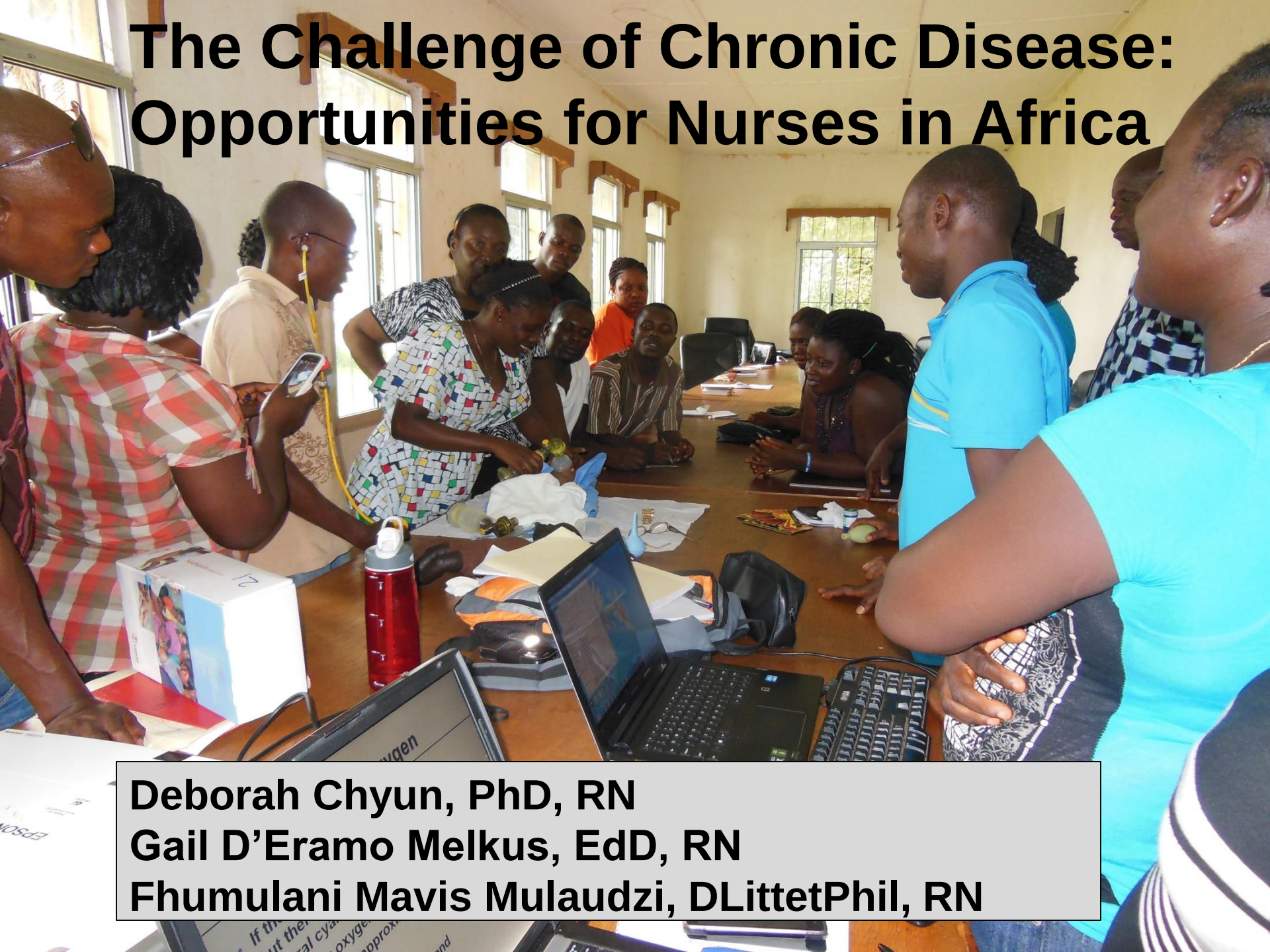
The Challenge of Chronic Disease: Opportunities for Nurses in Africa



Deborah Chyun, PhD, RN
Gail D'Eramo Melkus, EdD, RN
Fhumulani Mavis Mulaudzi, DLittetPhil, RN

