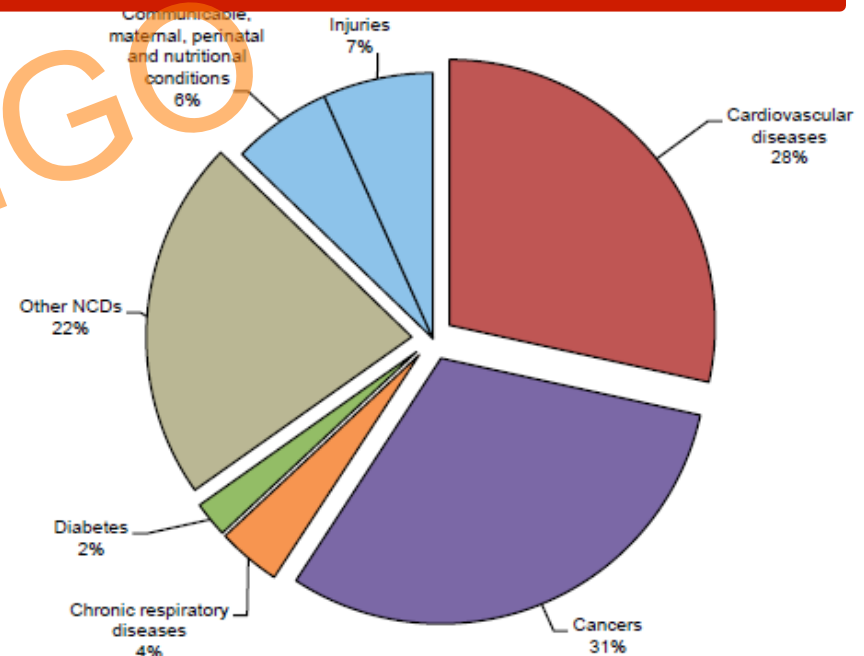
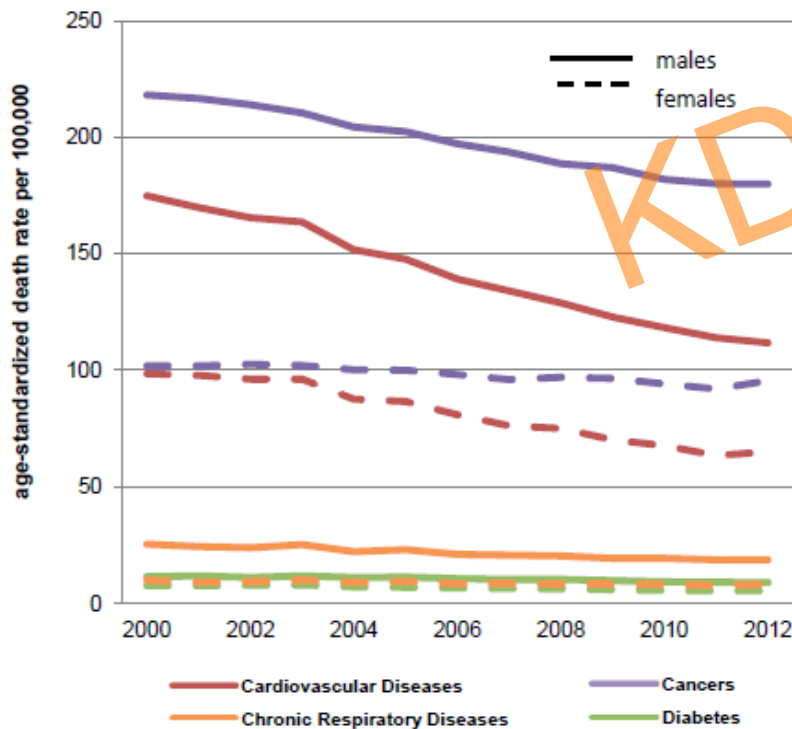
37% decline in CVD Deaths!
Cancer is the leading age adjusted cause of death!

France

Total population: 63 937

Income Group: High

Age-standardized death



Total deaths: 554,000
NCDs are estimated to account for 87% of total deaths.





United Kingdom

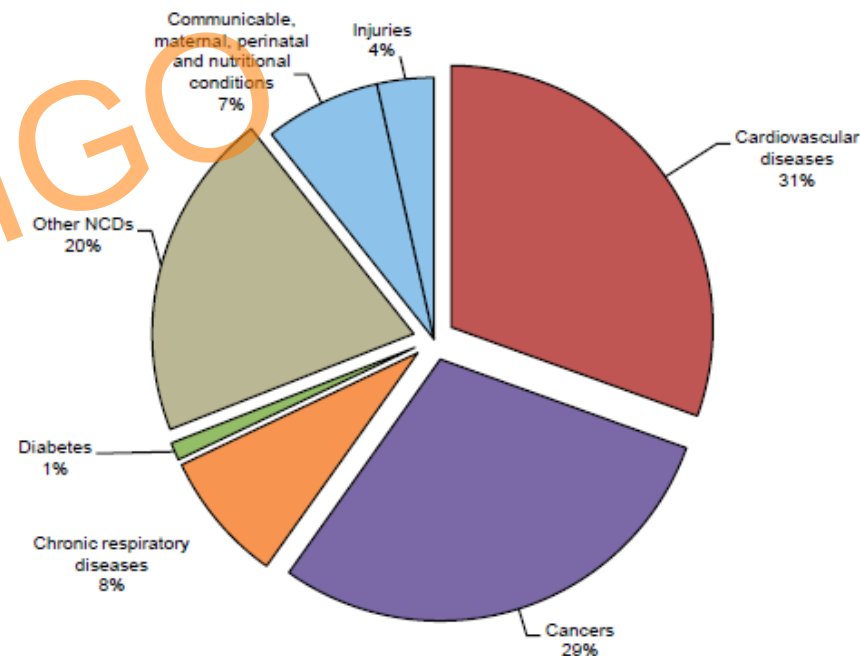
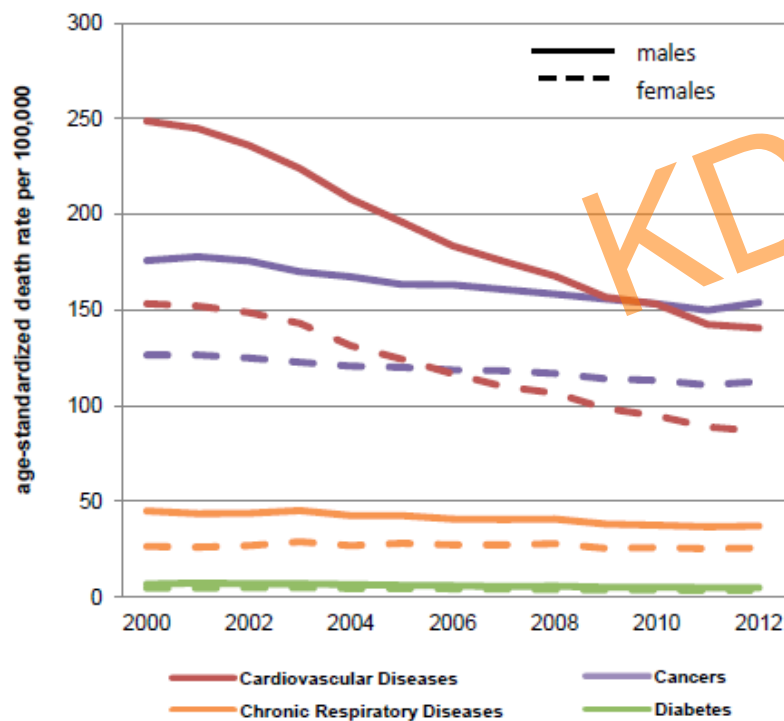
**41% decline in CVD Deaths!
Cancer is now the leading age adjusted cause of death!**

Total population: 62 783 000

Income Group: High

Age-standardized death rates

Proportional mortality (% of total deaths, all ages, both sexes)



Total deaths: 557,000
NCDs are estimated to account for 89% of total deaths.



