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# **NCDs – Burden, Interventions and Expected Outcomes**

## **Meeting on Results-Based Financing for NCDs**

**Dr James Hospedales  
Executive Director CARPHA**



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# All is not well in Paradise: “Diabesity” and NCDs



# Presentation Outline

- Burden of NCDs
  - Mortality
  - Risk Factors for NCDs
  - Economic Burden
- Interventions for NCD Prevention and Control
  - Best Buys
  - Good Buys
  - Cost-Effective Co-Benefits

# Mortality from NCDs



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# NCDs: What are they?



**DRUNK**  
I believe you've had enough.



**NCDs**  
**4 by 4**

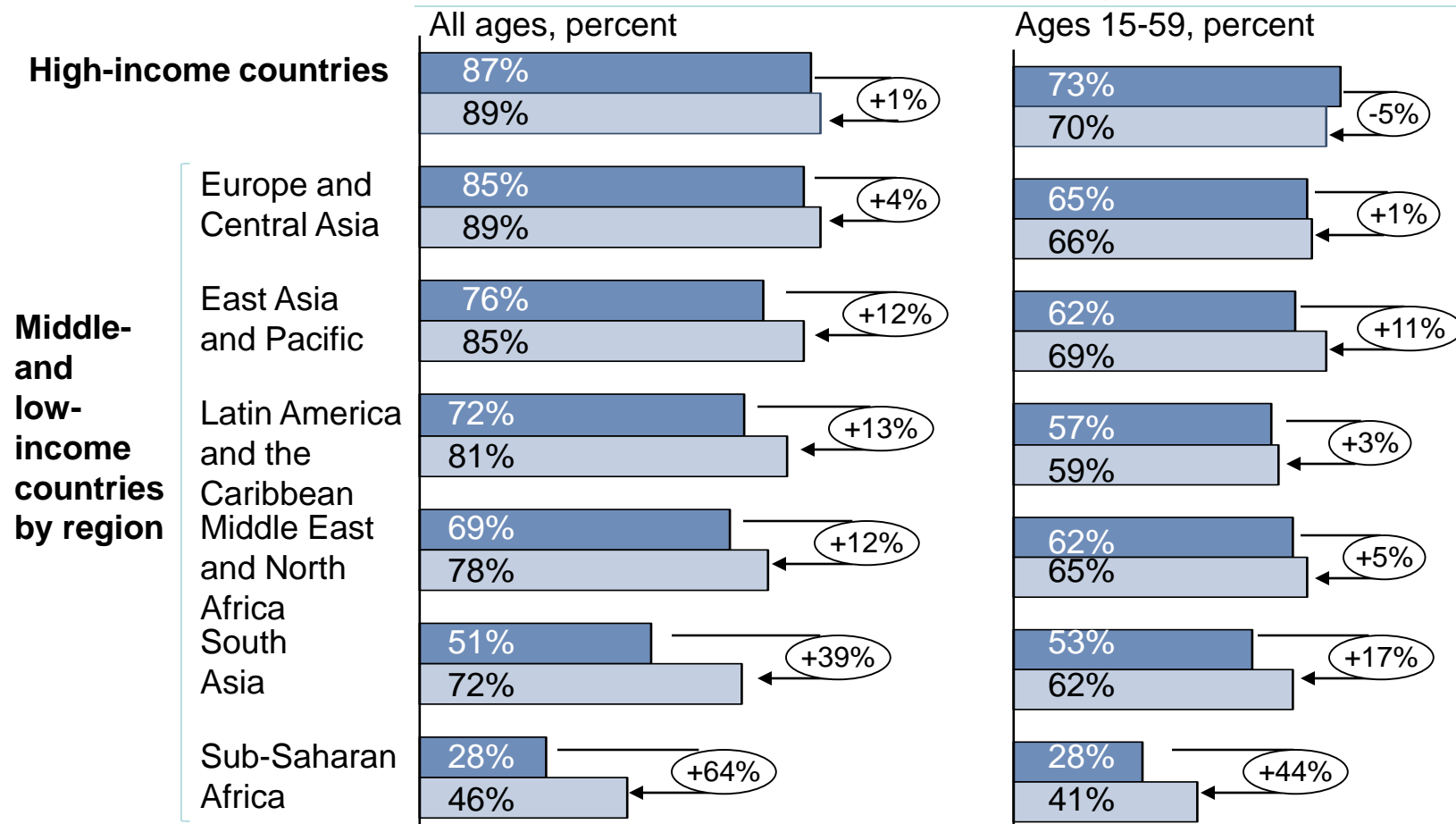


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# NCDs present a rising challenge in all middle- and low-income country regions

2008  
2030

Deaths from NCDs as a share of total deaths, 2008-2030<sup>1</sup>

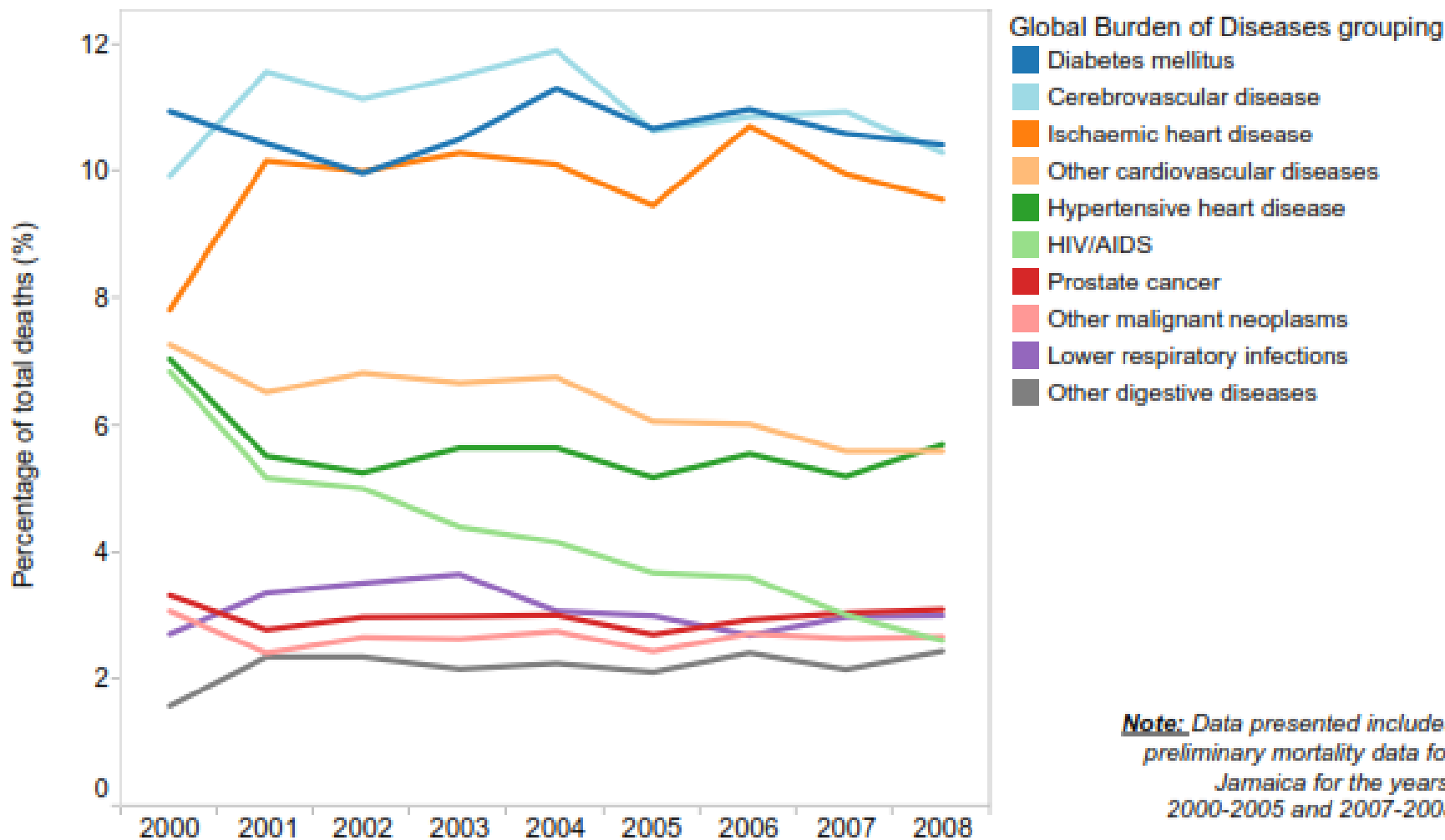


Notes: <sup>1</sup> Analysis by region uses WHO updated estimates for 2008 and baseline projections for 2030; analysis by income group uses WHO 2008-2030 baseline projections.

Sources: World Bank analysis by the authors in "Chronic Emergency: Why NCDs Matter." *Health, Nutrition, and Population Discussion Paper*. 2011.

Washington DC: World Bank, based on the WHO Global Burden of Disease estimates and projections and the World Bank regional/income country groupings.

# Leading Causes of Death in the English- and Dutch-speaking Caribbean, 2000-2008 (using the Global Burden of Diseases grouping)



*Note: Data presented includes preliminary mortality data for Jamaica for the years: 2000-2005 and 2007-2008*

Number of reporting countries:

[18] [19] [19] [19] [19] [18] [20] [16] [19]