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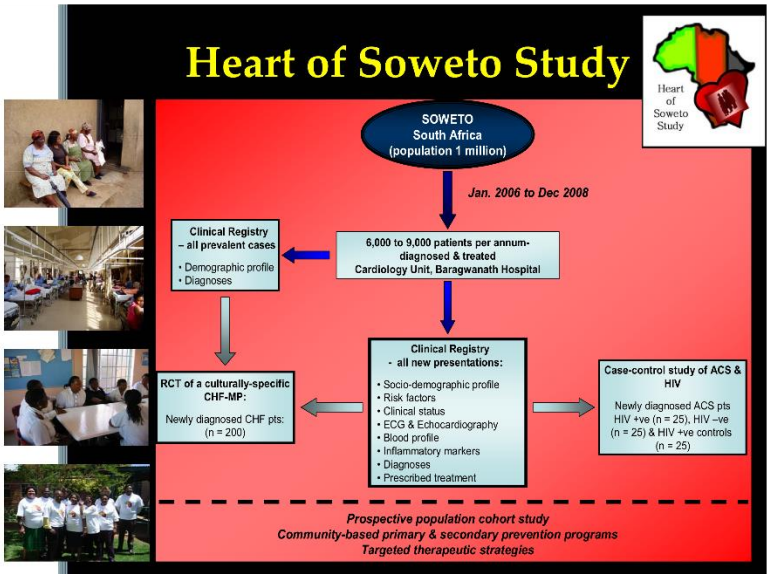
Nursing opportunities to decrease the global burden of cardiovascular disease

Deborah Chyun PhD, RN, FAHA, FAAN

Maurice, 2013, *Lancet*, 382:1085-6

Is this possible? How?