Russian Federation

Ru

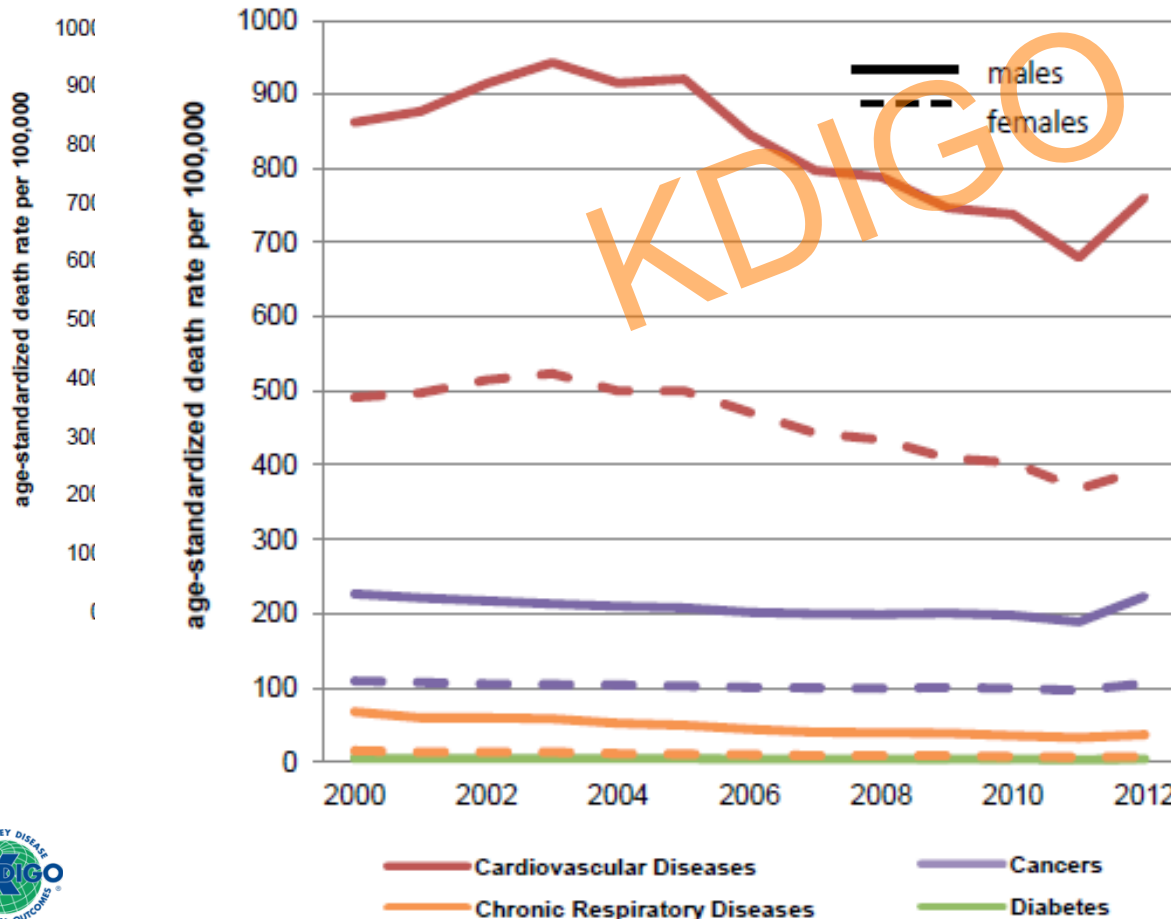
Total population: 143 000 000

Income Group: High

Total pop
Income (

Age-star

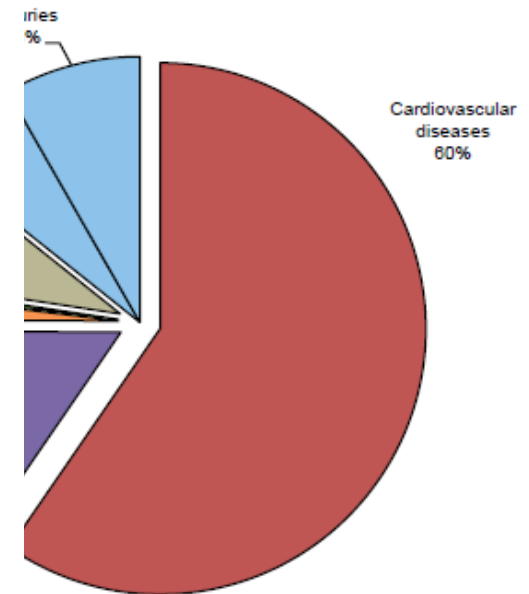
Age-standardized death rates



ng in urban areas: 73.8%

en ages 30 and 70 years: 52.9%

total deaths, all ages, both sexes)



deaths: 2,102,000
to account for 86% of total deaths.

angkok, Thailand

General Observations on NCD death rate in High Income Countries

- CVD death rates generally range between 100-200 deaths/100,000 population (Except Russia at 750)
- Cancer death rate also range between 100-200 deaths/100,000 population
- There has been less progress in death rates from Chronic Respiratory Disease and Diabetes

High Income Countries NCDs and Public Health Infrastructure

- High income countries have established public health infrastructures and have made substantial progress on reducing death rates for CVD and Cancer
- CVD and DM have been linked to CKD & ESRD for years
- Education & Interventions are well established to reduce CVD events, kidney disease progression and less costly ESRD replacement services

Middle income Countries NCDs and Kidney disease-1

- Middle income countries are developing public health infrastructures which have contained communicable disease but NCDs have emerged as major challenges to public health and the economy
- CVD death rates tend to range from 300-800 deaths per 100,000 population
- Examples of these countries are:
 - Mexico
 - Brazil
 - China, Thailand, India
 - Malaysia, Indonesia, Philippines
 - Turkey
 - Argentina



Mexico

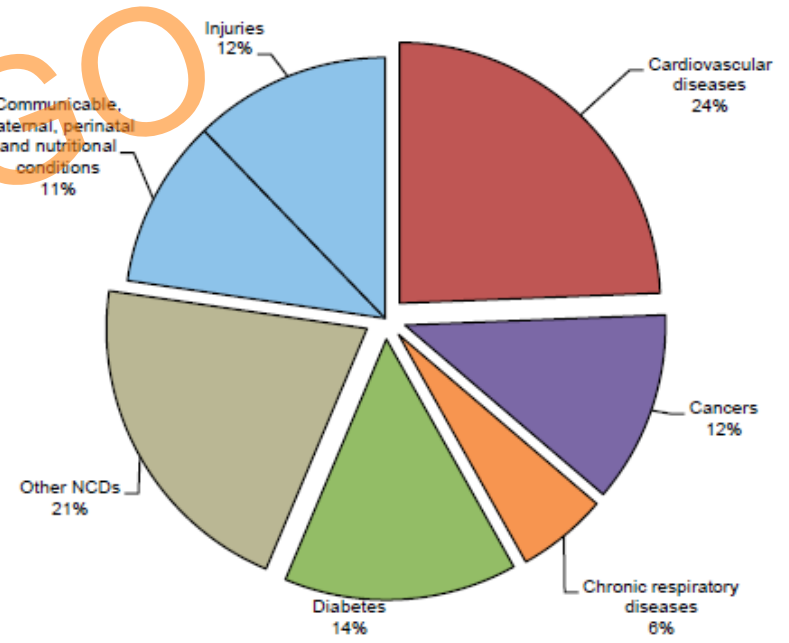
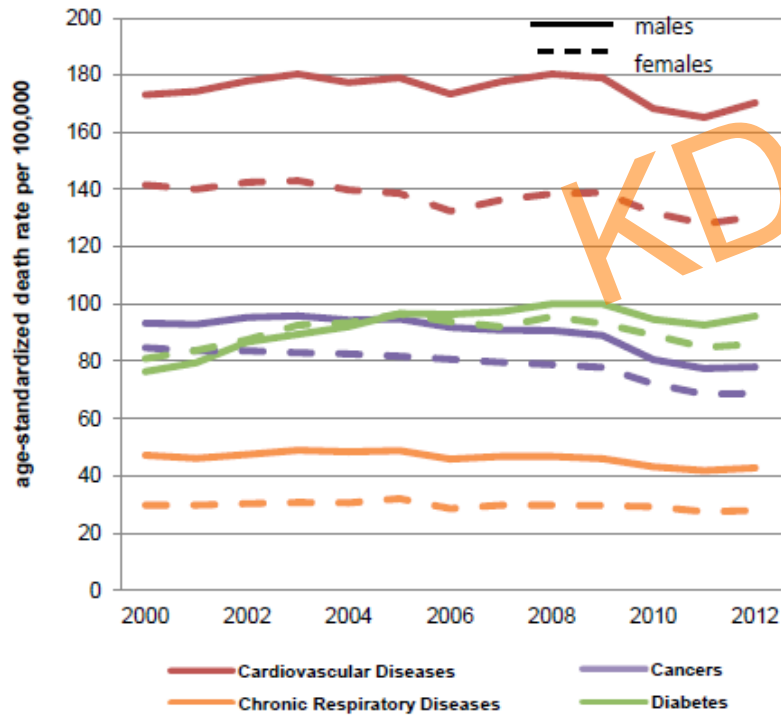
Little progress in NCD death rates

Total population: 121 000 000
Income Group: Upper middle

Percentage of population living in urban areas: 78.1%
Population proportion between ages 30 and 70 years: 40.5%

Age-standardized death rates

Proportional mortality (% of total deaths, all ages, both sexes)



Total deaths: 605,000
NCDs are estimated to account for 77% of total deaths.



Brazil

24% decline in CVD Deaths!

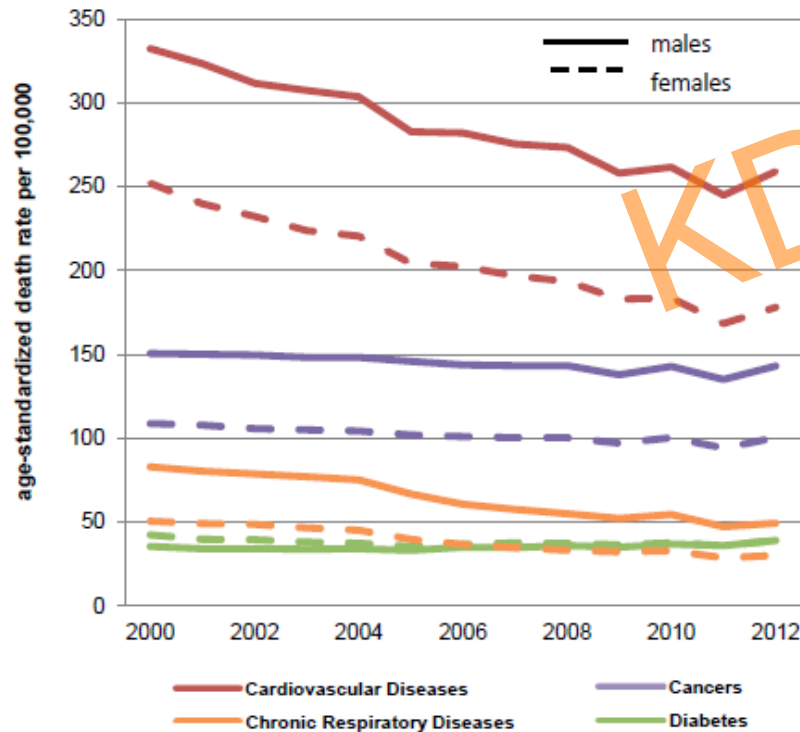
Total population: 199 000 000

Income Group: Upper middle

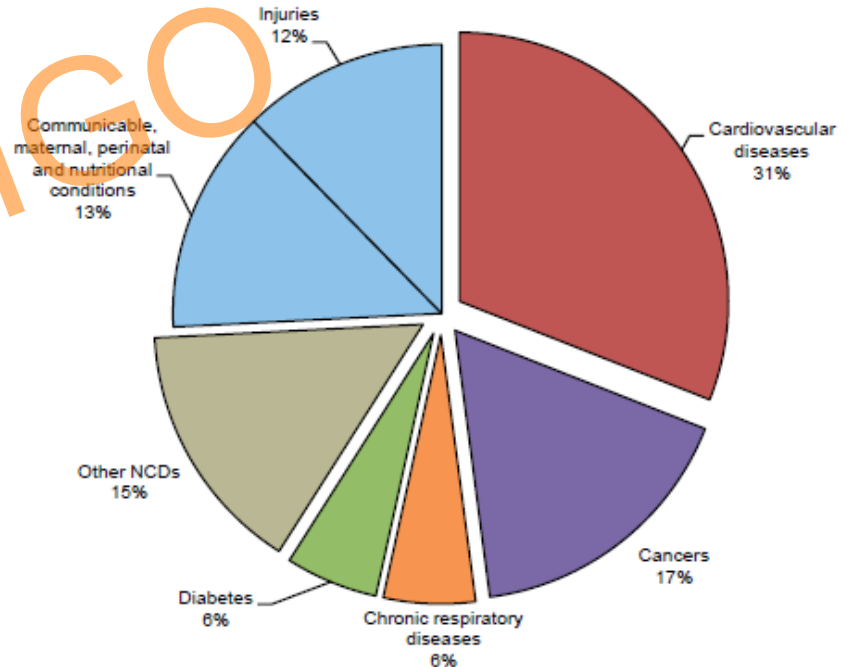
Percentage of population living in urban areas: 84.6%

Population proportion between ages 30 and 70 years: 45.0%

Age-standardized death rates



Proportional mortality (% of total deaths, all ages, both sexes)



Total deaths: 1,318,000

NCDs are estimated to account for 74% of total deaths.