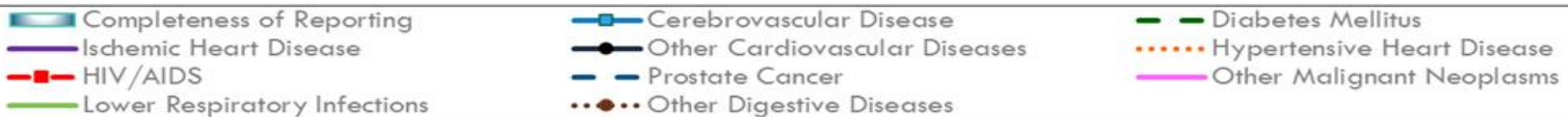
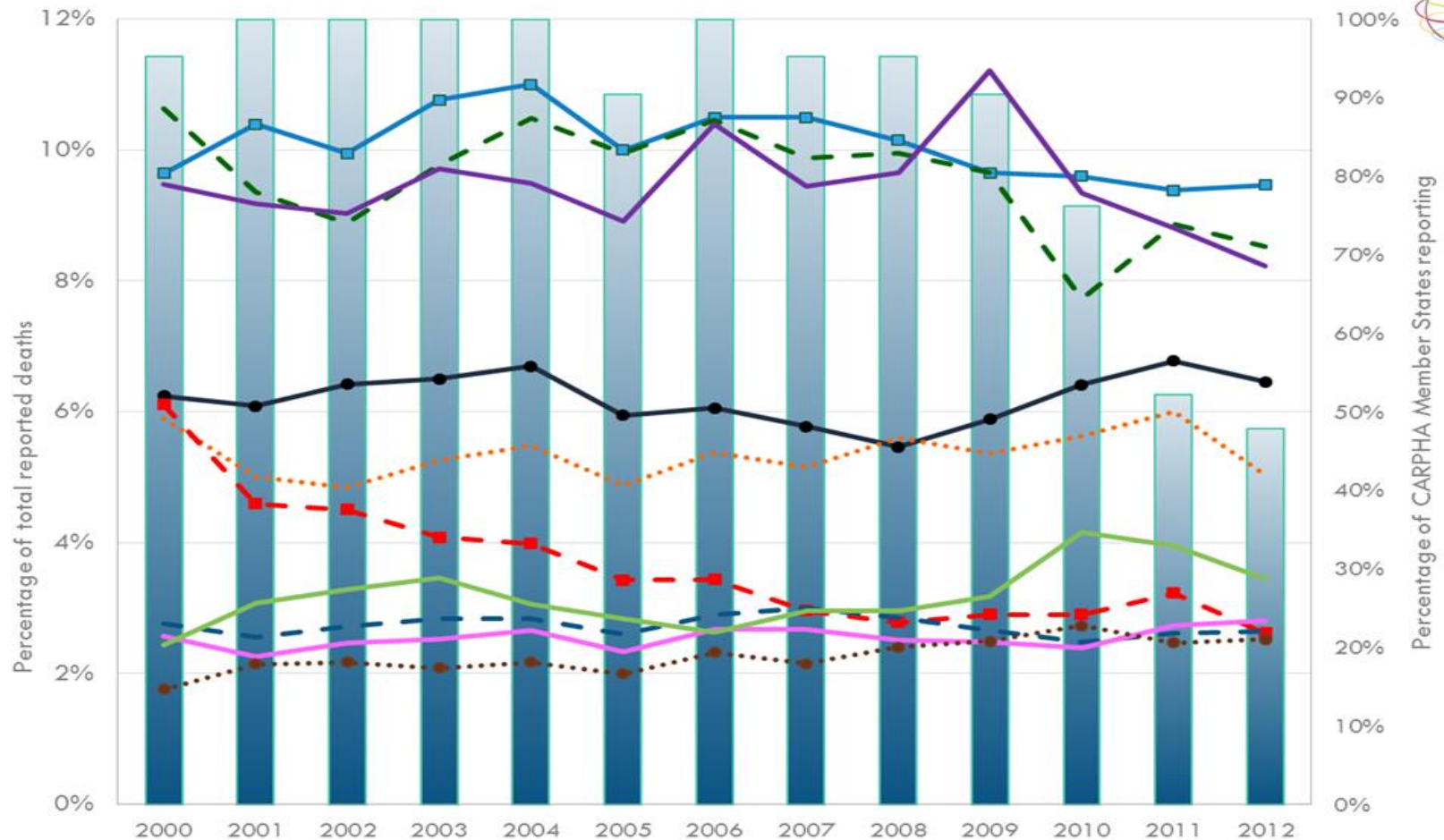
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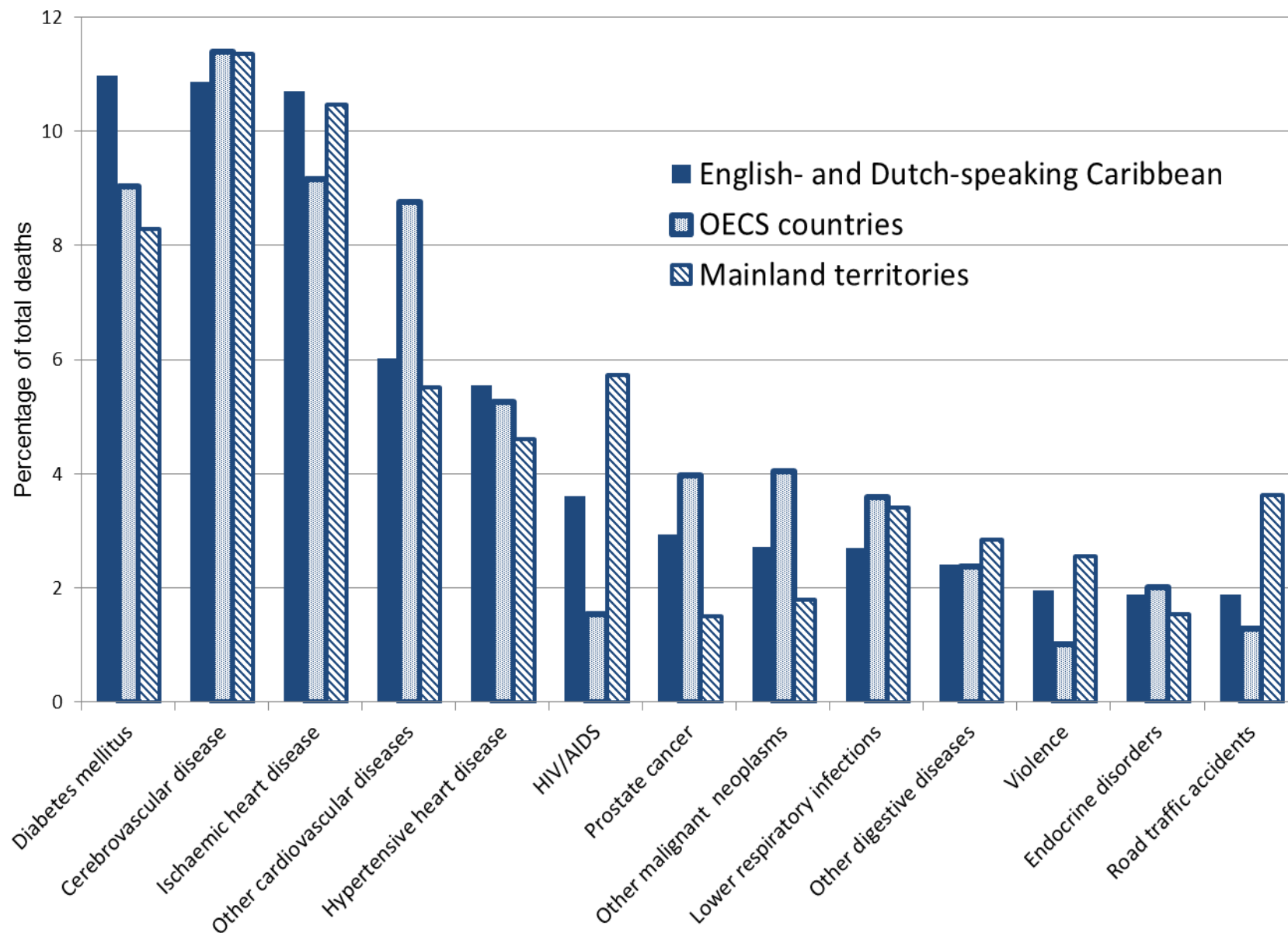


# Leading Causes of Death CARPHA Member States\*, 2000-2012

\* Excluding Haiti

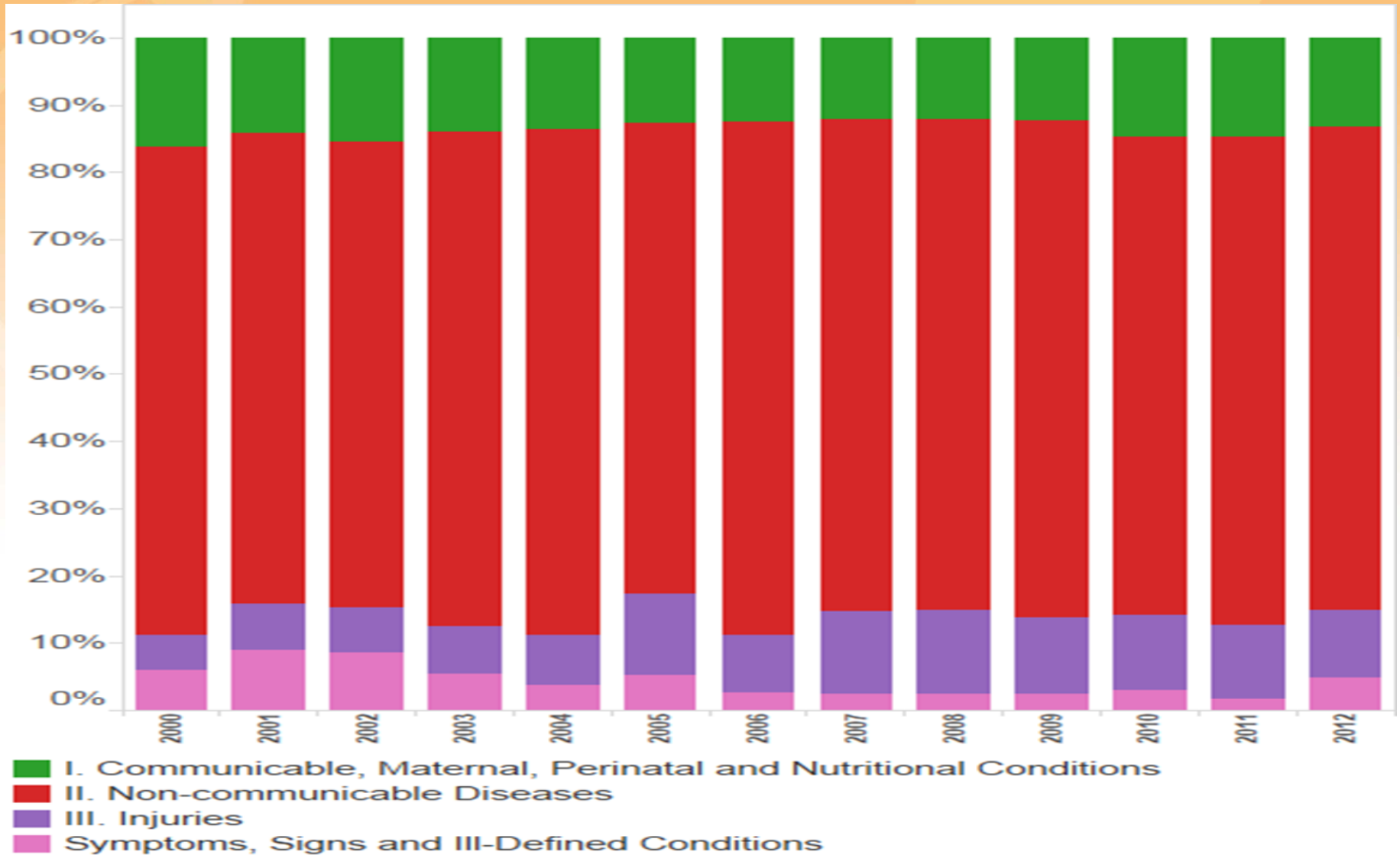


## Leading causes of death in the English- and Dutch-speaking Caribbean and in the OECS countries and the Mainland territories , 2006

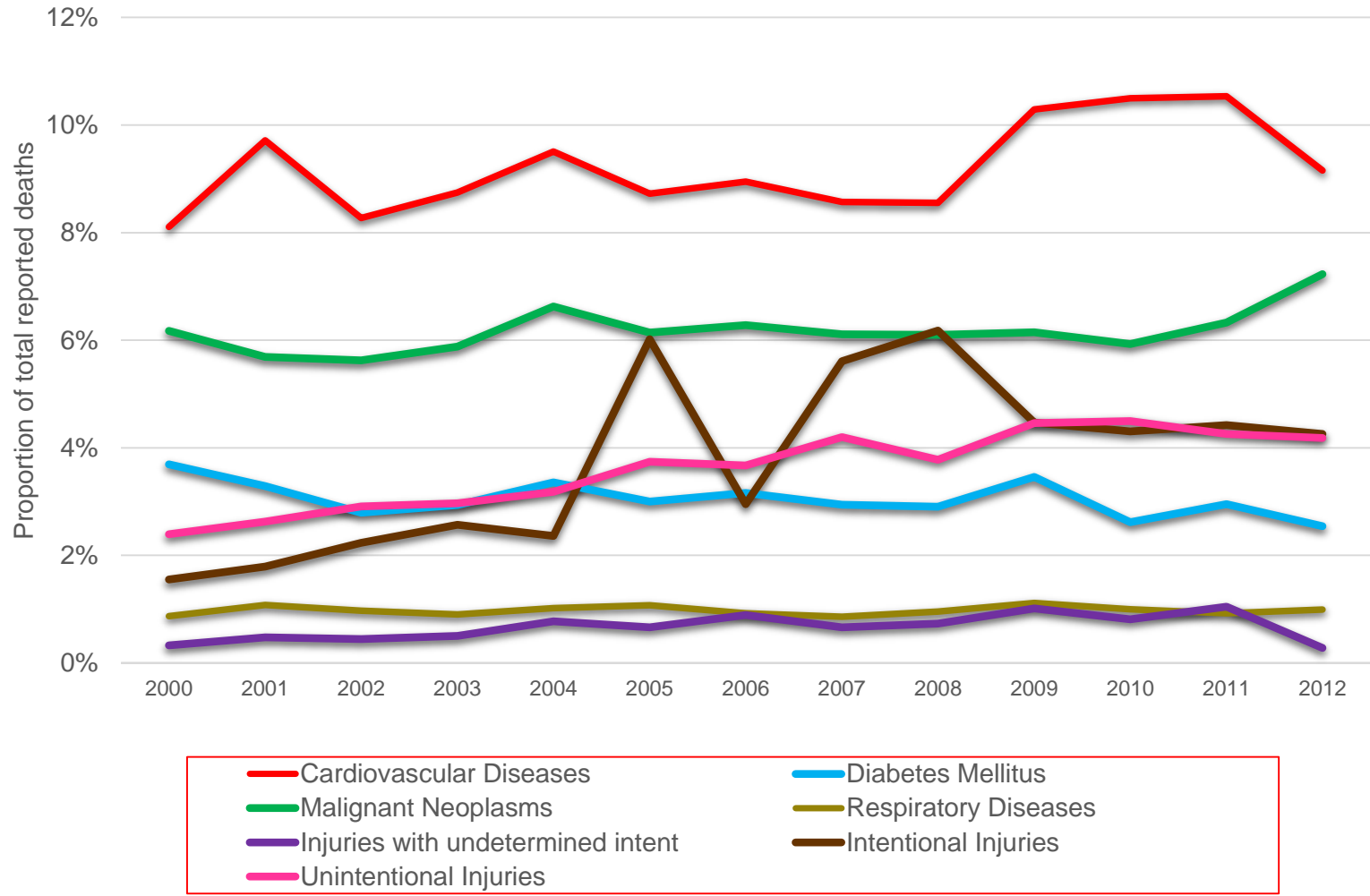


**Source:** Quesnel S, et al. 2013. *Leading causes of death in the English- and Dutch-speaking Caribbean during the period 2000-2008.*