- Population demographics
- Importance of chronic disease
  - Cardiovascular disease
  - Risk factors
- Prevention strategies



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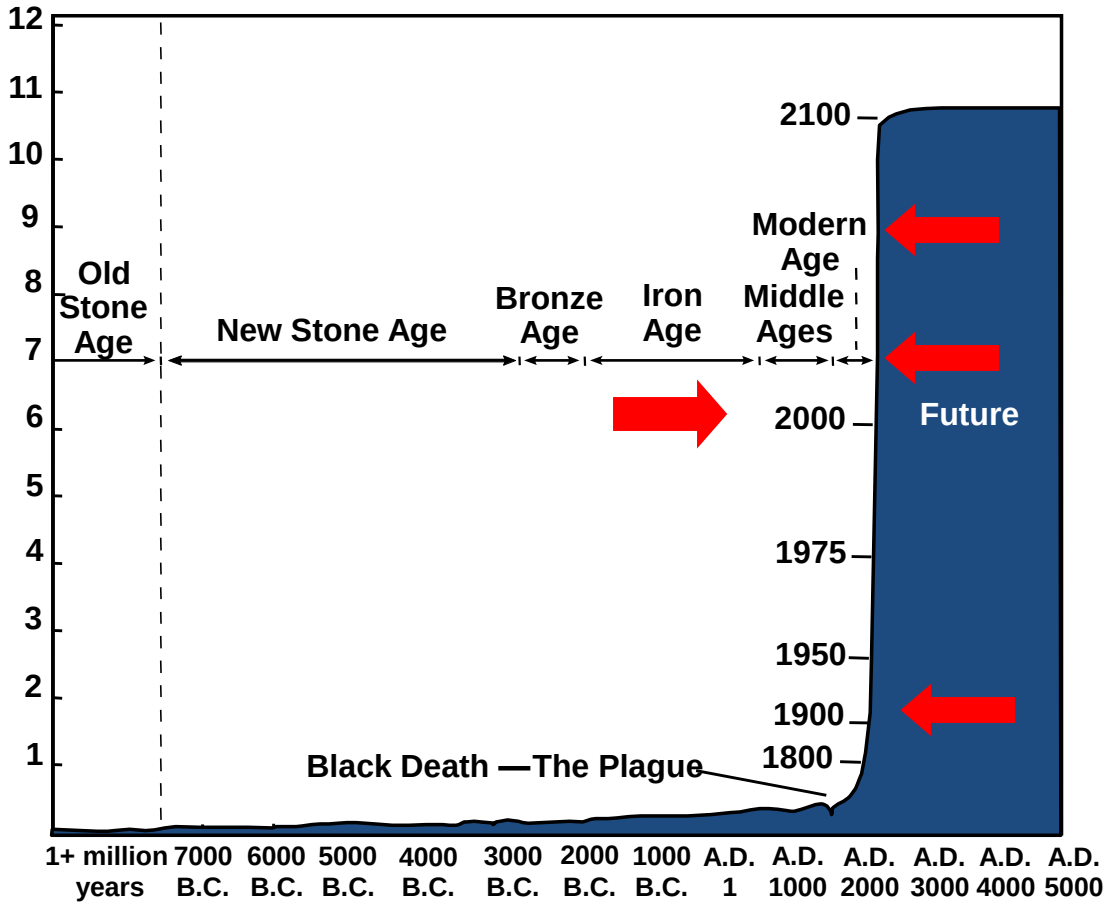
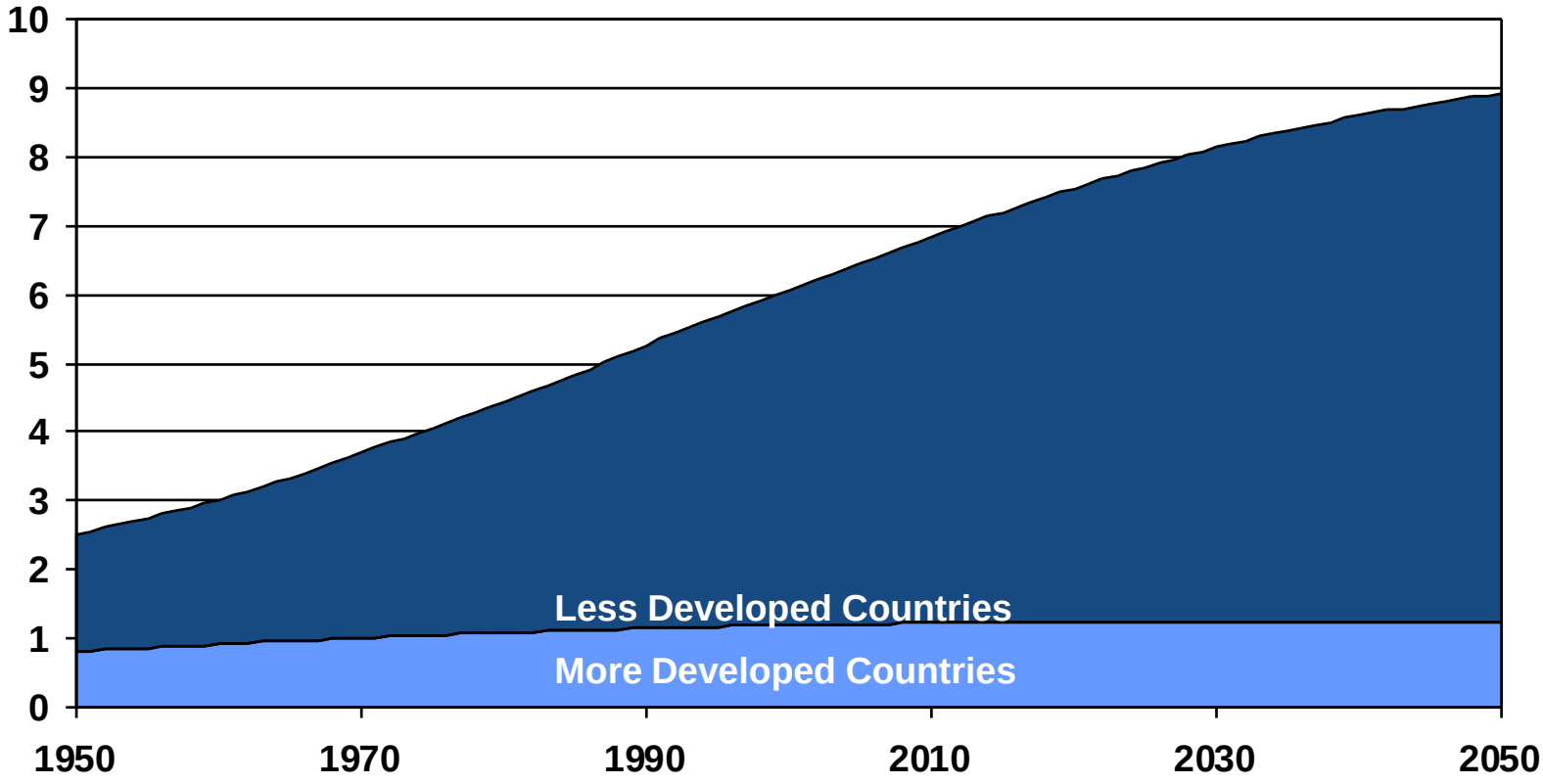
Population demographics