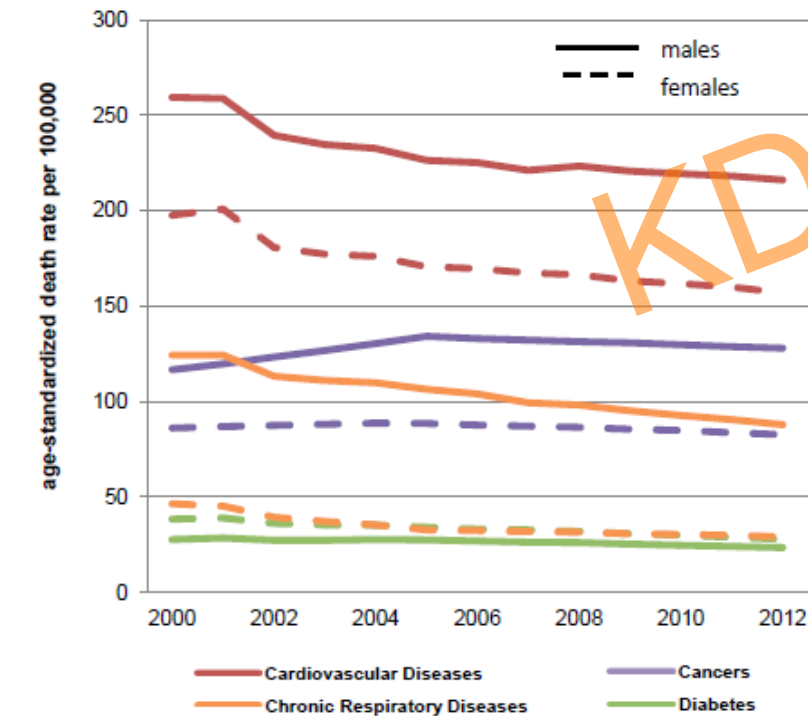


15% decline in CVD Deaths!
28% decline in CRD deaths!

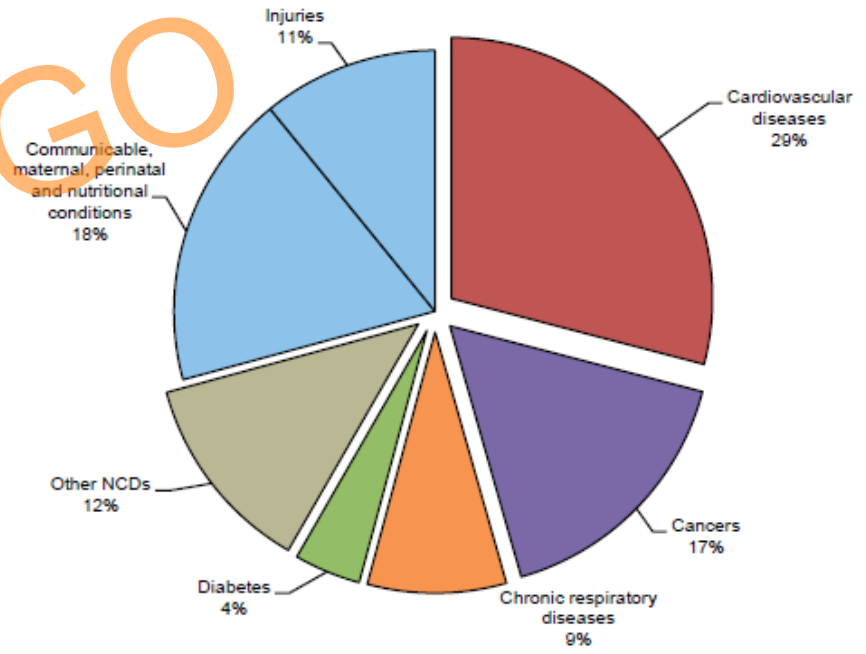
Thailand

Total population: 66 785 000
Income Group: Upper middle

Age-standardized death rates*



Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 501,000
NCDs are estimated to account for 71% of total deaths.



Argentina

Total population: 41 087 000

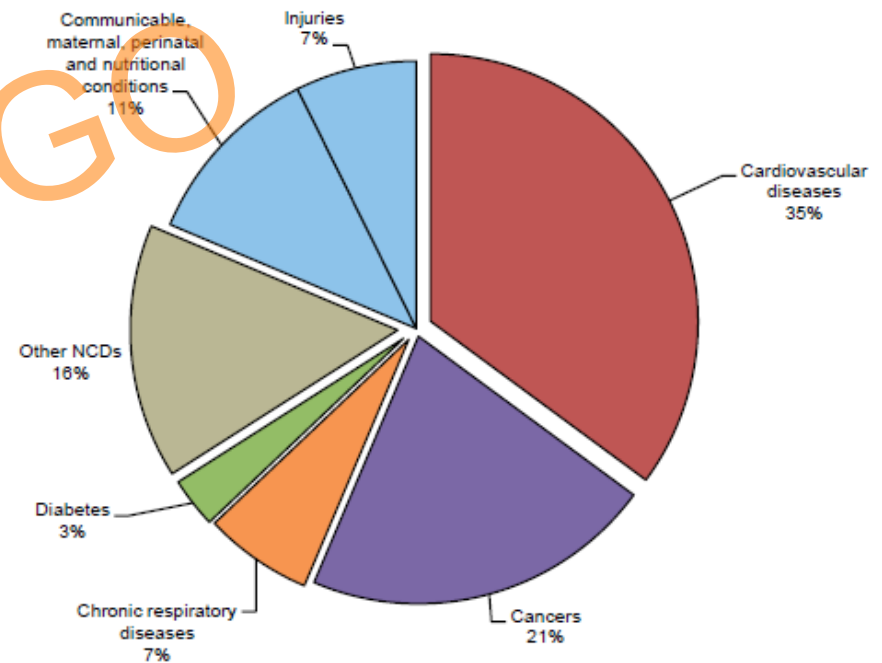
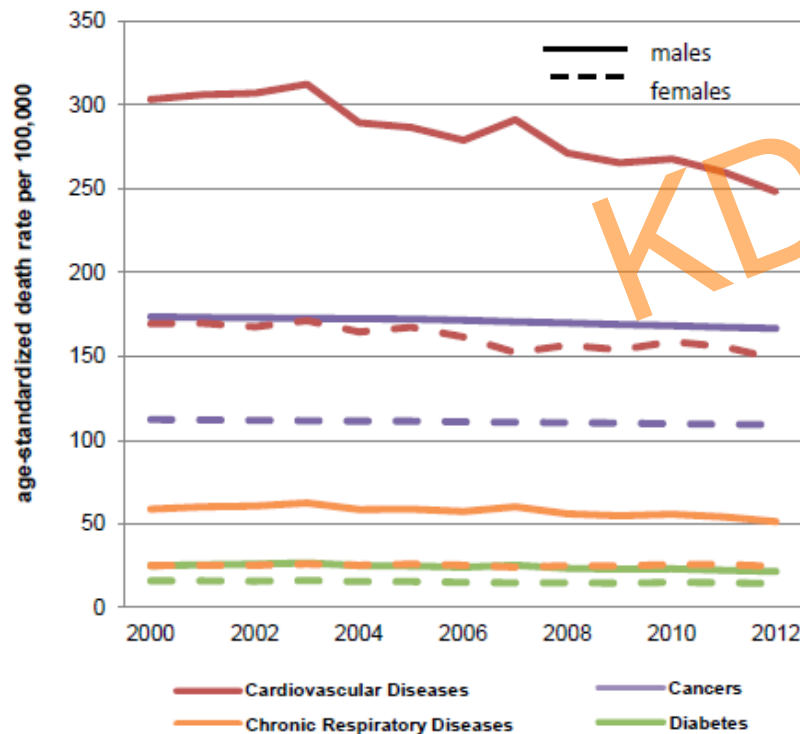
Income Group: Upper middle

Percentage of population living in urban areas: 92.5%

Population proportion between ages 30 and 70 years: 43.9%

Age-standardized death rates*

Proportional mortality (% of total deaths, all ages, both sexes)*



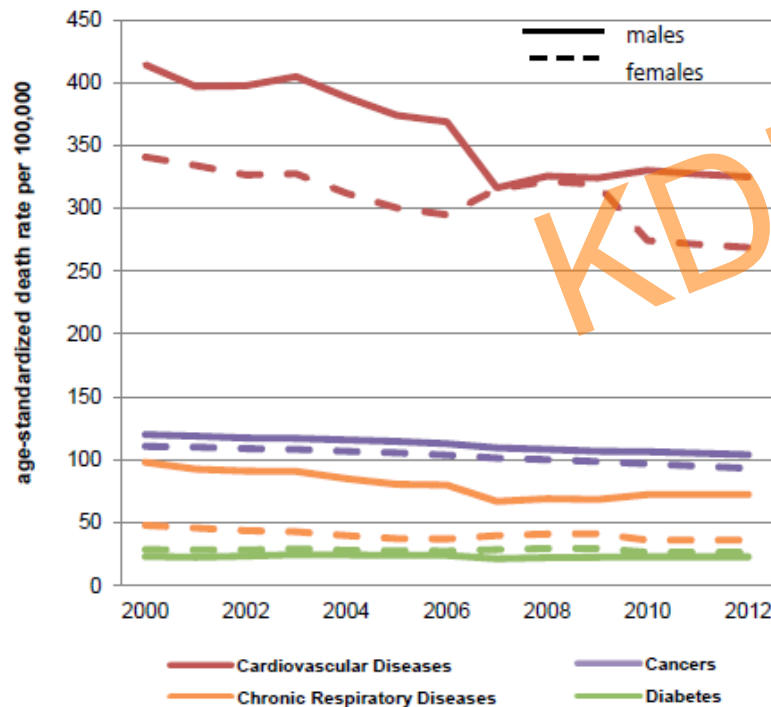
Total deaths: 314,000
NCDs are estimated to account for 81% of total deaths.