# Broad Groupings of Conditions Causing Death in CARPHA Member States



## Crude mortality rates for select Non-Communicable Diseases for deaths among persons 65 years or younger, English- and Dutch-speaking Caribbean, 2000-2012

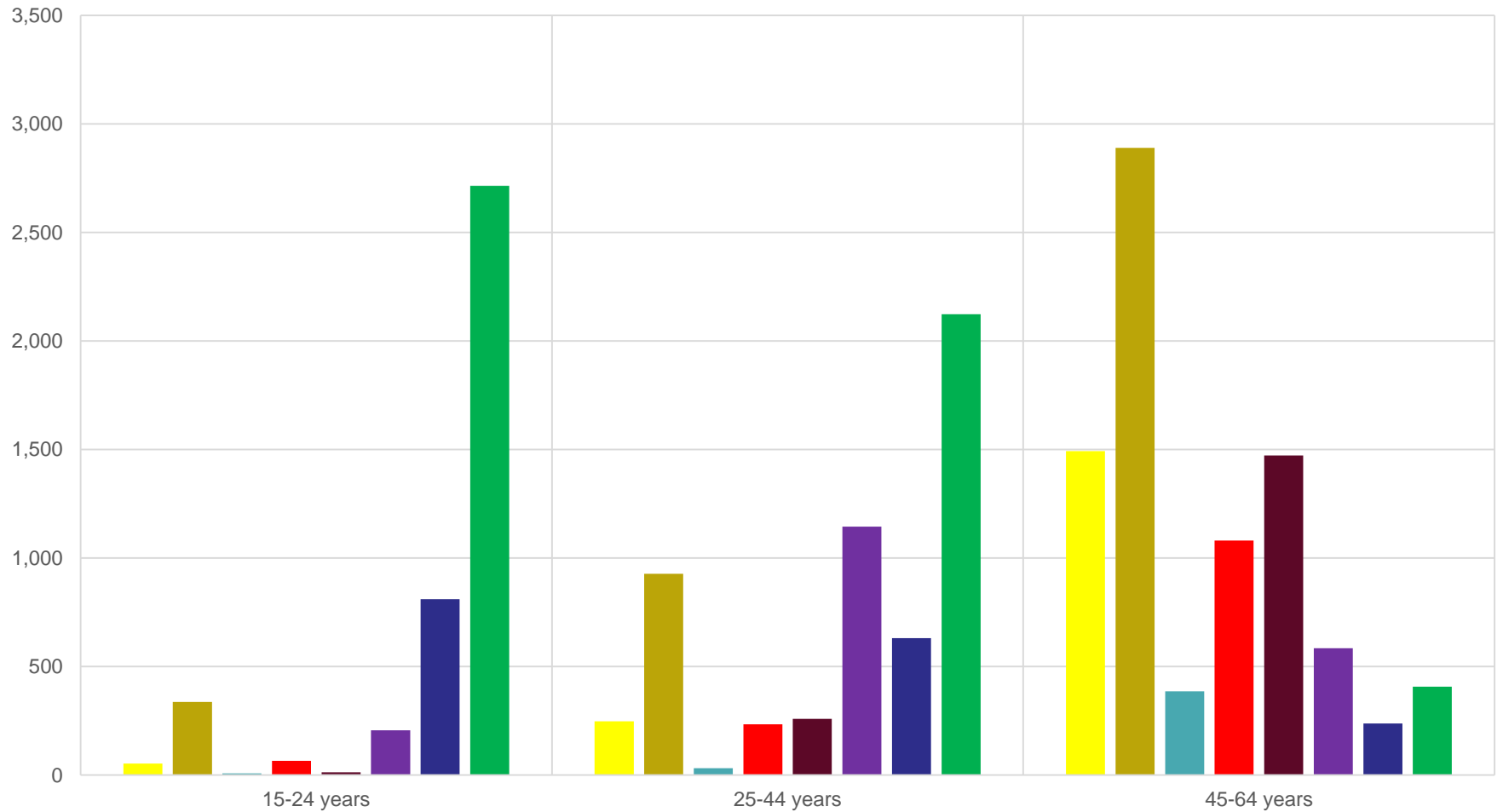


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PYLL per 100,000 population for select Diseases by age group