World Population Growth Through History



Source: Population Reference Bureau; and United Nations, *World Population Projections to 2100* (1998).

Growth in More, Less Developed Countries



Source: United Nations, *World Population Prospects: The 2002 Revision* (medium scenario), 2003.

Demographic Transition

- World population in midst of transformation from high mortality and high fertility to one of low mortality and fertility
- Responsible for rapid and accelerating growth, slowing and changes in age distribution
  - Stage 1:
    - Reduction in mortality → longer survival
    - Proportion of children increases

The diversity of changing population age structures in the world, Population Division, Dept of Economic and Social Affairs, UN Secretariat, 2005

Demographic Transition - 2

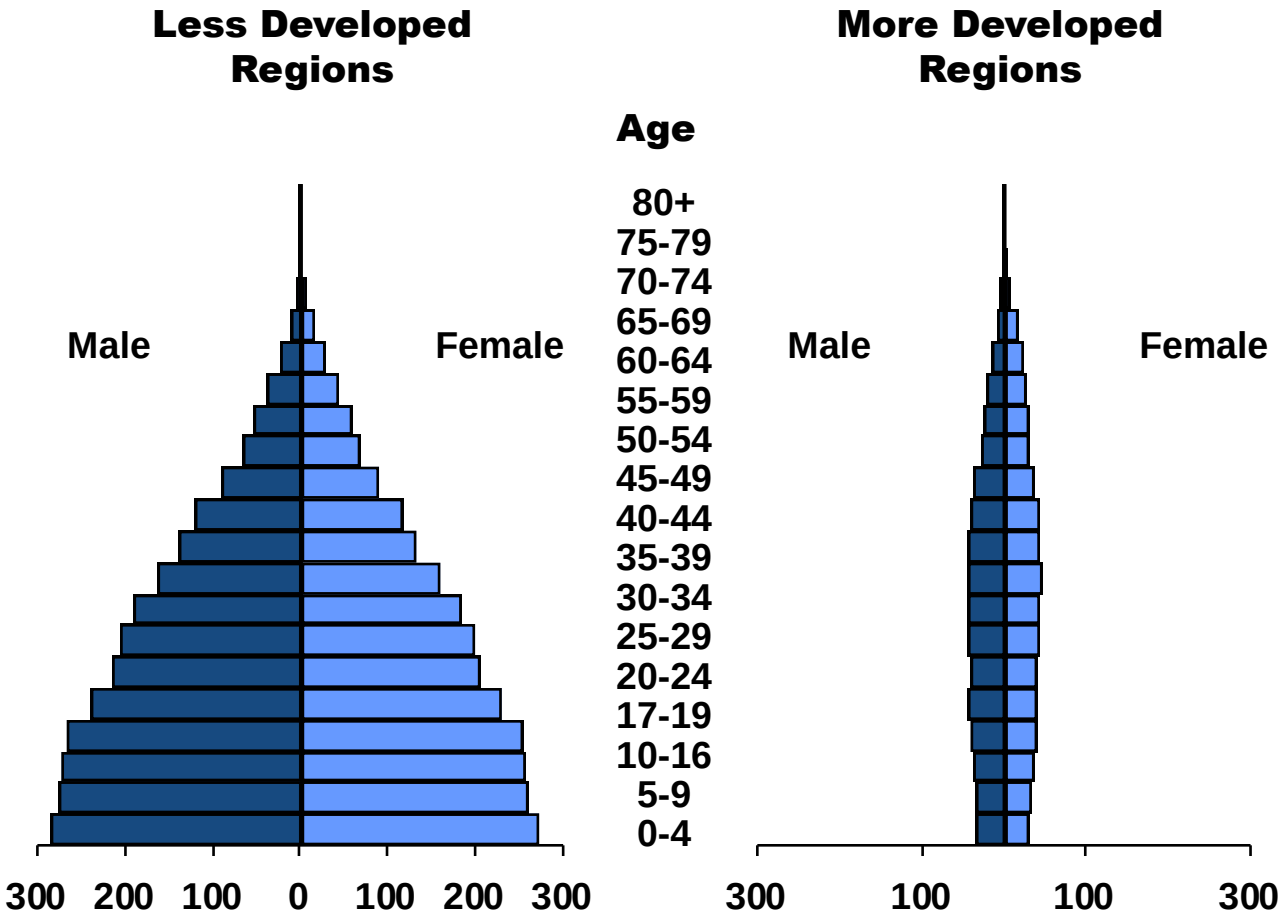
- Stage 2:
  - Fertility declines as fewer children needed
  - Proportion of children declines while population ages
  - Sustained reduction slow growth and contribute to ageing
- Stage 3:
  - After lengthy periods of low fertility and mortality, proportion of children and adult of working age decline and only older adults rise
  - Ageing reinforced and growth of older persons greater than younger

The diversity of changing population age structures in the world, Population Division, Dept of Economic and Social Affairs, UN Secretariat, 2005