Malaysia

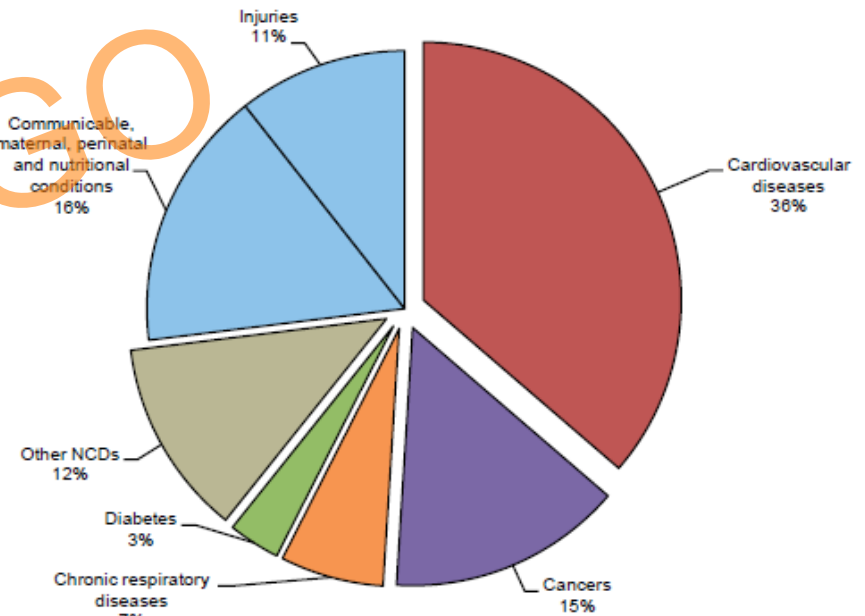
Total population: 29 240 000
Income Group: Upper middle

Percentage of population living in urban areas: 72.8%
Population proportion between ages 30 and 70 years: 41.0%

Age-standardized death rates*



Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 146,000
NCDs are estimated to account for 73% of total deaths.

Turkey

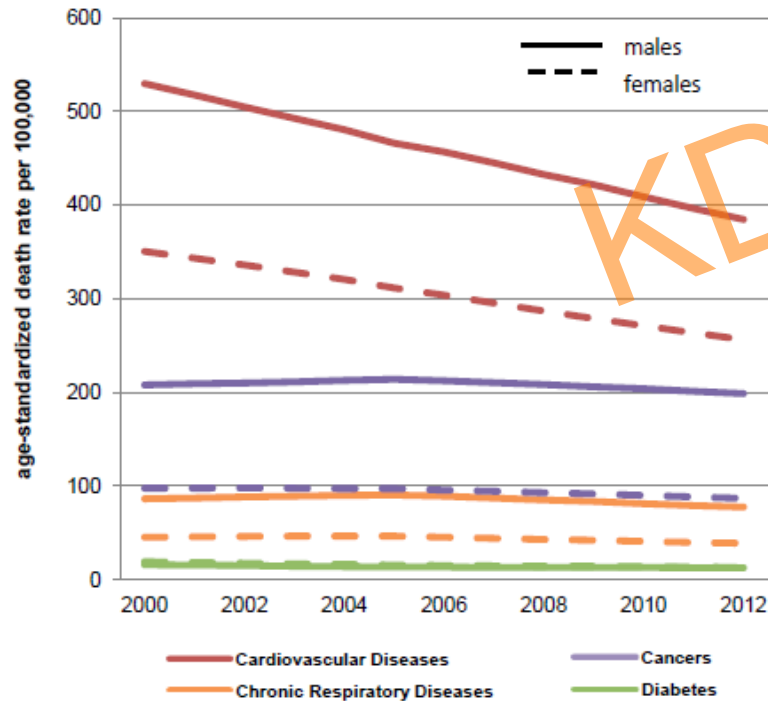
Total population: 73 997 000

Income Group: Upper middle

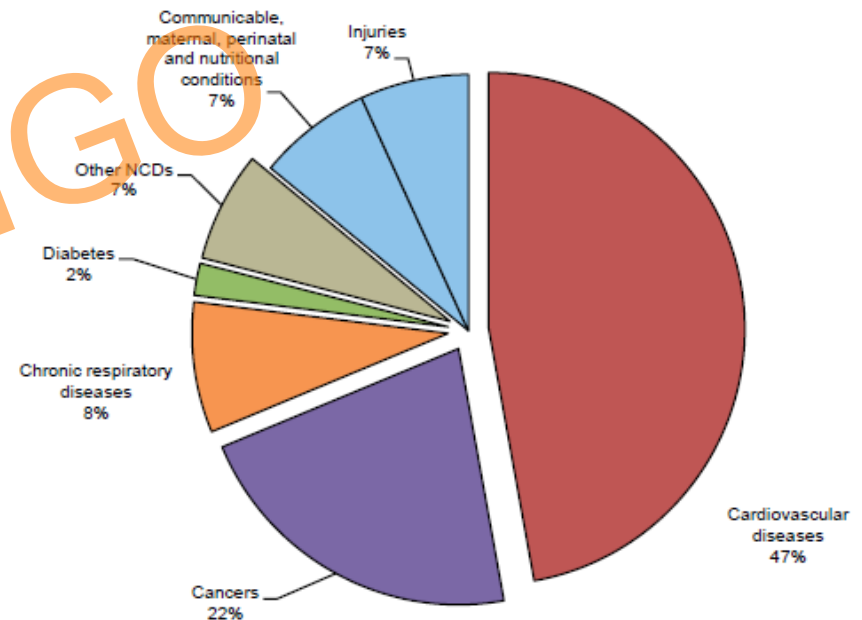
Percentage of population living in urban areas: 71.5%

Population proportion between ages 30 and 70 years: 43.6%

Age-standardized death rates*



Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 422,000
NCDs are estimated to account for 86% of total deaths.

China

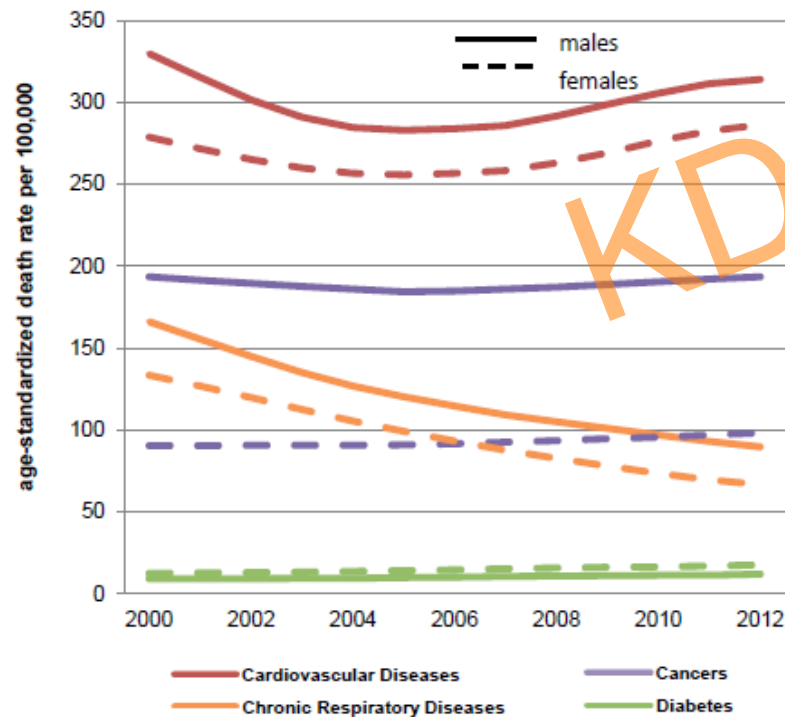
Total population: 1 390 000 000

Income Group: Upper middle

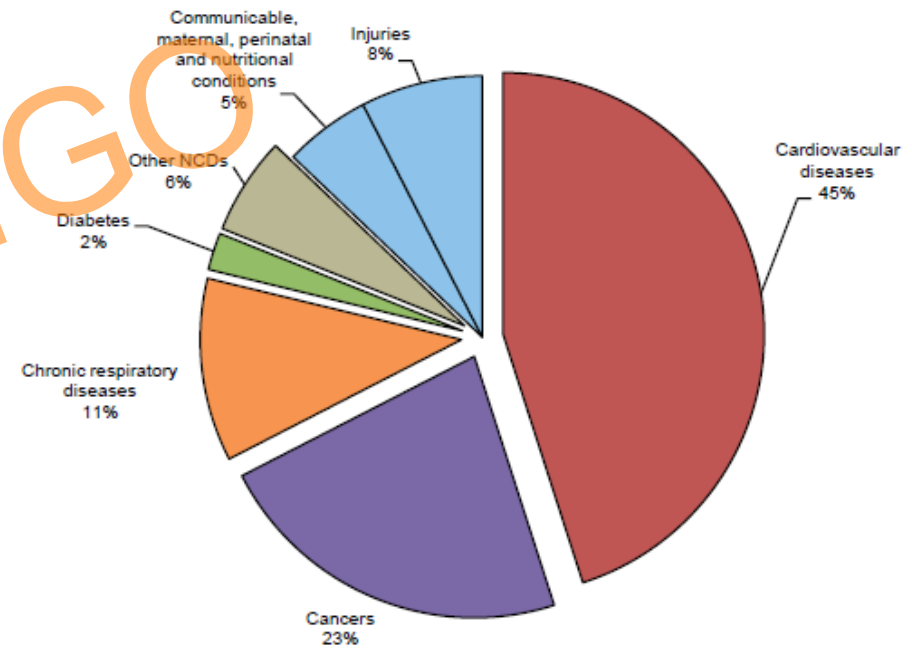
Percentage of population living in urban areas: 50.6%

Population proportion between ages 30 and 70 years: 51.5%

Age-standardized death rates*



Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 9,846,000
NCDs are estimated to account for 87% of total deaths.

High-Middle Income Countries NCD death Rates

- There is considerable diversity in the middle income countries progress toward NCD death rates
- China with its huge population is quite different from other High-Middle income countries
- What about the Low-Middle Income Countries?