■ Diabetes Mellitus

■ Malignant Neoplasms

■ Trachea, Bronchus and Lung Cancers

■ Cerebrovascular Disease

■ Ischemic Heart Disease

■ HIV/AIDS

■ Road Traffic Accidents

■ Violence

# Risk Factors for NCDs

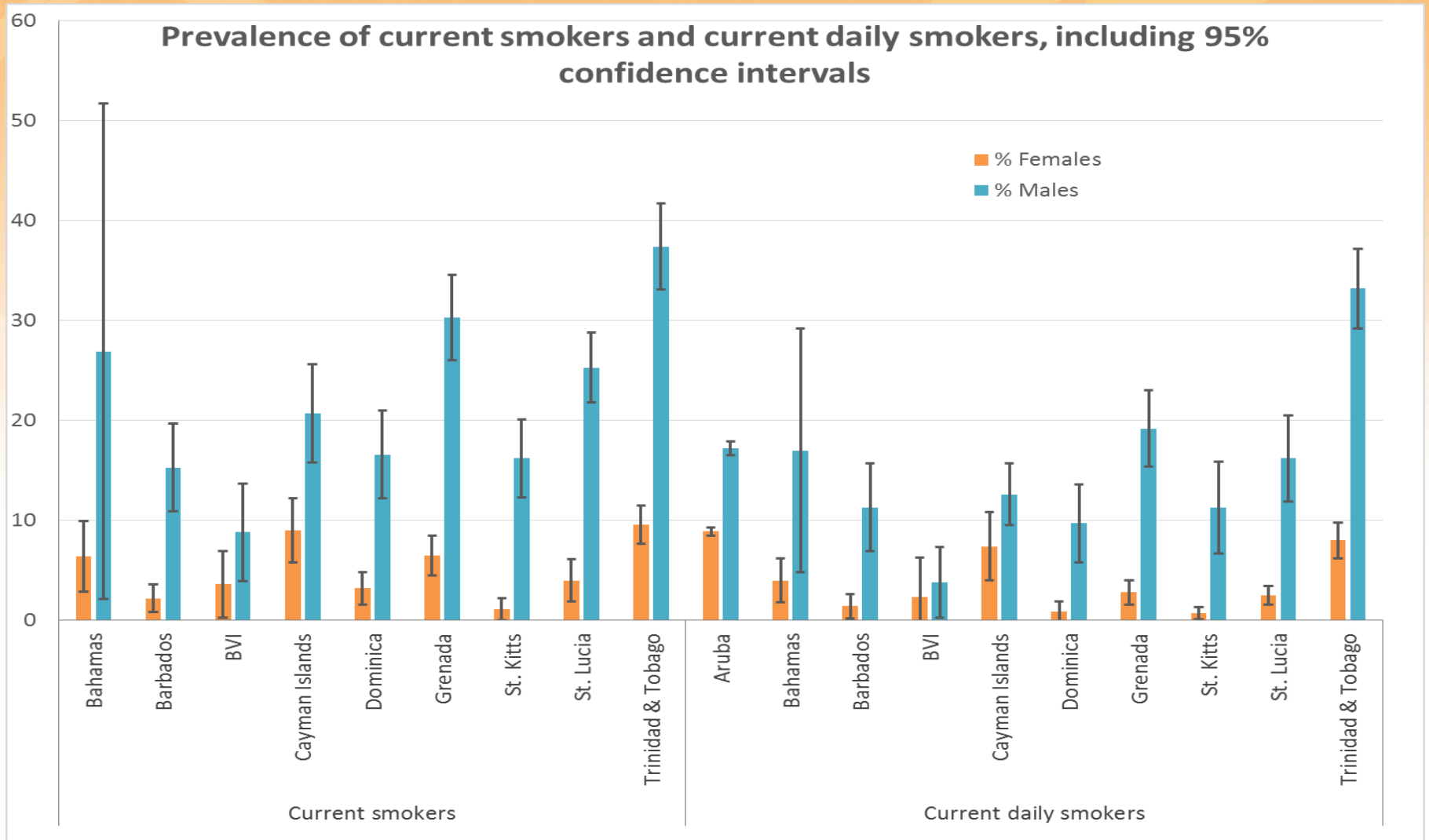


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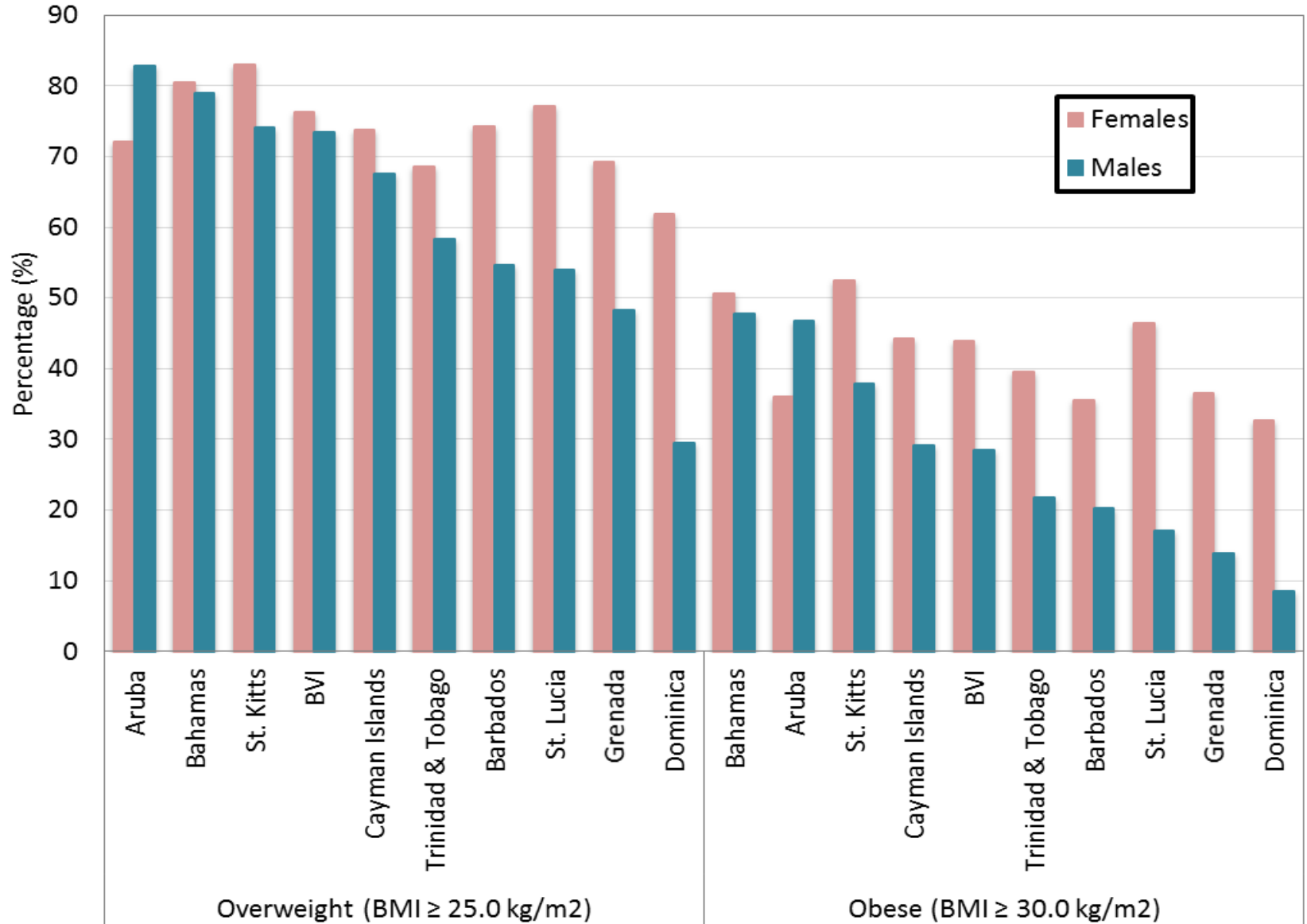
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# Tobacco use

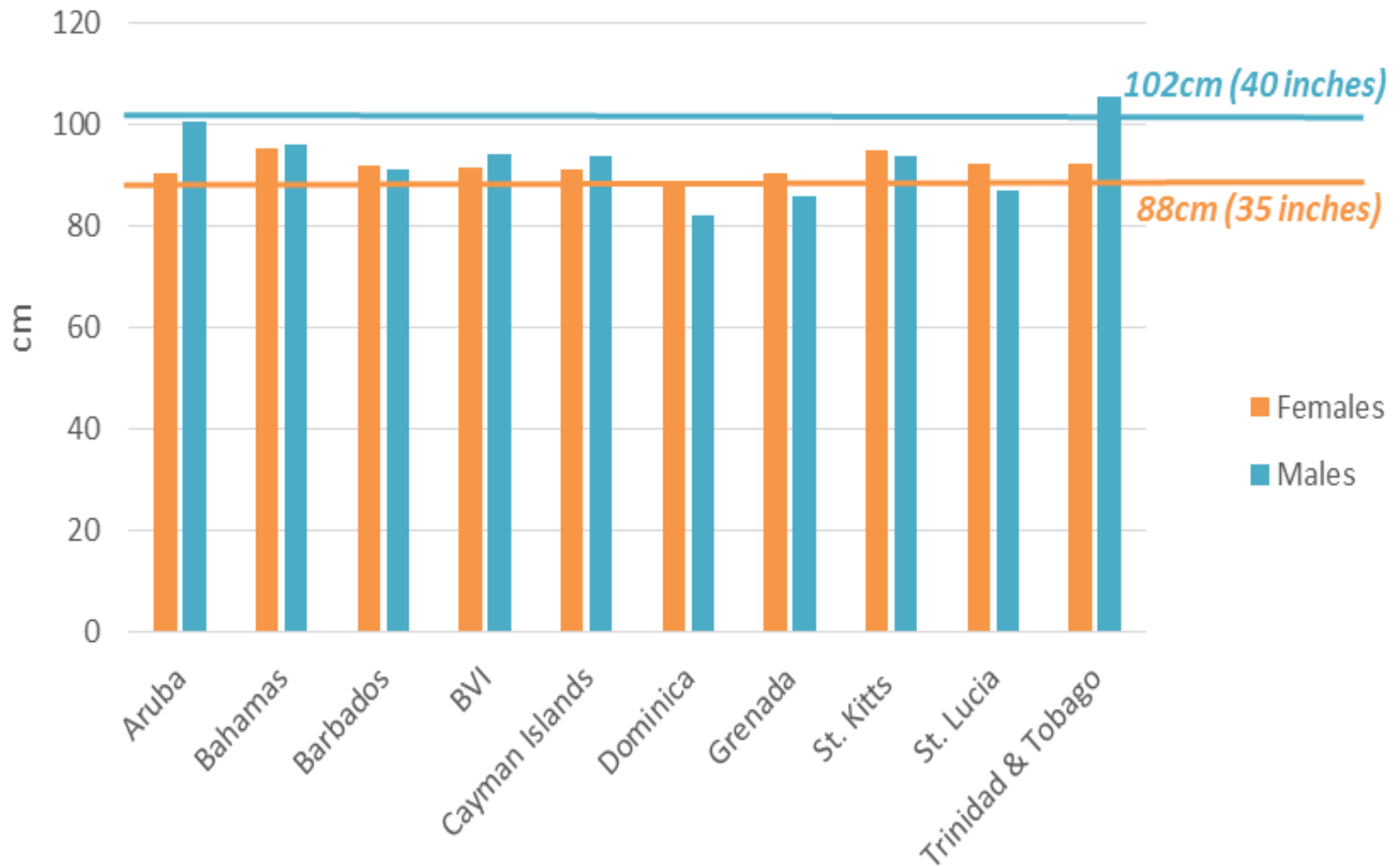


## Prevalence of overweight and obesity

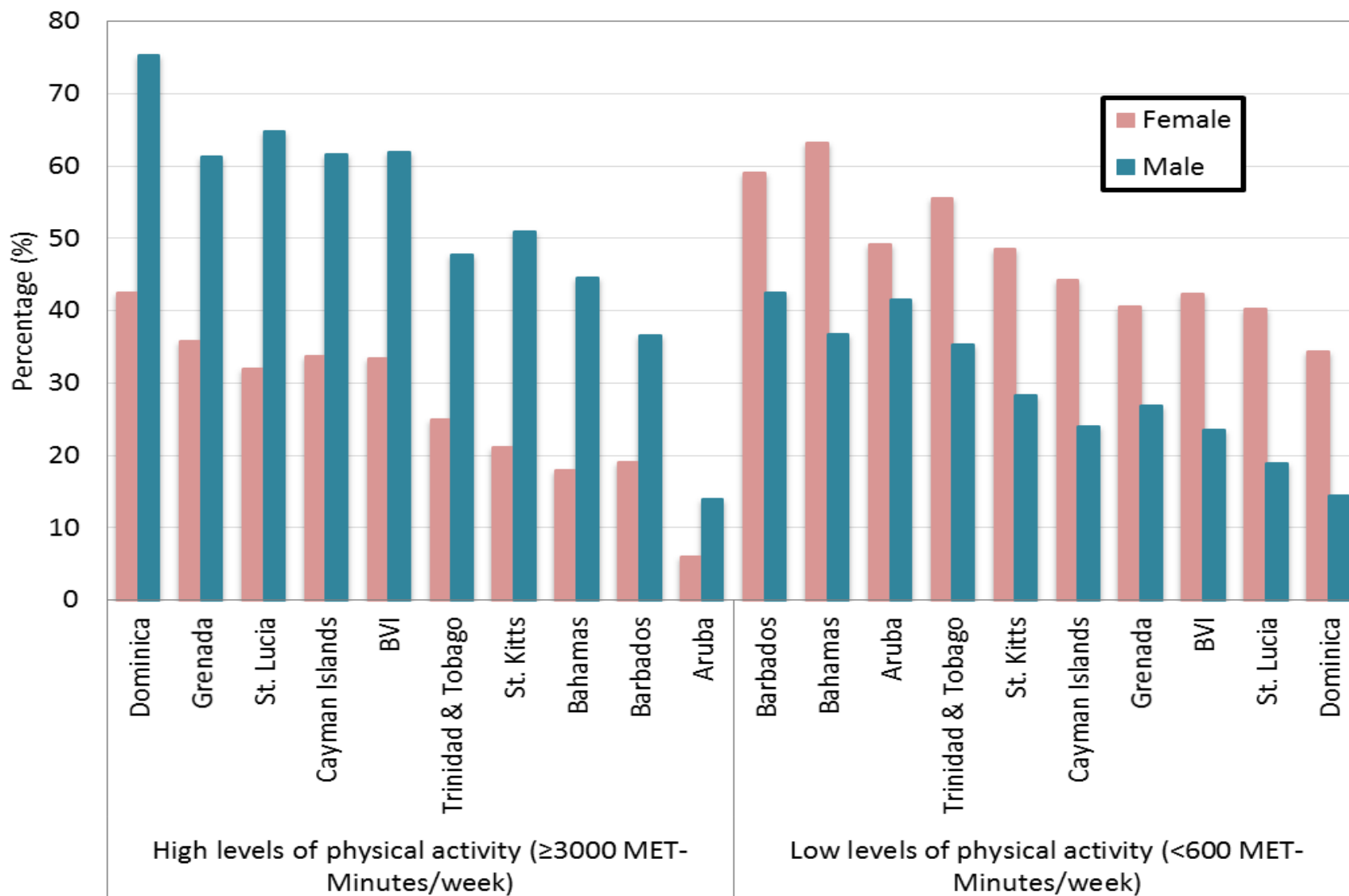




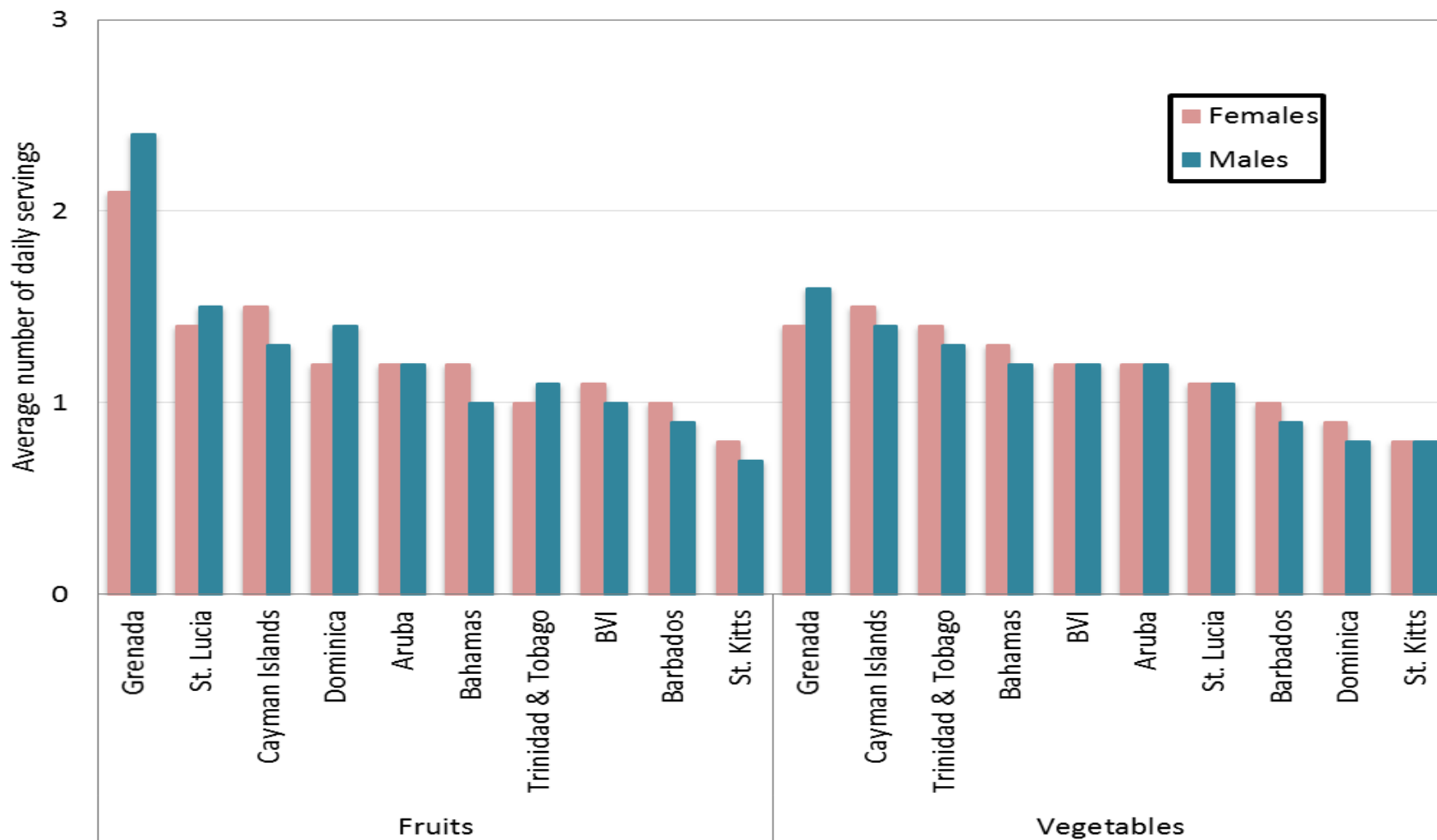
## Average Waist Circumference (cm)