Age Distribution of the World's Population

Population Structures by Age and Sex, 2005

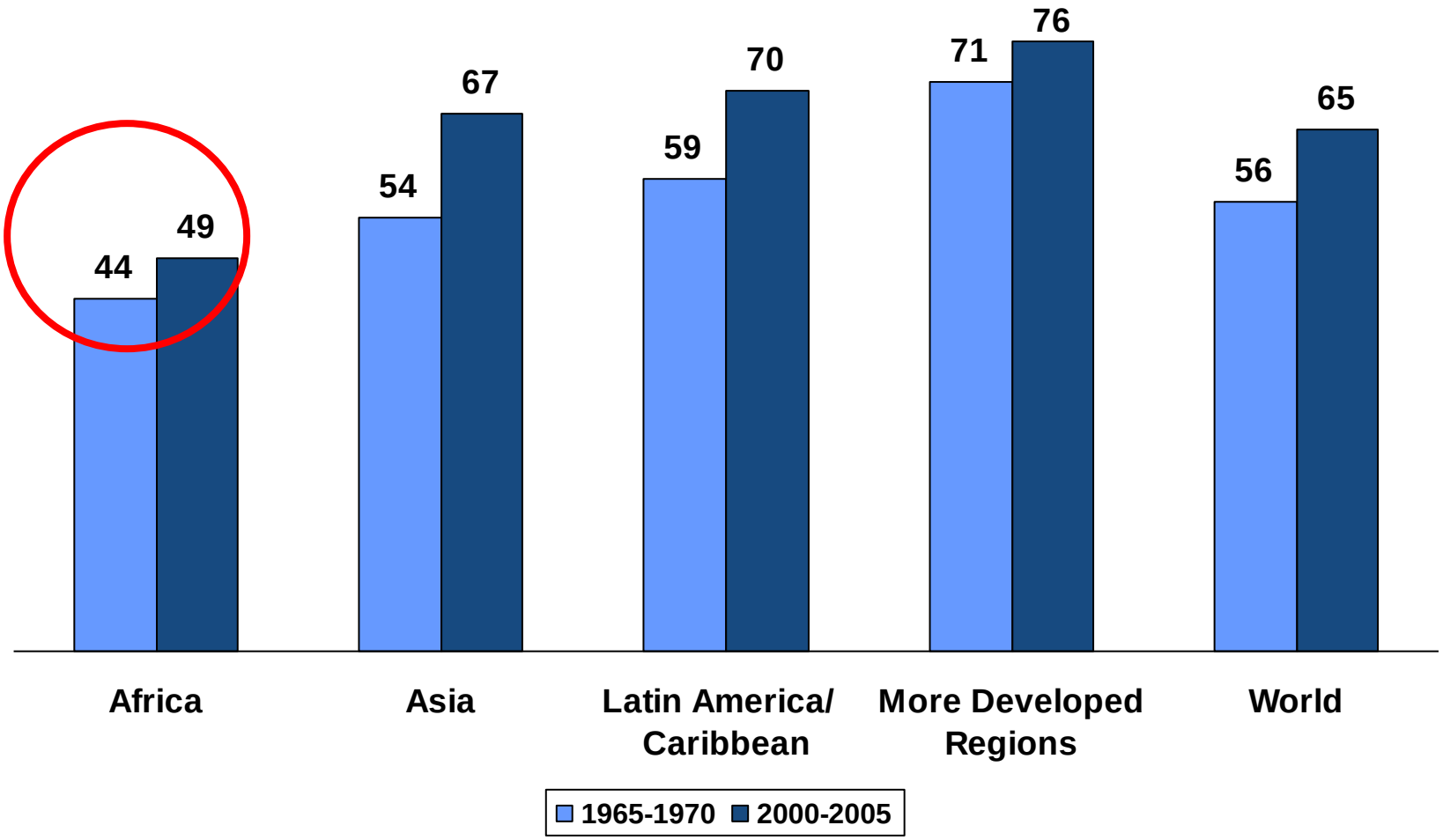
Millions



Source: United Nations, *World Population Prospects: The 2002 Revision* (medium scenario), 2003.