India

**Communicable Diseases are a continuing issue.
Little progress in CVD and CRD death rates**

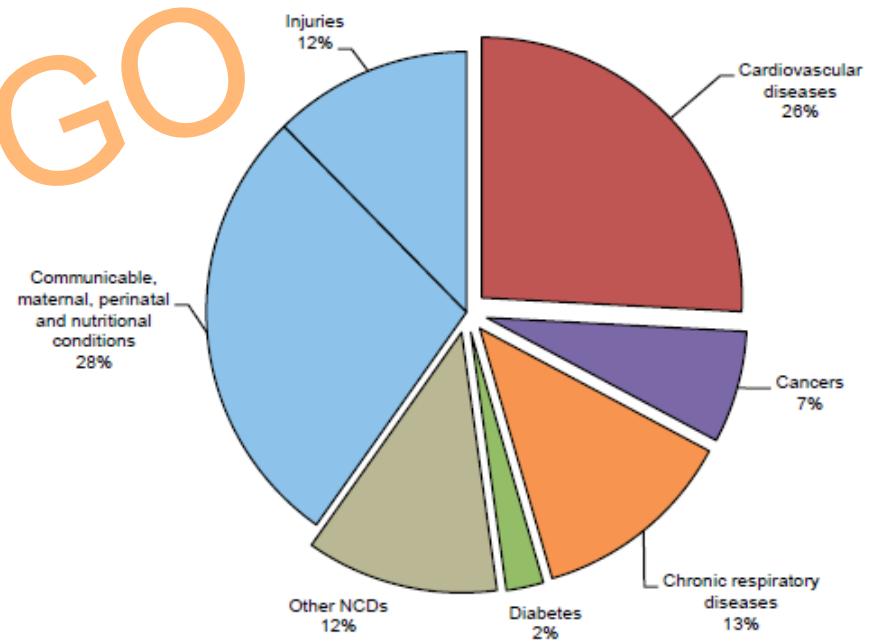
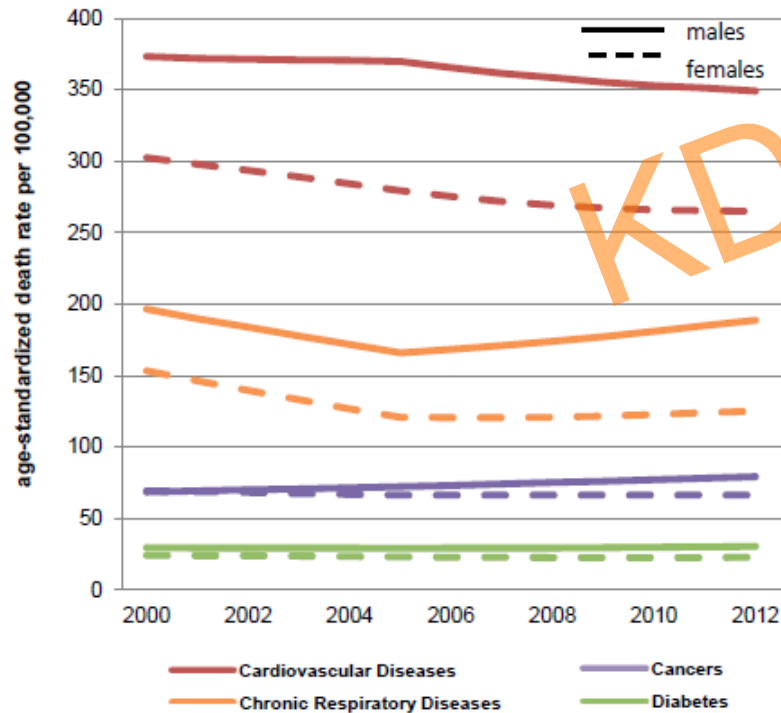
Total population

Income Group: Lower middle

Population proportion between ages 30 and 70 years: 40.1%

Age-standardized death rates*

Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 9,816,000
NCDs are estimated to account for 60% of total deaths.

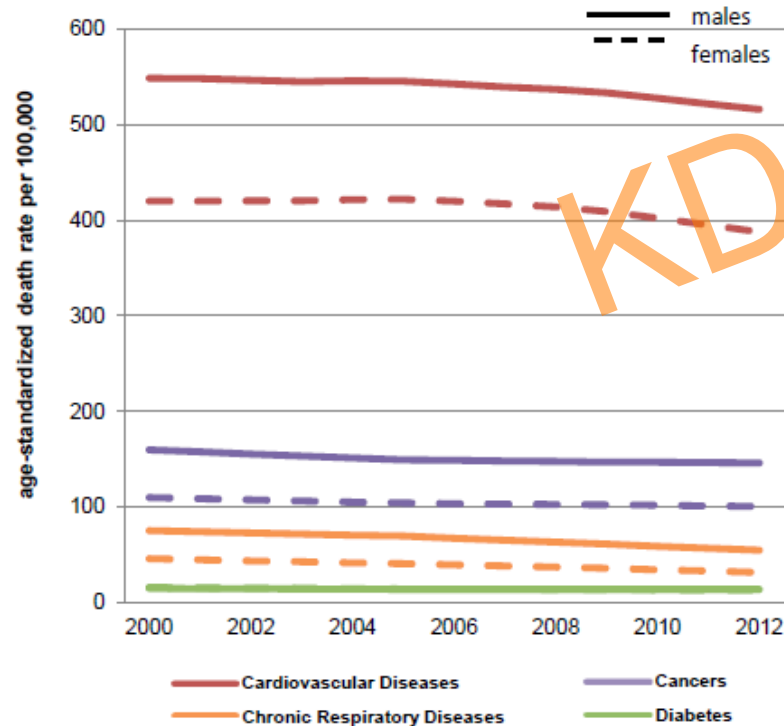
Egypt

Little Progress in NCD death rates

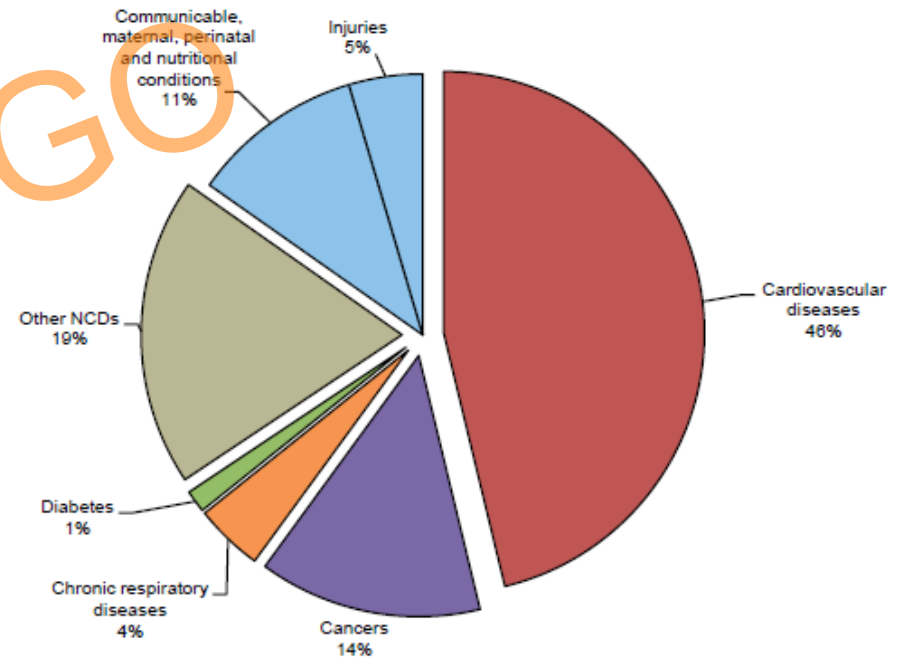
Total population: 80 722 000
Income Group: Lower middle

Percentage of population living in urban areas: 43.5%
Population proportion between ages 30 and 70 years: 37.3%

Age-standardized death rates*



Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 523,000
NCDs are estimated to account for 85% of total deaths.



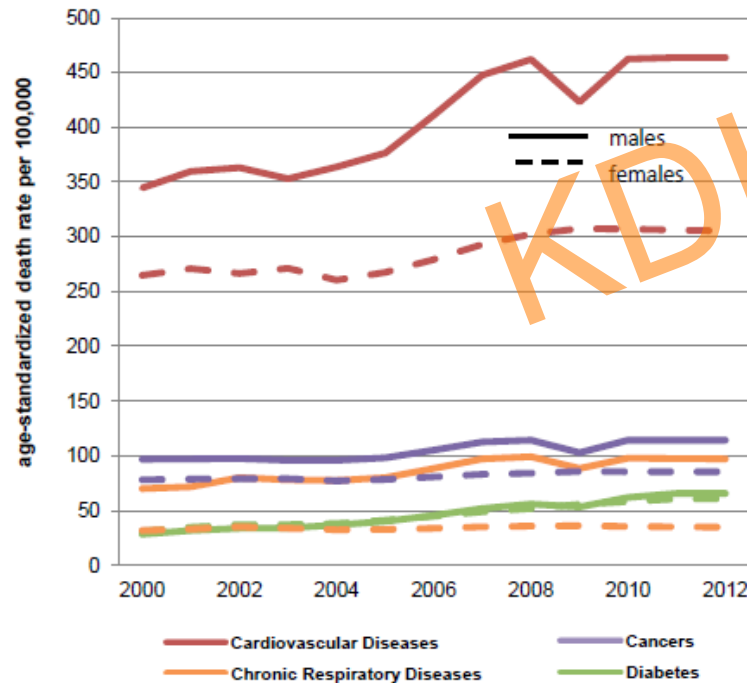
Philippines

NCD death rates have increased

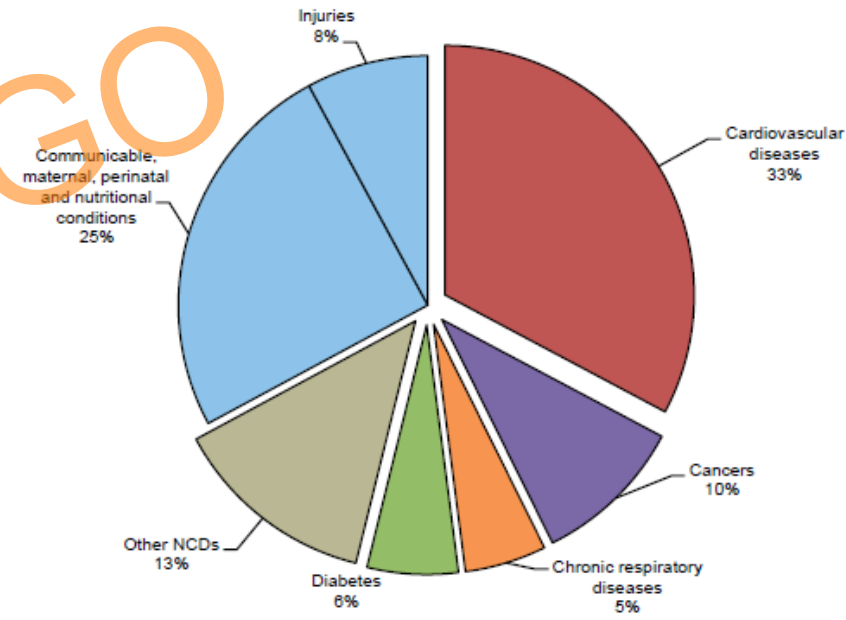
Total population: 96 707 000
Income Group: Lower middle

Percentage of population living in urban areas: 48.8%
Population proportion between ages 30 and 70 years: 35.2%

Age-standardized death rates



Proportional mortality (% of total deaths, all ages, both sexes)



Total deaths: 571,000
NCDs are estimated to account for 67% of total deaths.