## Levels of physical activity



## Mean daily servings of fruits and vegetables

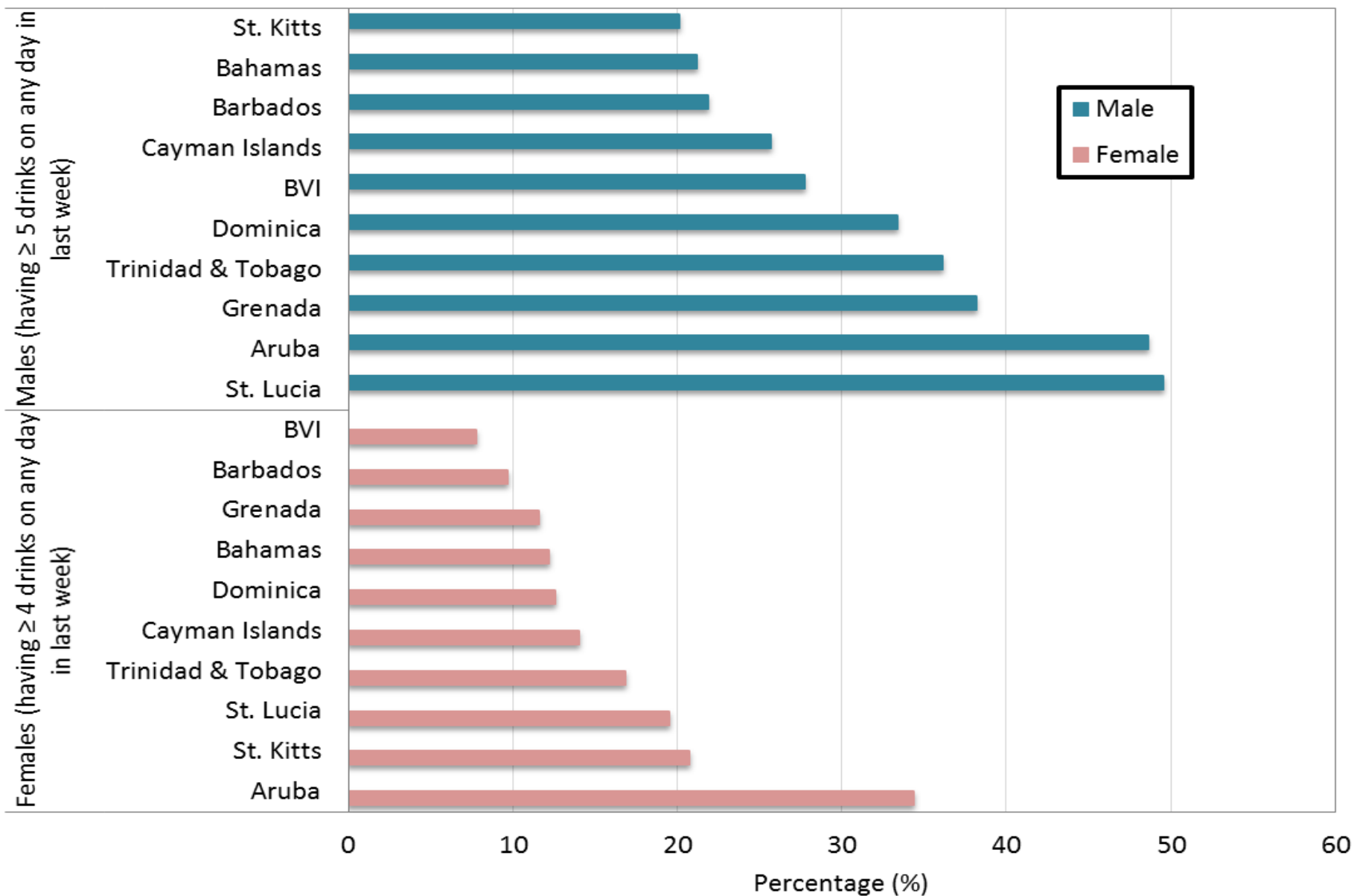


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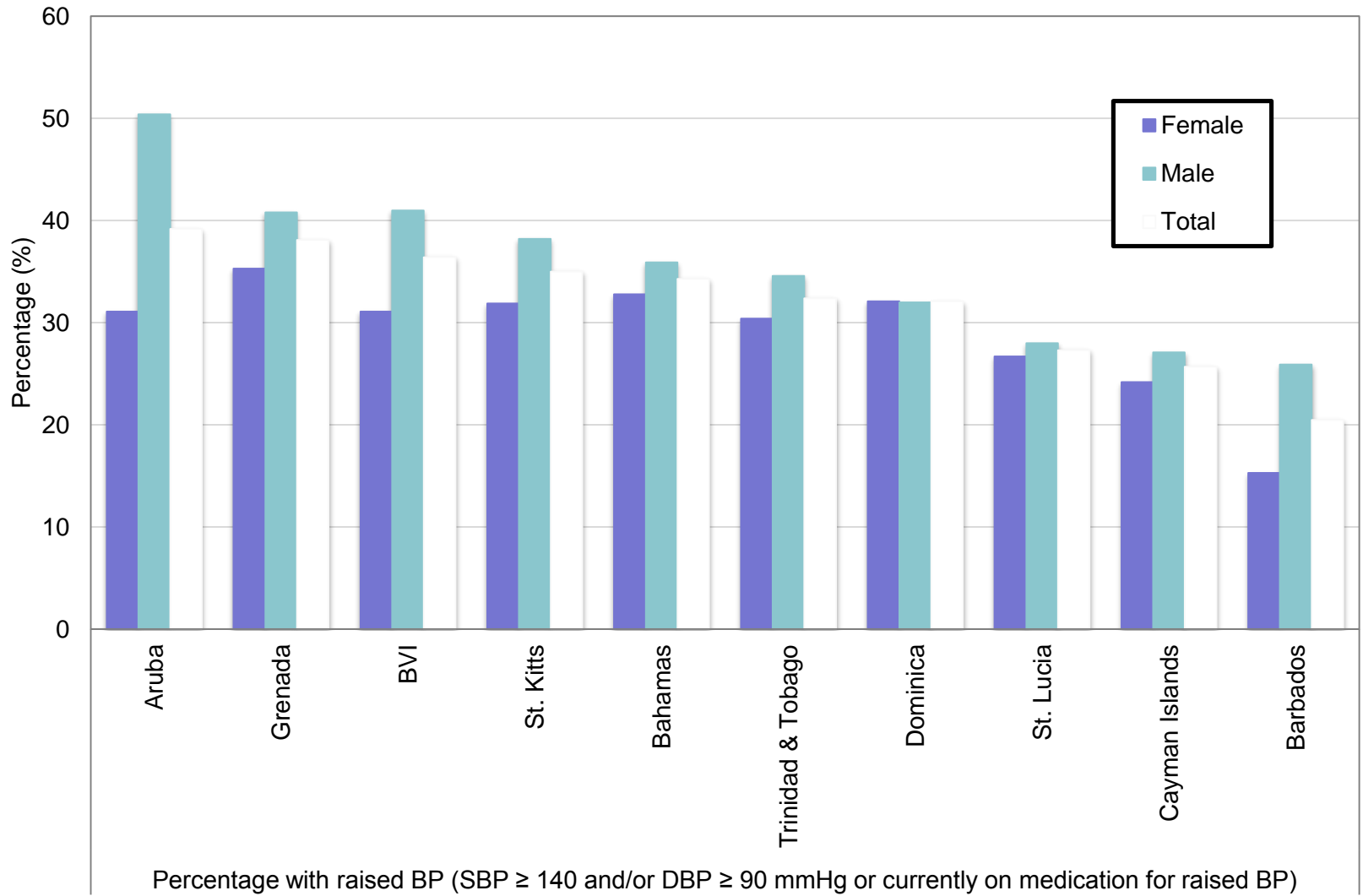
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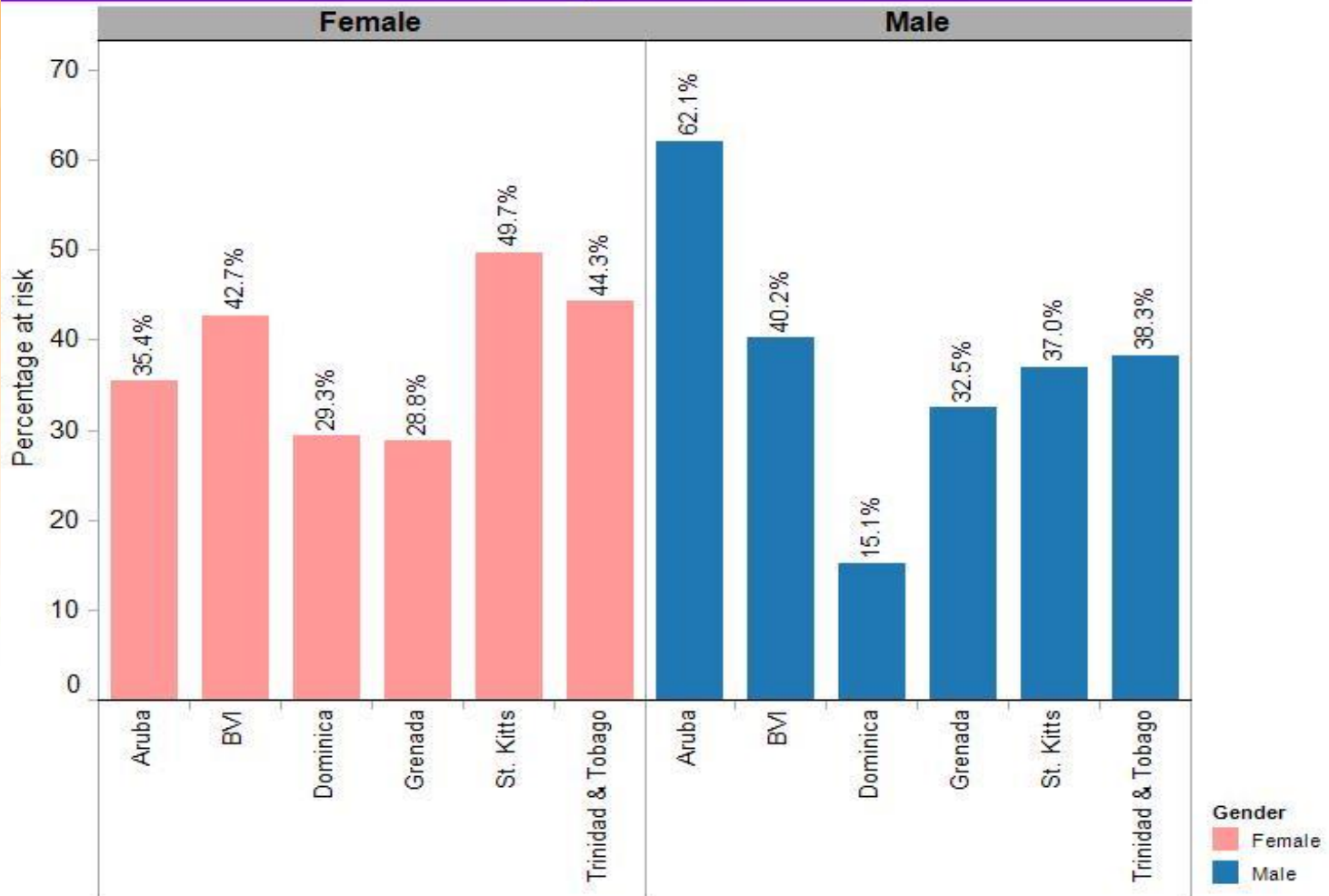
## Harmful use of alcohol