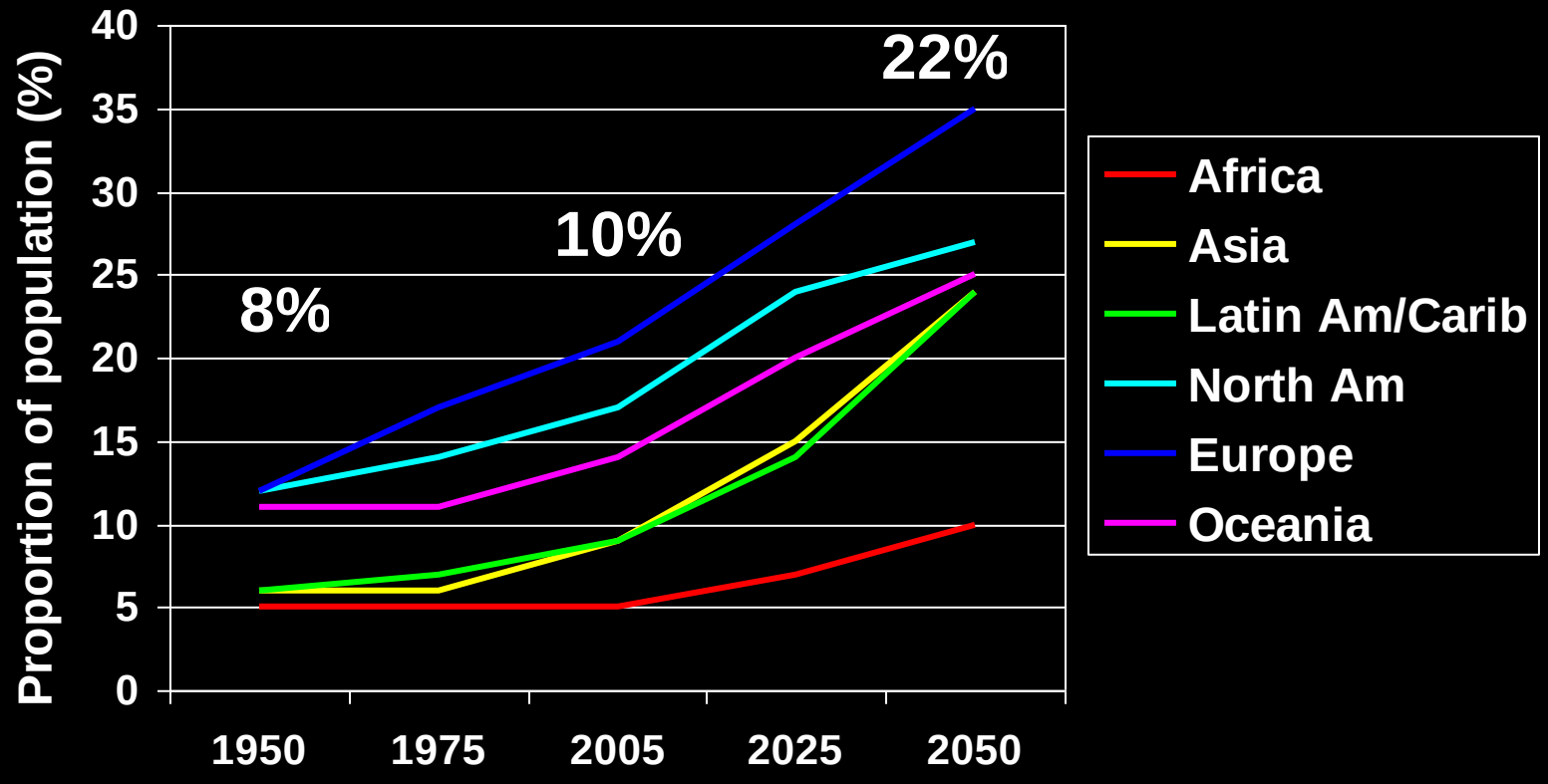
Trends in Life Expectancy, by Region

Life Expectancy at Birth, in Years



Source: United Nations, *World Population Prospects: The 2002 Revision* (medium scenario), 2003.