Low-Middle Income Country NCD Challenges

- The diversity of outcomes poses important challenges to Ministries of Health on the breath of NCD death interventions verses Communicable Diseases
- The issues related to kidney disease may be overshadowed by other larger public health considerations
- What about Low Income countries



Cambodia

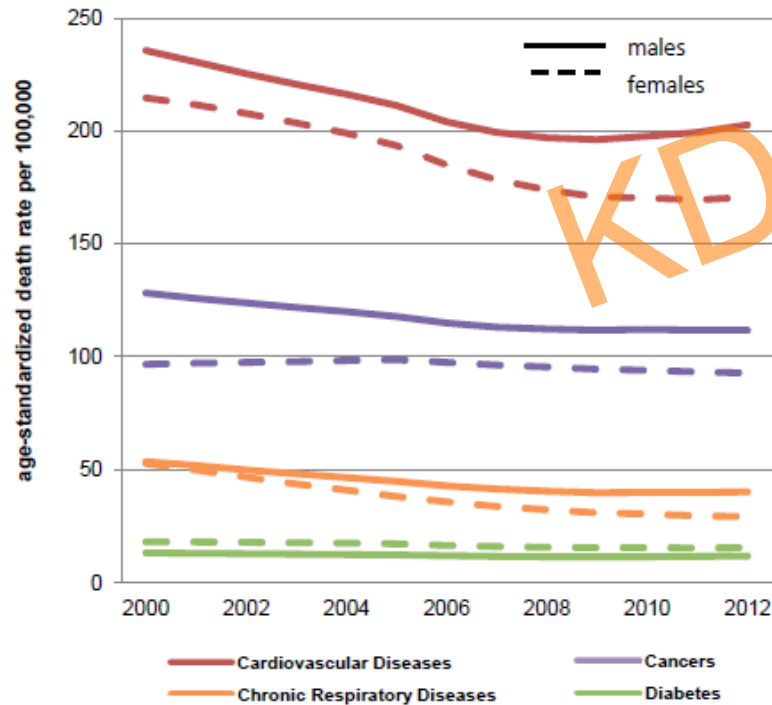
Total population: 14 865 000
Income Group: Low

**Communicable Diseases are a continuing issue.
Little progress in CVD and CRD death rates**

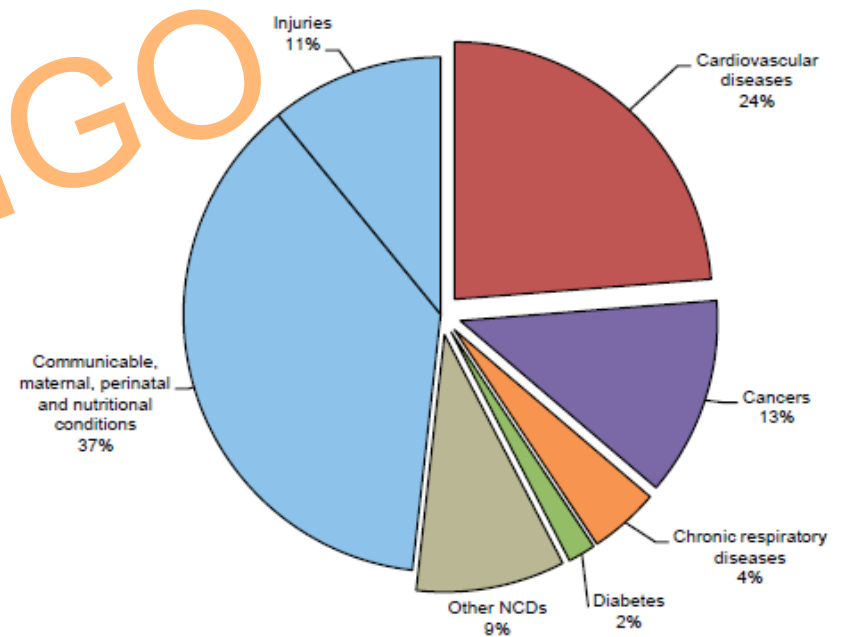
Percentage of population living in urban areas: 20.0%

Population proportion between ages 30 and 70 years: 33.8%

Age-standardized death rates*



Proportional mortality (% of total deaths, all ages, both sexes)*



Total deaths: 85,000
NCDs are estimated to account for 52% of total deaths.

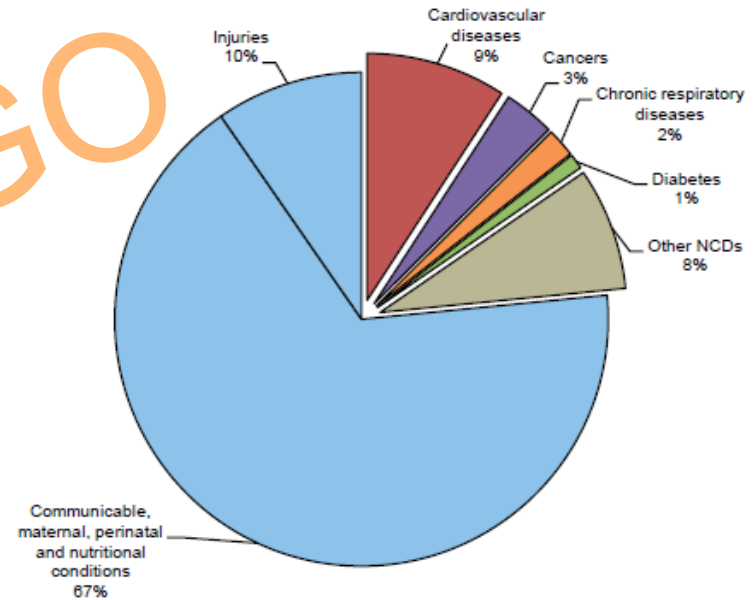
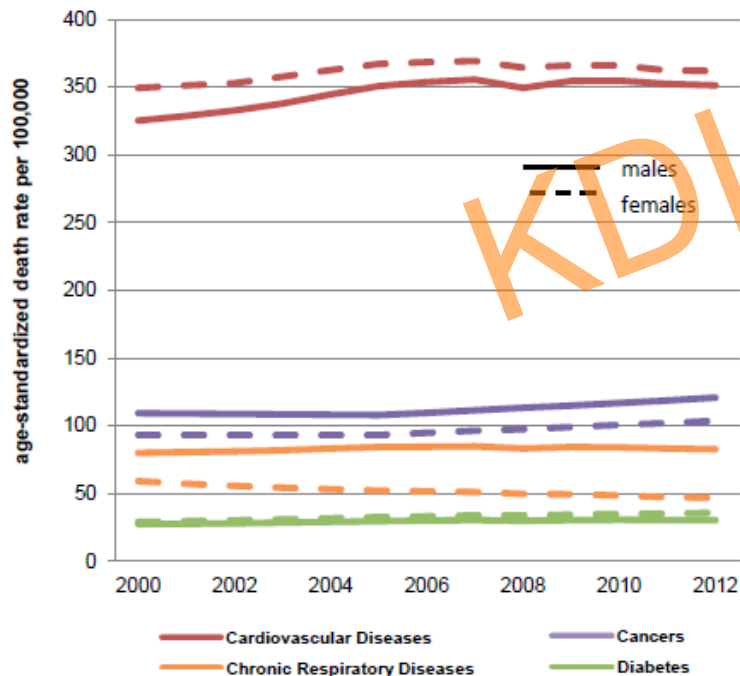
Democratic Republic of the Congo

Total population: 65 705 000

Income Group: Low

Age-standardized death rates*

**Communicable Diseases are a continuing issue.
Little progress in CVD and CRD death rates**



Total deaths: 920,000
NCDs are estimated to account for 23% of total deaths.

Bangladesh

Total population: 155 000 000

Income Group: Low

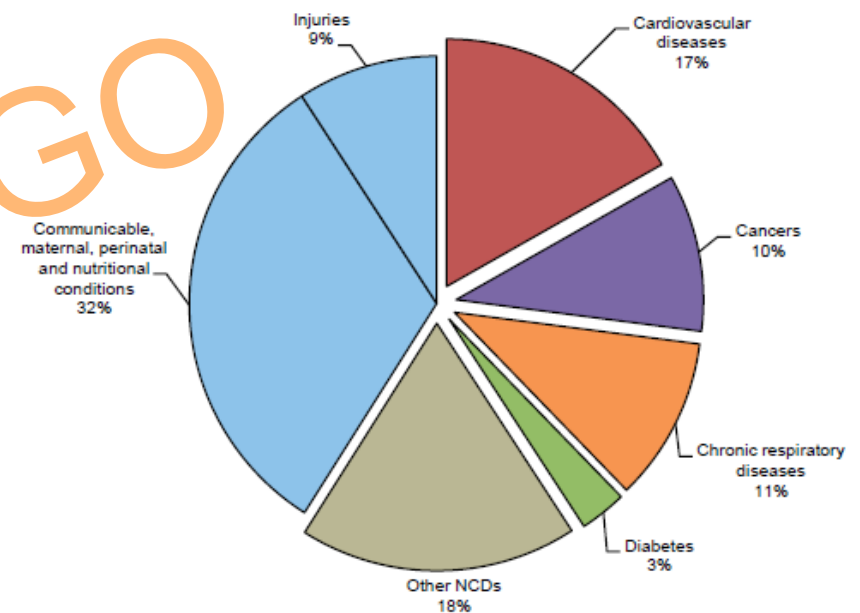
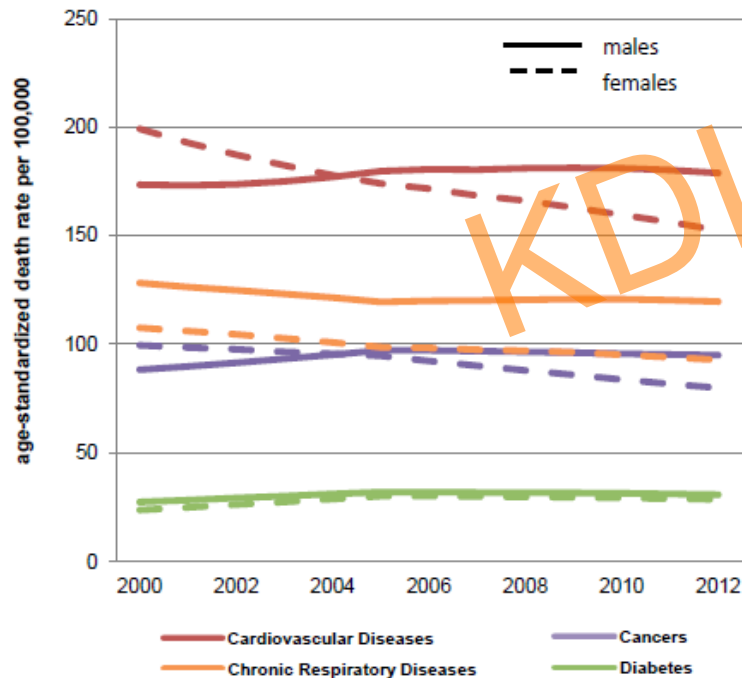
**Communicable Diseases are a continuing issue.
Little progress in CVD and CRD death rates**