# Prevalence of raised BP (SBP $\geq$ 140 and/or DBP $\geq$ 90 mmHg or currently on medication for raised BP)



## Prevalence of Raised Risk for Development of Chronic Diseases in 25-44 year olds\*



### Risk factors:

- current daily smokers
- less than 5 servings of fruits & vegetables per day
- low level of physical activity
- overweight or obese
- raised BP (SBP  $\geq$  140 and/or DBP  $\geq$  90 mmHg or currently on medication for raised BP)

### Raised Risk:

3-5 Risk factors



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\* For Dominica, raised risk in calculated for 15-44 year olds

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# Estimated Economic Burden (\$US Million, 2001)

	BAH	BAR	JAM	TRT
Diabetes	27	38	221	467
Hypertension	46	73	266	250
<b>Total</b>	<b>73</b>	<b>111</b>	<b>487</b>	<b>717</b>
<b>% GDP</b>	<b>1.4</b>	<b>5.3</b>	<b>5.8</b>	<b>8.0</b>



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Abdulkadri et al. Social and Economic Studies 58: 3 & 4 (2009): 175-197

# A Costly Consequence of Diabetes





# Economic burden of NCDs

## NCD COSTS

Health spending on diabetes ranges from 6% of all health costs in China to 15% in Mexico

*Source: P. Zhang, et al, 2010*

Each 10% increase in NCD burden is associated with a 0.5% reduction in annual economic growth

*Source: WHO*

23 high burden countries are projected to lose \$84 billion in GDP between 2005-2015 from 3 NCDs

*Source: Abegunde, et al, 2007*

**NCDs will cost more than \$47 trillion globally between now and 2030**

*Source: D. Bloom, 2011*

# Interventions and Expected Outcomes



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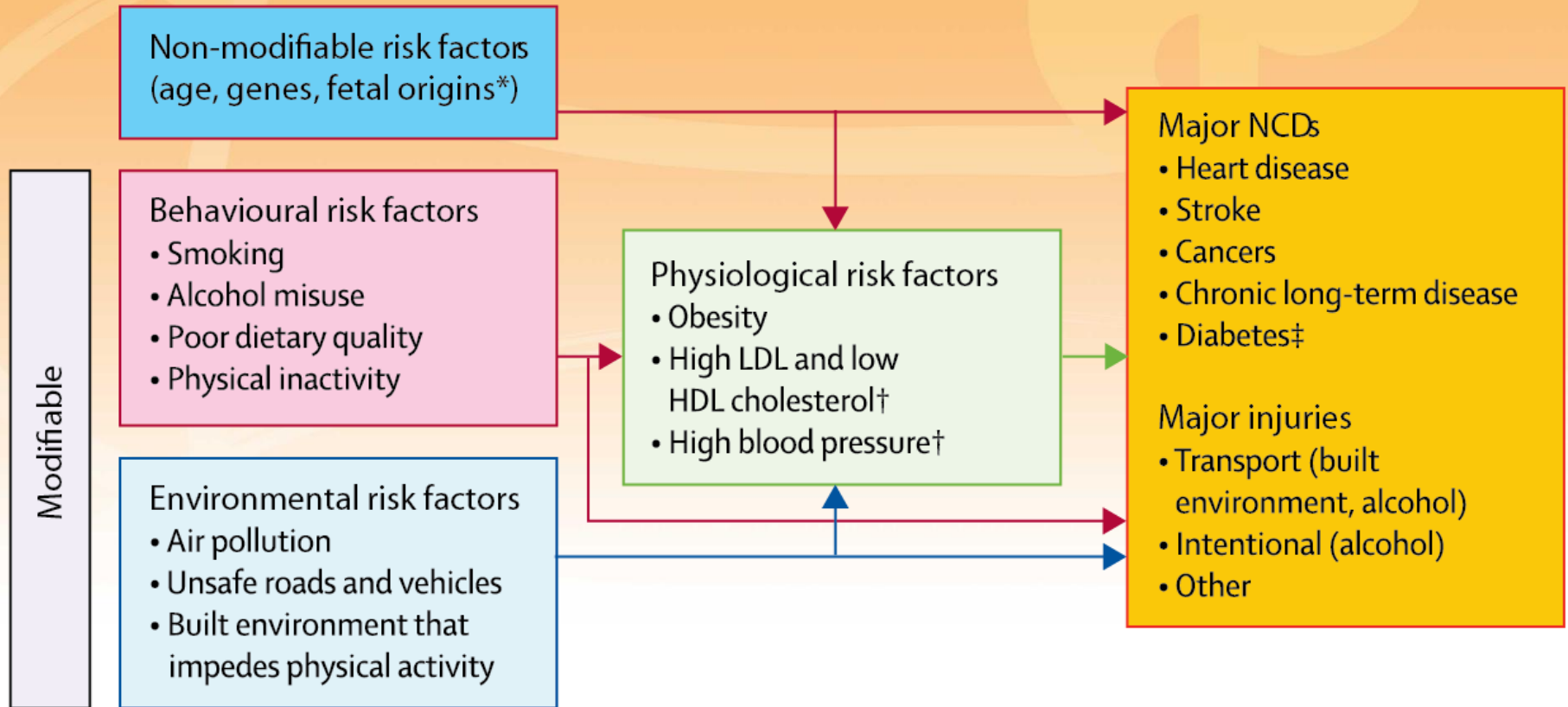
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# Chain of Results

- **RESULT CHAIN**      **EXAMPLES**
- **IMPACT**      Health status changes, e.g., mortality rates decrease, Productivity improves,
- **OUTCOME**      Changes in risk factor prevalence, Improved quality of care
- **OUTPUTS**      Numbers of persons trained
- **PROCESS**      Training Workshops, campaigns
- **INPUTS**      Policies, funding,

# What steps can countries take to delay onset?



*Relations between key risk factors for major NCDs and injuries*  
† Amenable to drug therapy

1st CARICOM SUMMIT on CHRONIC NON-COMMUNICABLE DISEASES  
PORT OF SPAIN, TRINIDAD AND TOBAGO — September 15, 2007

# UNITE AGAINST CHRONIC DISEASES



# The CARICOM Heads Summit on NCDs, 2007.

- “We, the Heads of State of the Caribbean Community....”
- 15-point, 27 commitment “Port of Spain Declaration”; multi-sectoral
- Tobacco – Ratify and implement the WHO FCTC: taxes, packaging, earmark some revenue for health promotion & disease prevention, ban smoking in public places
- Alcohol- use alcohol taxes to finance NCD prevention and control
- Healthy Diet - Trade policies on food imports, agriculture policies, Healthy school meals, Food labeling, reduce or eliminate trans fats
- Physical activity-physical education in schools; physical activity in work places; improve public facilities for physical activity
- Health services - screening and management of NCDs to achieve 80% coverage by 2012; primary and secondary prevention, comprehensive health education
- Monitoring - Surveillance of risk factors; monitoring of the actions agreed upon in Declaration (CARICOM Secretariat, CAREC, UWI & PAHO/WHO)
- Mobilizing Society - National Commissions on NCDs; including public, private sector and civil society, media and communications industry
- Caribbean Wellness Day – Second Saturdays in September



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[WWW.CARICOM.ORG](http://WWW.CARICOM.ORG)

*Compilation of*  
**LEGISLATION** for the **ENGLISH-SPEAKING**  
**CARIBBEAN COUNTRIES** and **TERRITORIES**  
on **PREVENTION** and **CONTROL** of  
**OBESITY, DIABETES** and  
**CARDIOVASCULAR DISEASES**



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CA



Pan American  
Health  
Organization

Regional Office of the  
World Health Organization

Area of Health Surveillance, Disease Prevention and Control  
Area of Health Systems based on Primary Health Care  
Pan American Health Organization (PAHO)  
Regional Office of the World Health Organization (WHO)

# A thought experiment

*You are the minister of health in a Caribbean country. You have **\$35 million** to spend on NCDs. Which of these do you choose?  
Who is covered for what?*



## Population prevention

Low-cost: Tobacco taxation  
High-cost: food regulations  
[pushback from industry]

## Population screening

What diseases? HTN?, DM?  
What target groups?  
[unclear guidelines, costly]

## Individual prevention

Which meds are covered?  
How do you deliver care?  
- Buy more HCWs?  
- Redistribute HCWs?

## Individual treatment

Low-cost: ACEI, BB, ASA?  
High-cost:  
- Acute, e.g., CABG  
- Chronic, e.g., dialysis??

### Some data snippets (Caribbean)

27% of men and 12% of women use tobacco

Hypertension prevalence: 27%  
(23%-50%)

Diabetes prevalence: 10%  
(4%-22%)

CAD, CKD prevalence not available

Source: "Health Situation in Americas: Basic Indicators 2011." PAHO, Office of the Assistant Director. Health Surveillance and Disease Prevention and Control.

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# Estimated Costs of WHO Best Buys

Interventions		Cost per person per year (\$US)		
		China	India	Russia
1. Tobacco Use	Accelerated implementation of the WHO Framework Convention on Tobacco Control	0.14	0.16	0.49
2. Dietary Salt	Mass media campaigns and voluntary action by food industry to reduce consumption	0.05	0.06	0.16
3. Obesity, unhealthy diets and physical inactivity	Mass media campaigns , food taxes, subsidies, labelling, and marketing restrictions	0.43	0.35	1.18
4. Harmful Alcohol Intake	Tax increases, advertising bans, and restricted access	0.07	0.05	0.52
5. Cardiovascular risk reduction	Combination of drugs for individuals at high risk of NCDs	1.02	0.90	1.73
6. Total		1.70	1.53	4.09

# Essential packages of interventions

**Specific interventions in each package will vary by country**

- **Depends on which risk factors dominate**
- **Population package:** reduces incidence of NCDs and injuries
- **Clinical package:** reduces incidence and manages consequences