Population of individuals 60 and over

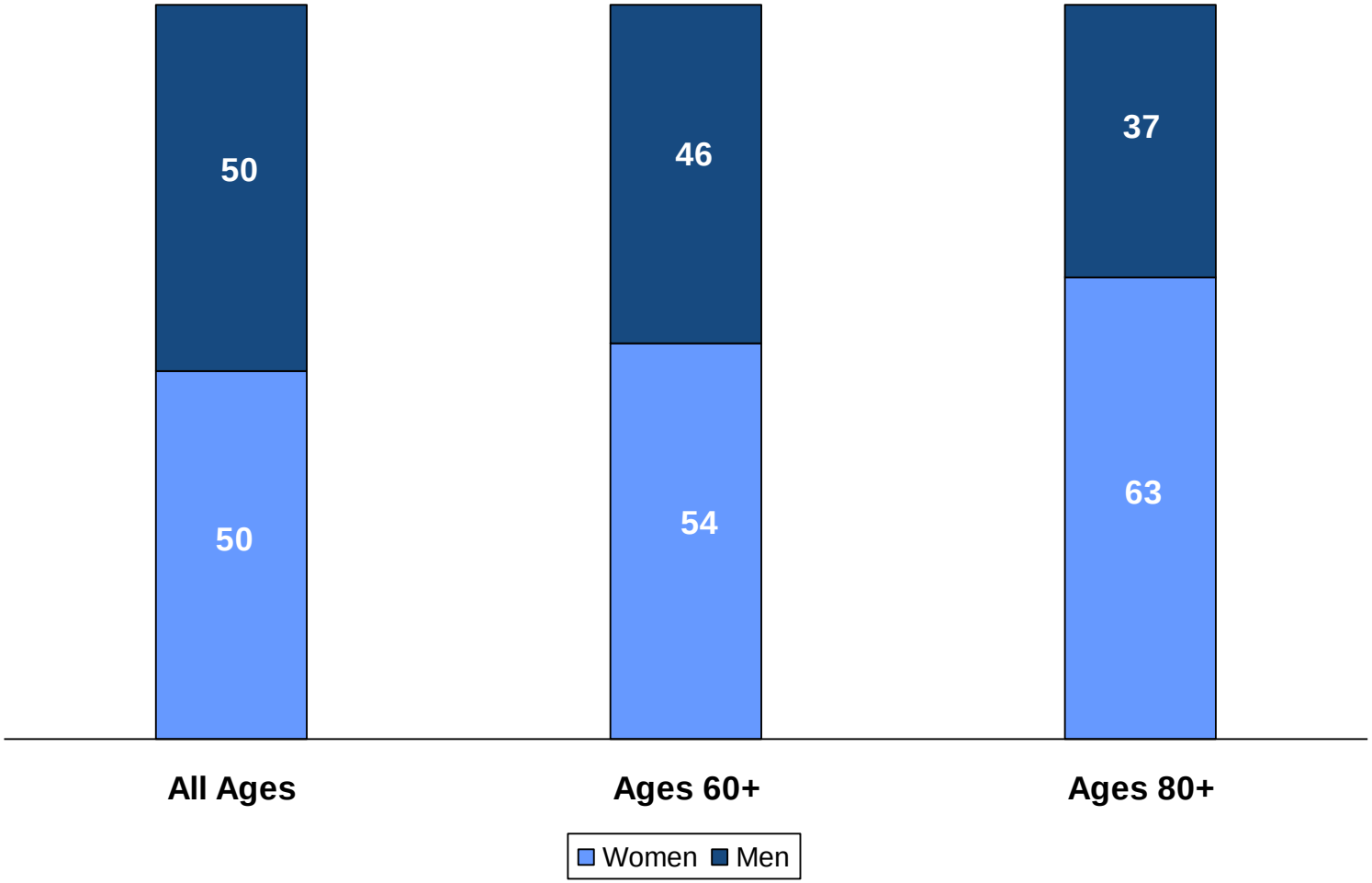


World population prospects: The 2004 revision, United Nations, 2005

Women and Aging

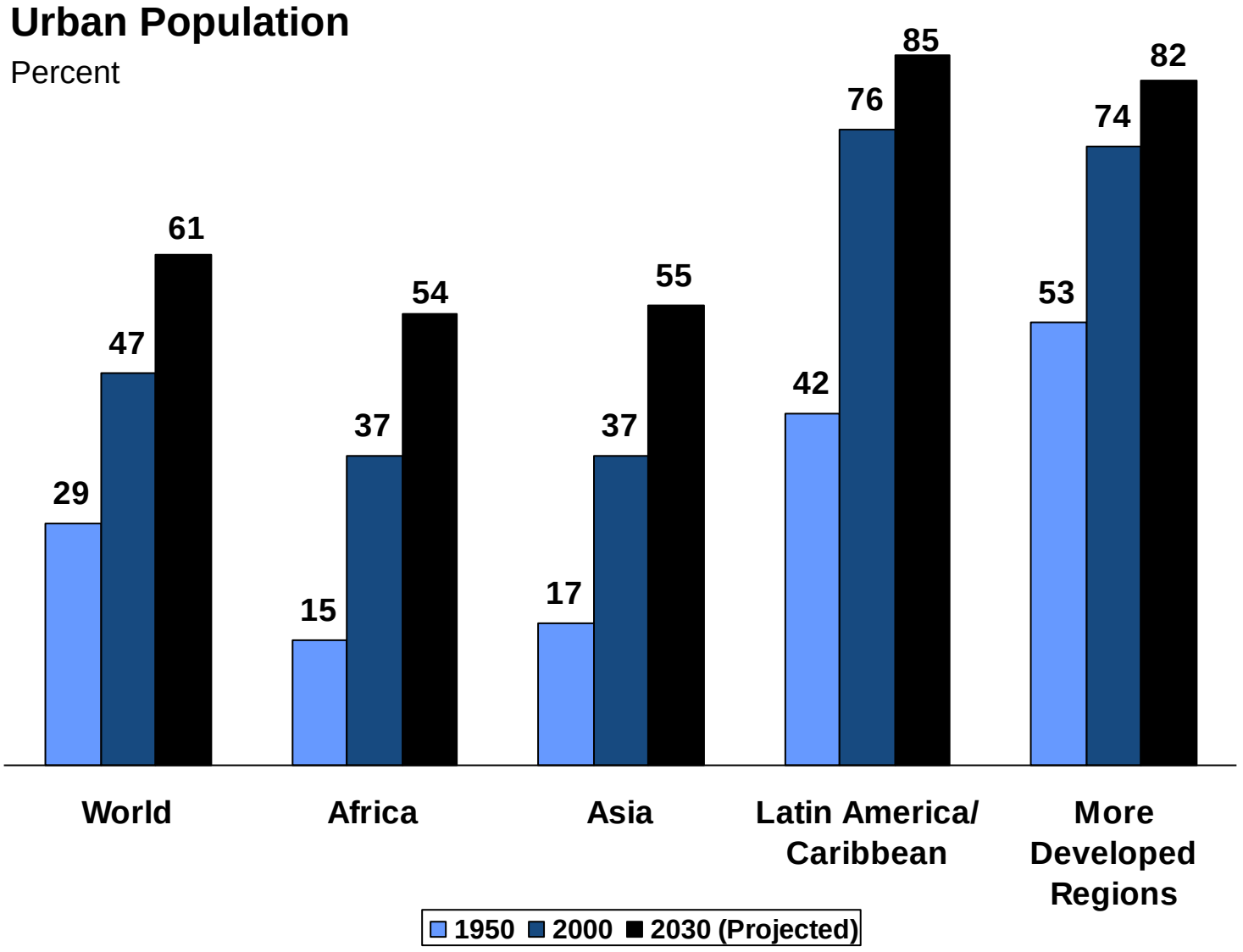
Projected World Population, by Sex, at Specified Age Groups, 2025

Percent



Source: United Nations, *World Population Prospects:The 2002 Revision* (medium scenario), 2003.