Percentage of population living in urban areas: 28.4%

Population proportion between ages 30 and 70 years: 37.3%

Age-standardized death rates*

Proportional mortality (% of total deaths, all ages, both sexes)*



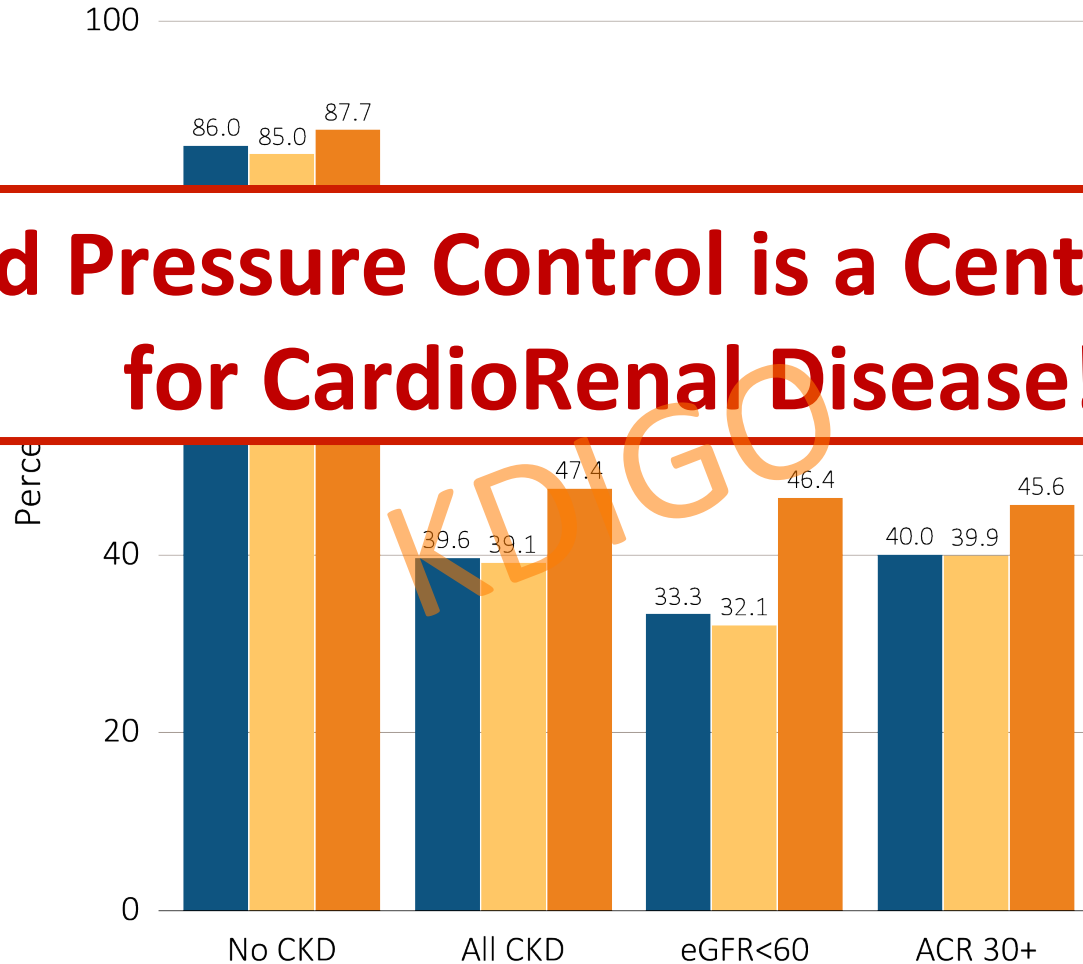
Total deaths: 886,000
NCDs are estimated to account for 59% of total deaths.

NCDs and Kidney Disease: The CardioRenal Agenda

- CVD is the leading cause of death in most middle and high income countries
- Death rates for NCDs declined in most High Income countries consistent with the targets
- The heavy burden of CVD and Diabetes is highly interactive with kidney disease
- Interventions for kidney disease are similar to CVD, HTN and DM: ACE-I/ARBs, Beta Blockers etc
- Kidney Disease progression is not only the multiplier disease but it may limit effective treatments for CVD because of hyperkalemia risk
- The CardioRenal Connection is the core issue for disease management and farther progress in reducing NCD death rates particularly High-Income Countries



vol 1 Figure 1.12 NHANES participants at target blood pressure, 1998-2012

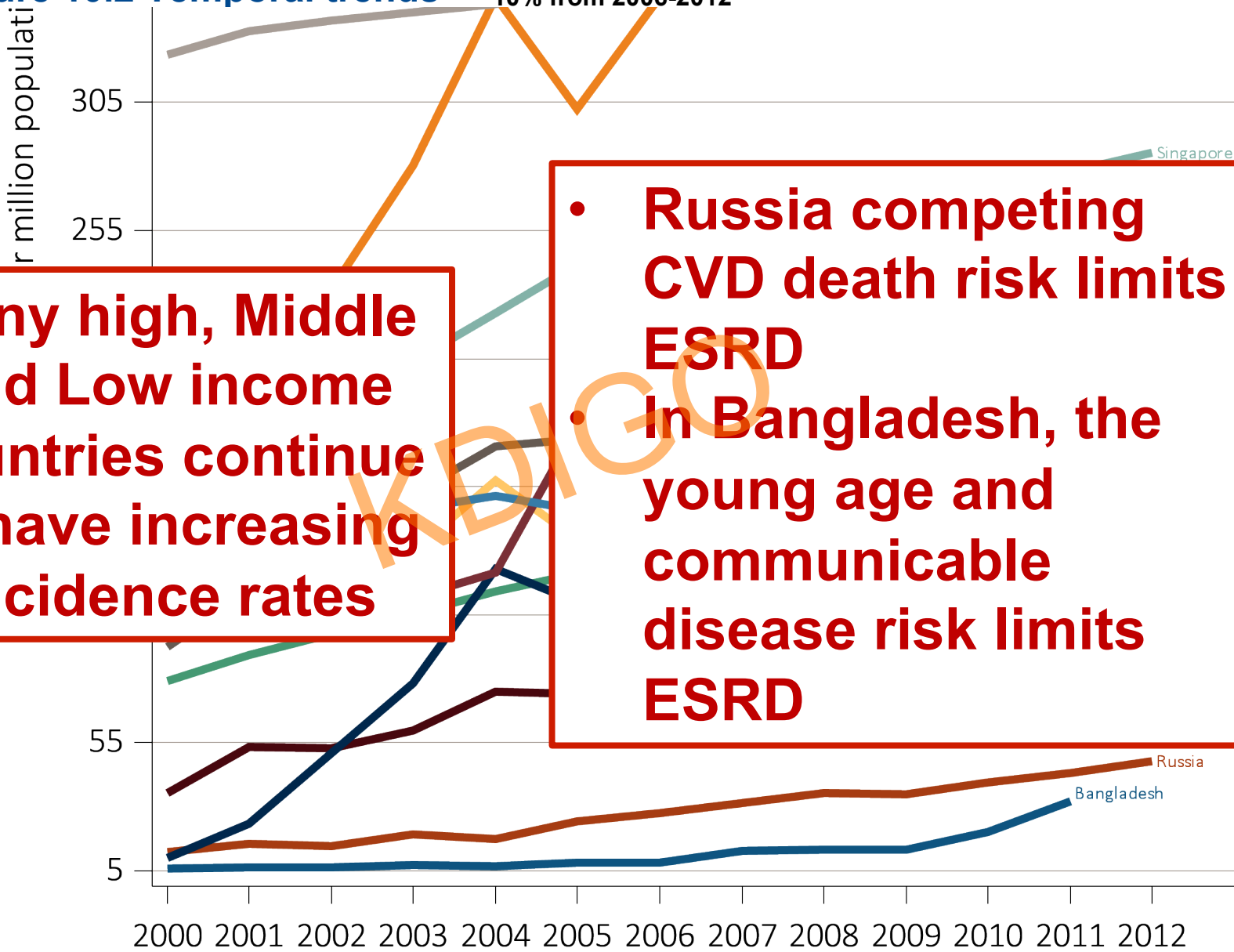


Blood Pressure Control is a Central Issue for CardioRenal Disease!