# Taxes: the single greatest opportunity is tobacco

## 50% rise in tobacco price from tax increases in China

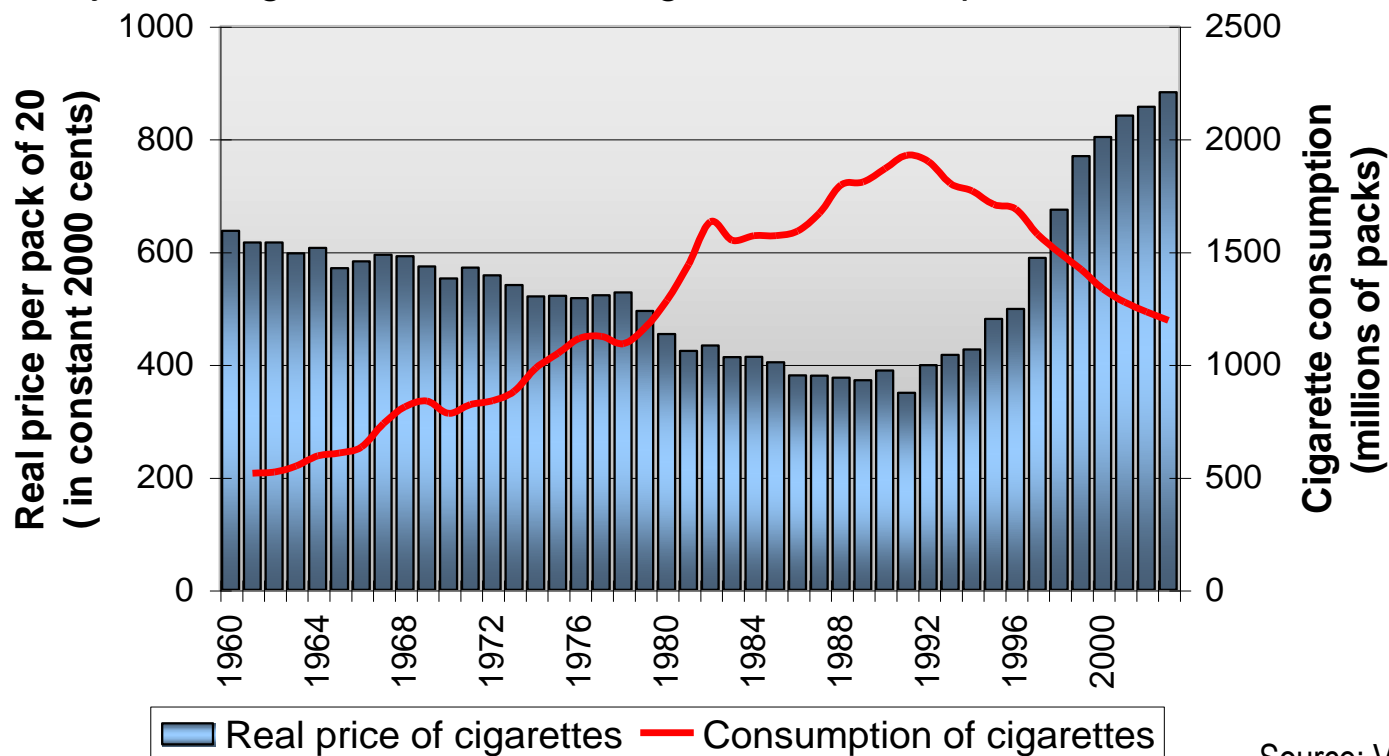
- prevents 20 million deaths + generates extra \$20 billion/y in next 50 y
- additional tax revenue would fall over time **but** would be higher than current levels even after 50 y
- largest share of life-years gained is in bottom income quintile



# Tobacco taxation

Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits <sup>b</sup>
1. Cancer, heart disease, other: tobacco taxation	40:1	0.5	1 million deaths averted or 20 million DALYs

Inflation Adjusted Cigarette Prices and Cigarette Consumption, South Africa, 1960-2003



Source: Van Walbeek, 2003

# Lessons from taxing tobacco and alcohol

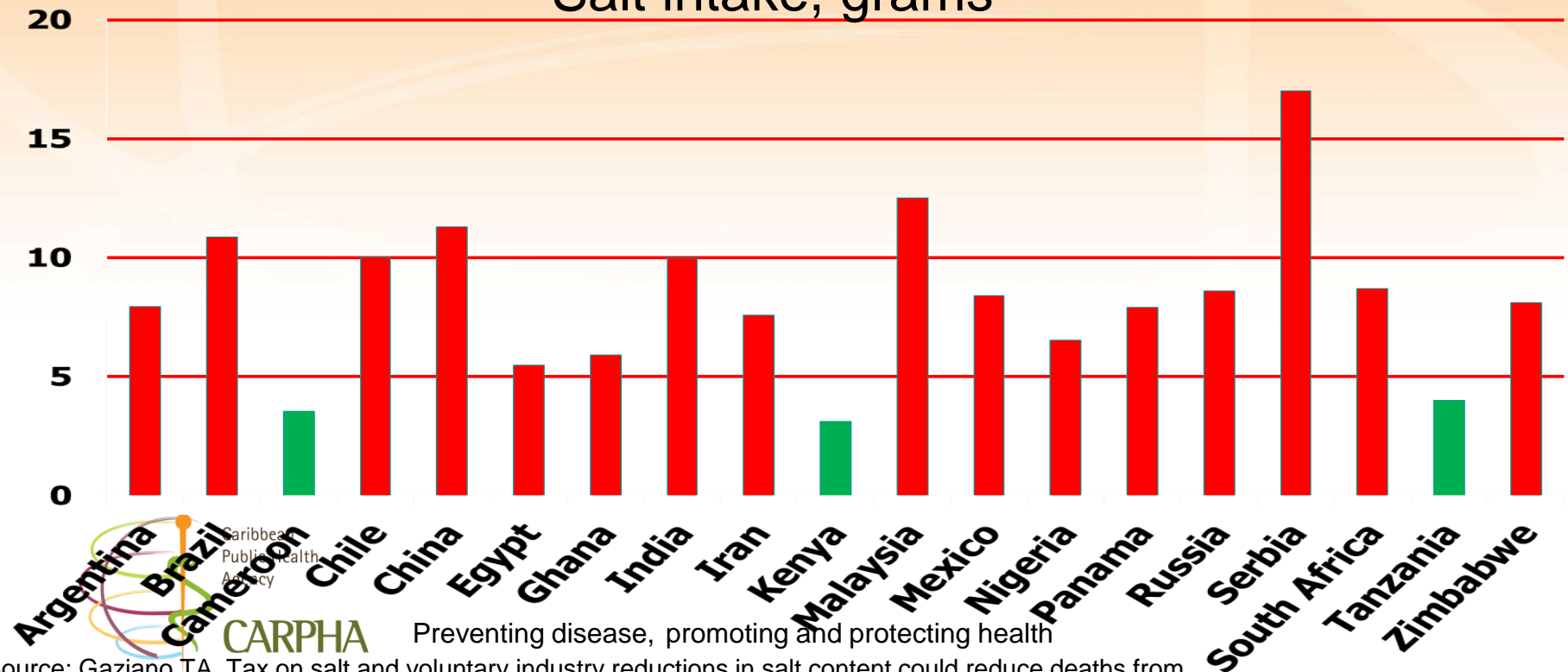


- Taxes must be **large** to change consumption
- Must prevent **tax avoidance** (loopholes) and **tax evasion** (smuggling, bootlegging)
- Design taxes to **avoid substitution**
- **Young/low-income groups** respond most

# Salt reduction

Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits <sup>b</sup>
3. Heart disease, strokes: salt reduction	20:1	1	1 million deaths averted or 20 million DALYs

## Salt intake, grams



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Source: Gaziano TA. Tax on salt and voluntary industry reductions in salt content could reduce deaths from cardiovascular disease by 3 percent in developing countries. World Congress of Cardiology Presentation, 2012

# Elimination of Trans Fats

2% energy from trans fats  
replaced with polyunsaturated fats

Cardiovascular diseases  
reduced 7-40%

Reductions in Type 2 Diabetes

Cost per person  
US\$0.50

# Reduction of Alcohol Consumption

- Increases in Taxation on Alcohol
  - Bans on Alcohol Advertising
- Global Strategy to Reduce the Harmful Use of Alcohol was endorsed By 63<sup>rd</sup> World Health Assembly (2010)**



# Essential package of clinical interventions

## WHO “best buys”

### NCD

### Intervention

Liver cancer

Hepatitis B vaccine

Cervical cancer

Screening (HPV/ PAP/ VIA) and treatment of pre-cancerous lesions  
HPV Vaccination

CVD and diabetes

Counselling and multi-drug therapy for high-risk patients  
Good glycaemic control

Heart attack

Aspirin

# Management of AMI with low-cost drugs

Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits <sup>b</sup>
2. Heart attacks (AMI): acute management with low-cost drugs	25:1	0.2	300,000 heart attack deaths averted each year or 4.5 million DALYs

## Probability of death after heart attack with indicated drug interventions

		Probability of Dying
Baseline probability	(no treatment)	0.115
Probability with Treatment	Aspirin	0.09
	Metoprolol	0.1
	Streptokinase	0.086
	t-PA	0.075



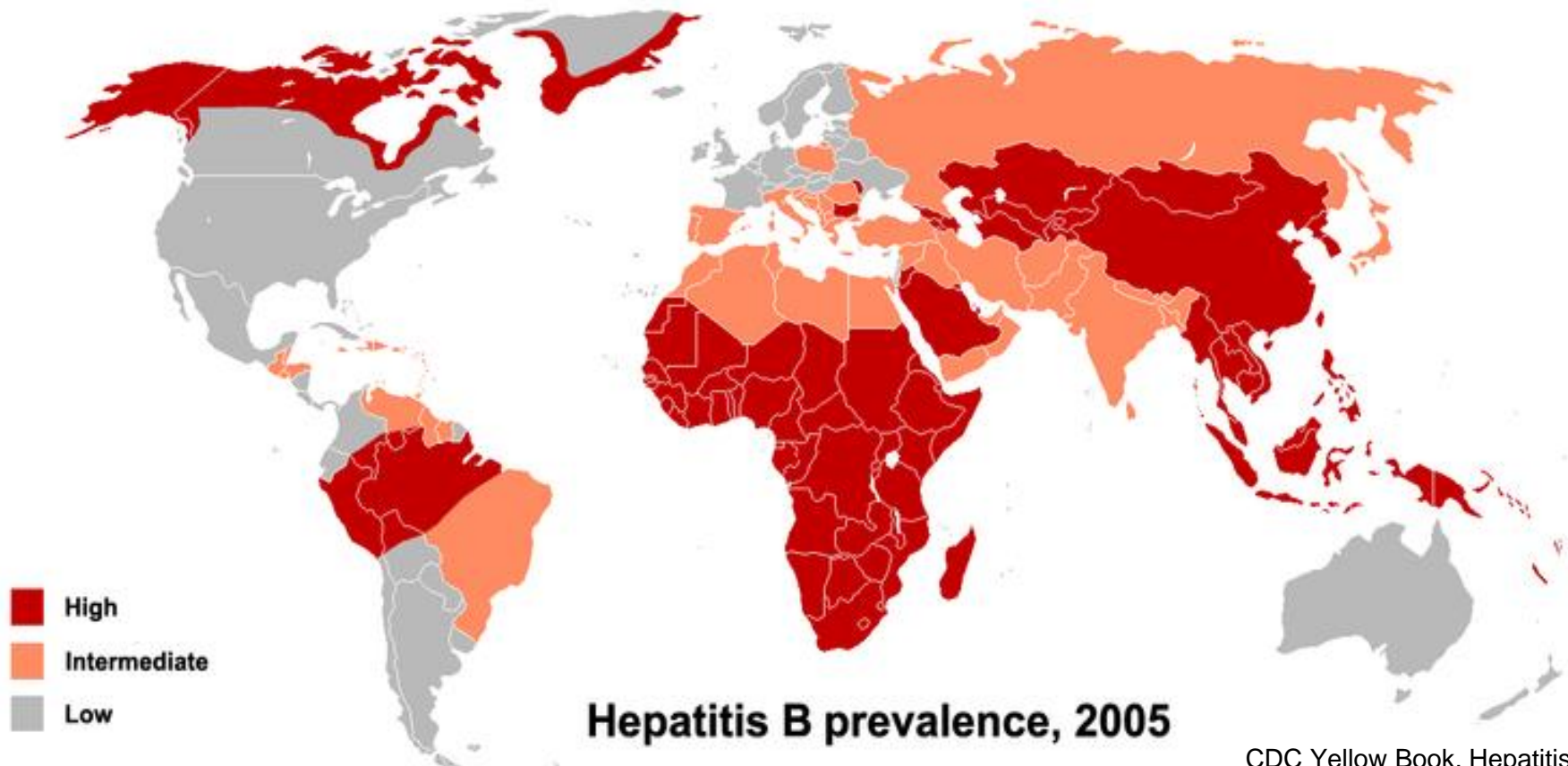
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# Hepatitis B immunization

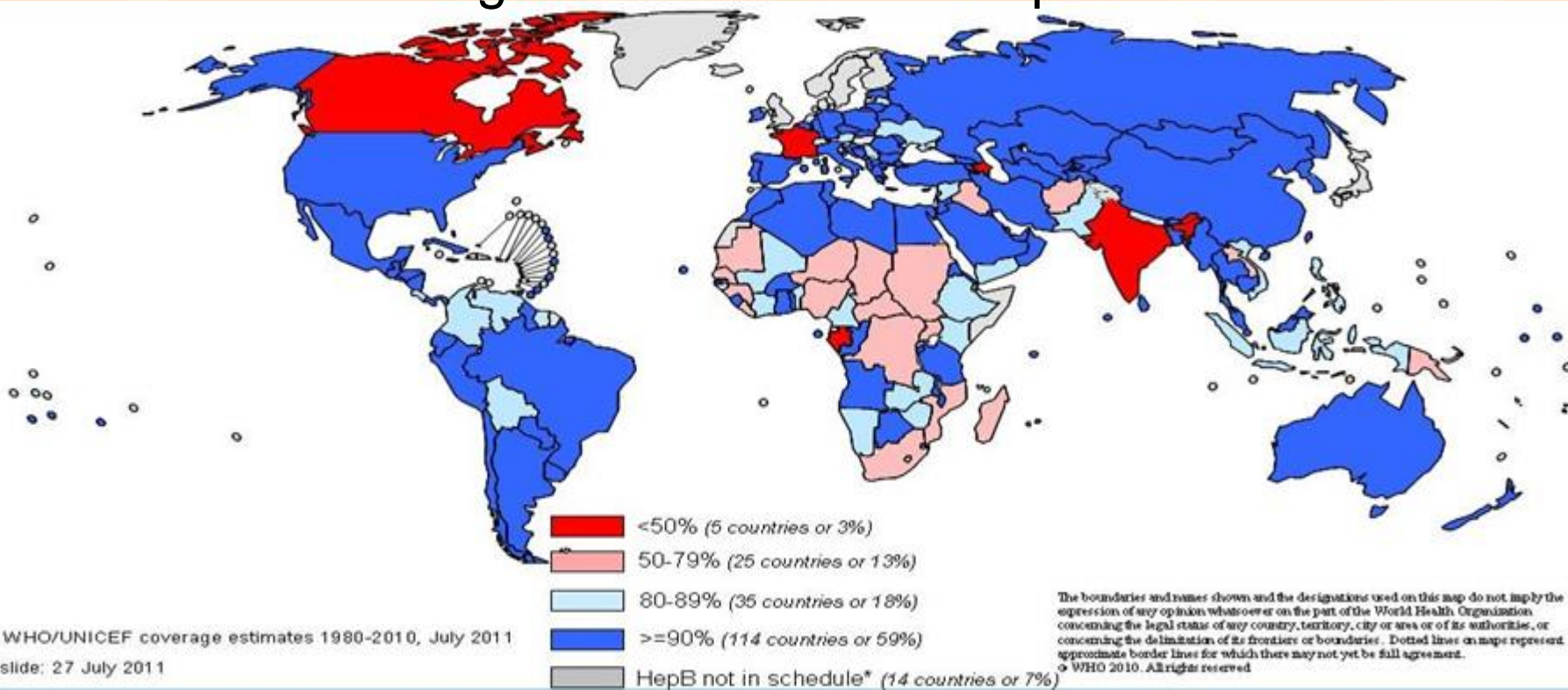
Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits <sup>b</sup>
4. Hepatitis B immunization	10:1	0.1	150,000 deaths averted or 3 million DALYs



# Hepatitis B immunization

Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits <sup>b</sup>
4. Hepatitis B immunization	10:1	0.1	150,000 deaths averted or 3 million DALYs

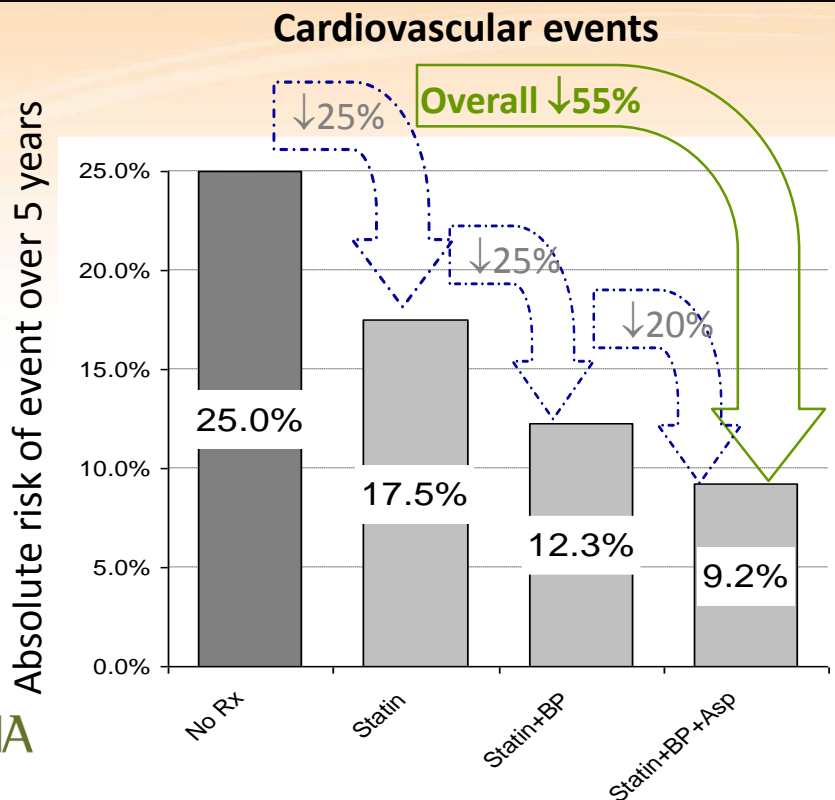
Immunization coverage with 3<sup>rd</sup> Dose of HepB vaccines in infants,



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.  
© WHO 2010. All rights reserved.

# Heart attacks and strokes: secondary prevention with 3-4 drugs in a “generic risk pill”

Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits <sup>b</sup>
5. Heart attacks and strokes: secondary prevention with 3-4 drugs in a “generic risk pill”	3:1	32	1.6 million deaths averted or 108 million DALYs averted



**Trinidad and Tobago and cardiovascular disease  
mortality. Possible causes and implications.**

Joaquin Barnoya, MD, MPH<sup>1,2</sup>

Yan Yan, MD, PhD<sup>1</sup>

August 26, 2013



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In Trinidad and Tobago, during the 2004 to 2008 period CVD mortality rates have significantly declined. Even though data on population coverage of CVD treatments and risk factors prevalence over this period is scant the decline is likely due to an increase in treatment availability. As a signatory of the 2007

has resulted in approximately 5,207 fewer deaths (3,038 in male and 2,169 female). In total, age-adjusted mortality has dropped 18.8% since 2004, with the effect growing over time.

referral to tertiary care centers. Consequently, the drop in CVD mortality rates observed in Trinidad and Tobago are most likely the result of treatment and within the multiple treatments available the CDAP program is the one that must account for the larger percentage.

If other risk factor modification strategies were to be implemented (e.g., the Tobacco Control Act) or evaluated (e.g., smoking prevalence, exposure to secondhand smoke) it is likely that the rate will drop even further in the near

# Concept of 90:90:90

- 90% people know their numbers (BP)
- 90% of those on Treatment
- 90% of those have blood pressure controlled

**=> 70% BP control at population level =>  
approx 700,000 deaths avoided per year in  
CARICOM**

**=> saves many expensive complications**



# Cost-benefit returns from selected investments

Priority Area	Indicative Benefit-Cost Ratio	Annual Costs (\$ billions)	Annual Benefits
1. Cancer, heart disease, other: tobacco taxation	40:1	0.5	1 million deaths averted or 20 million DALYs
2. Heart attacks (AMI): acute management with low-cost drugs	25:1	0.2	300,000 heart attack deaths averted each year or 4.5 million DALYs
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# Promising Interventions

## “Good Buys”

- **Price interventions for food and drink products**
  - Taxing high sugar, high salt, high fat food and drink products
    - Reduction of soft drink consumption by increasing the price
  - Reducing the price of fruits and vegetables to increase access and consumption by population
- **Increasing Physical Activity**
  - Implement policies to create enabling environments for community-based physical activity
  - Involve multi-sectorial partners
    - Community organizations, schools , worksites, media
- **Use mass media to increase public knowledge**

# What role for international collective action?

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## Curbing NCDs and Injuries

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### Leadership and stewardship

- Advocacy and technical assistance for taxation, trade and subsidy policies

### Provision of global public goods

- “PPIR” (population, policy, and implementation research)
- Expanding the menu of cost-effective population-based and clinical interventions
- Surveillance on implementing the WHO FCTC

### Managing cross-border externalities

- Regional collaboration to prevent tobacco smuggling

### Direct country assistance

- Aid to LMICs to support selected NCD and injury interventions (e.g HPV testing, HPV and hepatitis B vaccines)

# Concept of Cost-Effective, Co-Benefits



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**Cheap cars, traffic jams, global warming, hard to walk/exercise, stress**



# Concept for Regional Proposal on Built Environment, Climate Change & Health

- Interrelationship between community design that improves health, and built environment changes that mitigate climate change
- The most researched effect, is upon physical activity, but the built environment also affects air quality, safety and social connectivity.
- Potential to bring together an international partnership to pursue this opportunity – CARPHA, CCCCC, PHAC, W Bank, others



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- Characteristics of a health-sustaining, built environment are similar to those which support environmental sustainability and economic sustainability
- A most significant health-promoting component is whether urban design enables people to conveniently, safely and affordably transport themselves with options beyond single occupant vehicle...
  - design to support active transportation (walking and cycling, strollers, wheelchairs, in-line skating, etc.),
  - public transportation
  - grid street pattern/connectivity
  - Proximity work to home

- Built environment changes being advocated by public health same as those to mitigate climate change
- Health benefit argument more persuasive to the public than environmental sustainability argument
- Much can be gained through joint work on the built environment between the public health and those seeking to mitigate climate change
  
- A regional project which increases alternative transport, biking and walking, and rapid mass transport, will be good for health, good for the planet, and good for energy security and the foreign exchange bill for fossil fuel



# • **Cost-Effective, Co-Benefits: Alcohol**

## **The Need for Alcohol Policy in the Caribbean**

**CARICOM Council on Human & Social Development (COHSOD), Sept 28, 2014:**

**Agreed to make the reduction of alcohol-related harm a public health priority in the Caribbean;**

**Further agreed to commence development of a regional, culturally-relevant, comprehensive policy to reduce the harmful use of alcohol; and**

**Committed to taking action to in every CARICOM Member State.**

### **BENEFITS HEALTH, SOCIAL, OCCUPATIONAL, ECONOMIC:**

**- NCDs**

**- Mental Health**

**- Violence and Injury Prevention...traffic fatalities, domestic violence, suicide...**

**- Productivity, reduced absenteeism/ presenteeism...**



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# RECAP

- Burden of NCDs
  - Mortality
  - Risk Factors for NCDs
  - Economic Burden
- Interventions for NCD Prevention and Control
  - Best Buys
  - Good Buys
  - Cost-Effective Co-Benefits

# Acknowledgments

“Global Problems, Smart Solutions – Costs and Benefits”

Cambridge University Press, 2013

Prabhat Jha

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DCP3

Disease  
Control  
Priorities

an Hum

Preventing disease, promoting

*economic evaluation for health*

CARICOM NCD Summit 2007

“Global Health 2035”

Lancet Commission in Investing in Health

Lawrence Summers

Dean Jamison

GLOBAL HEALTH 2035