Data Source: National Health and Nutrition Examination Survey (NHANES), 1988–1994, 1999–2004 & 2007–2012 participants age 20 & older. Single-sample estimates of eGFR & ACR; eGFR calculated using the CKD-EPI equation. Figure represents all hypertensives plus those hypertensive participants that are at target blood pressure, probably due to medication. Abbreviations: ACR, urine albumin/creatinine ratio; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate.

vol 2 Figure 10.2 Temporal trends in the incidence rate of ESRD in the population aged 20 years and older

(A) Countries in which the incidence rate of ESRD increased at least 10% from 2006-2012



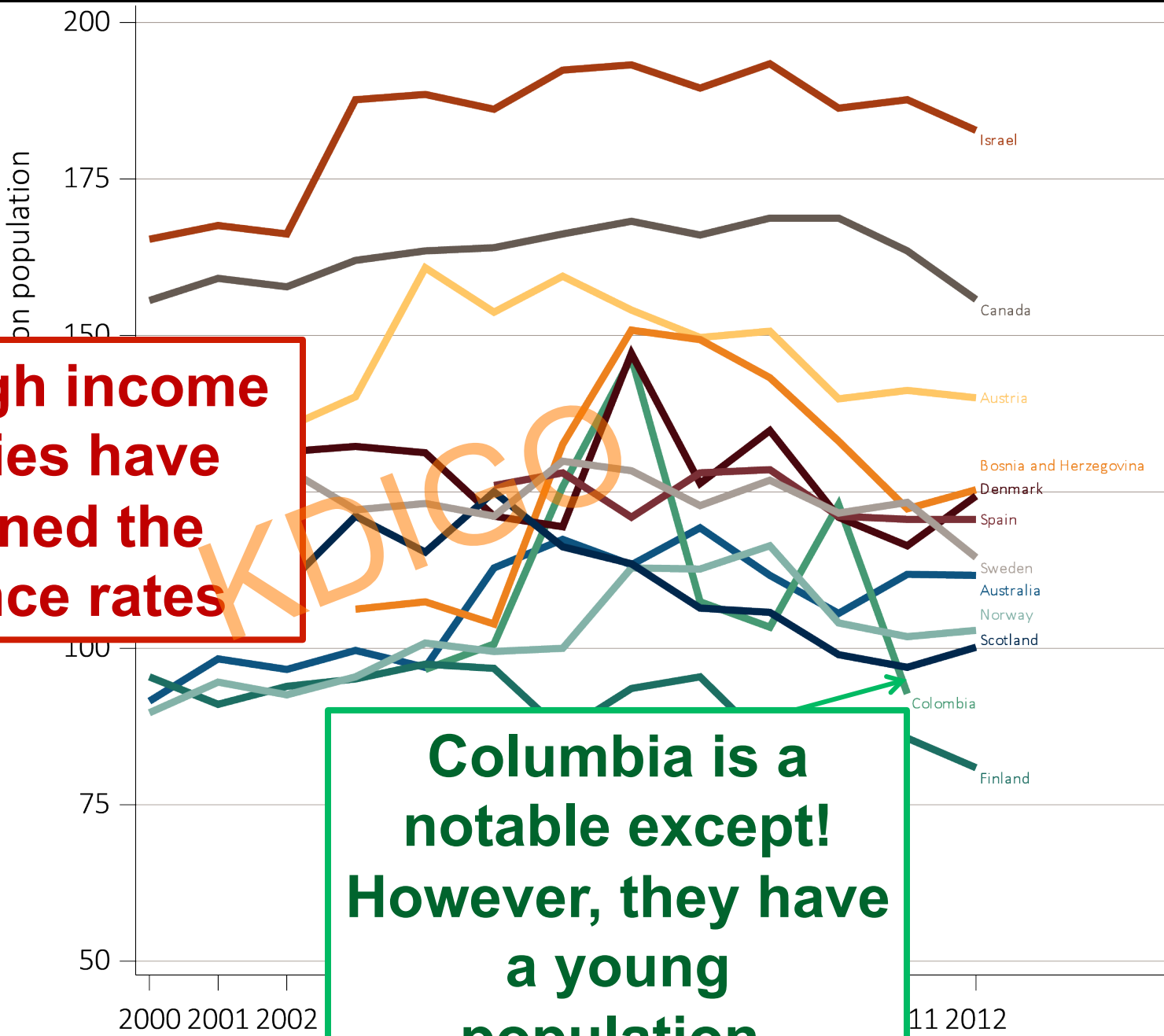
Many high, Middle and Low income countries continue to have increasing incidence rates

- Russia competing CVD death risk limits ESRD
- In Bangladesh, the young age and communicable disease risk limits ESRD

Data source: Global Burden of Disease Database. Incidence rates are shown for countries with a decrease from 2006-2012. U.S. are shown for comparison. Abbreviations: USA, United States; China, People's Republic of China; India, India; Russia, Russian Federation; Bangladesh, Bangladesh; Singapore, Singapore.



vol 2 Figure 10.2
 in the incidence |
 million populatio
 years 2000-2012



Many high income countries have contained the incidence rates

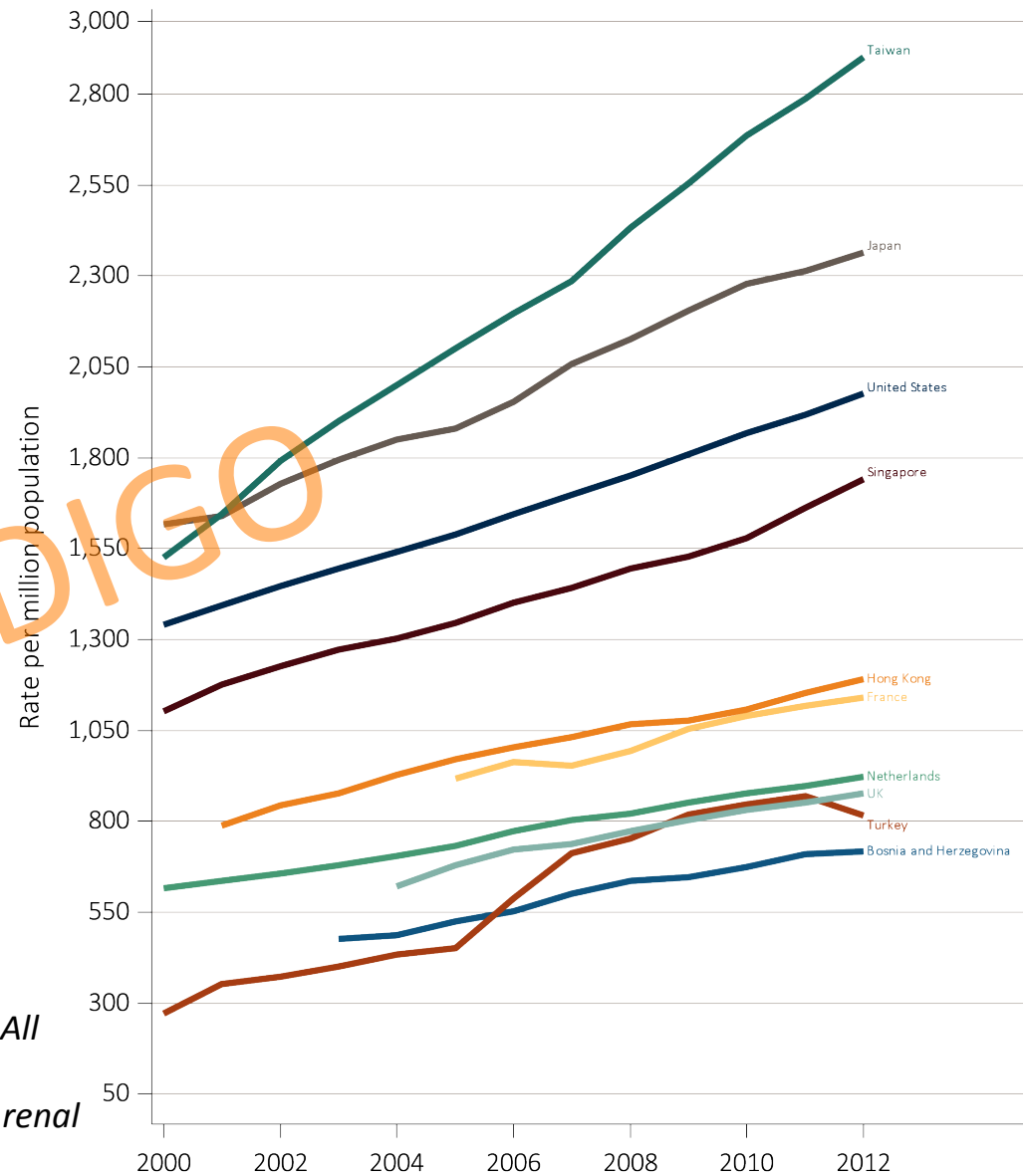
Colombia is a notable except! However, they have a young population.

Data source: Special a
 Database. All rates are
 shown for countries wit
 decrease from 2006 to
 U.S. are shown for com
 Abbreviations: ESRD, €



vol 2 Figure 10.6 Trends in the prevalence of ESRD, per million population, by country, years 2000-2012

(A) Countries in which the prevalence of ESRD increased by 15-31 % from 2006-2012



Data source: Special analyses, USRDS ESRD Database. All rates are unadjusted. Data for U.S. are shown for comparison purposes. Abbreviations: ESRD, end-stage renal disease.

vol 2 Figure 10.6 Trends in the prevalence of ESRD in selected countries, 2000-2012

(B) Countries in which the prevalence of ESRD increased by greater than 31% from 2000 to 2012

Rate per million population

1,550
1,300
1,050
800
550
300
50

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

KDIGO

Jalisco (Mexico)
Rep. of Korea
Chile
Malaysia
Czech Republic
Thailand
Argentina
Romania
Brazil
Iceland
Russia
Bangladesh
Philippines

Data source: United States Renal Data System

Public Health Challenge of NCDs and the subgroup with Kidney Disease

- Incidence rates have slowed in many high income countries which is consistent with the progress in NCD treatment, control of risk factors and declining death rates
- Low and Low-Middle Income countries have young populations which have not developed NCDs and also have low ESRD rates
- Prevalence rates, however, continue to rise based on increased survival thereby stressing Ministry of Health budgets



Detection and Prevention is the only choice

- In Middle-Income countries expanding public health programs targeting CVD, hypertension and diabetes still has the greatest potential for prevention of NCDs
- CVD and DM treatment uses the same drugs as in the Kidney disease population thereby targeting the three diseases multiplies
- The poorest risk factor control is within the kidney disease population



Ministries of Health NCDs and Kidney Disease

- **The only rational solution is**
- **detection and prevention!**

high-income countries which are able to
detect and prevent kidney disease

**ESRD treatment will be vulnerable
to limited resources including water
and skilled health care workers!**



World Wide Projected Renal Replacement Therapy: Current and Projected Demand

The Lancet 2015 385, 1975-1982

A

B

The RRT Demand has huge current & future budgetary implications such that MOH and Finance cannot ignore the looming implications!