Trends in Urbanization, by Region



Source: United Nations, *World Urbanization Prospects: The 2003 Revision* (medium scenario), 2004.

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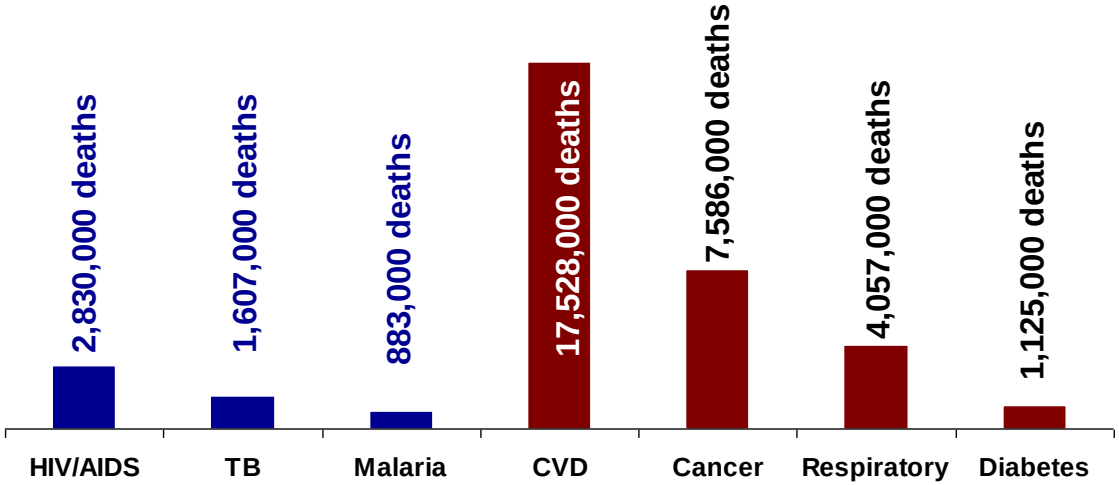
Chronic disease

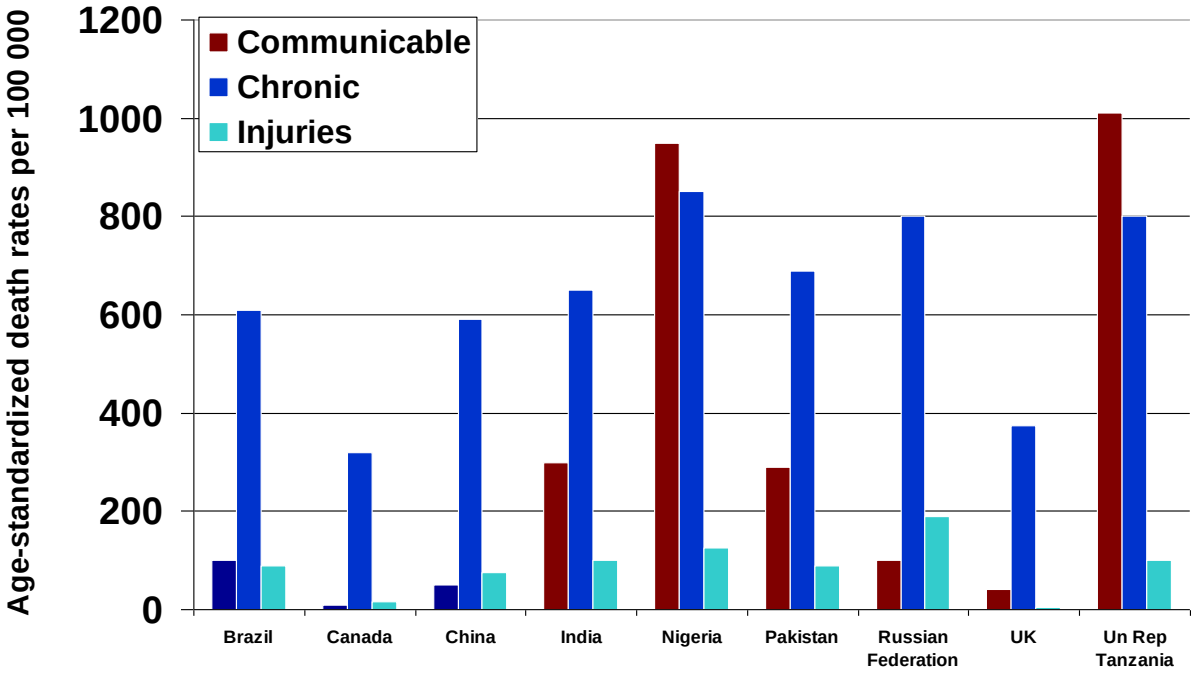
Did you know??

35 000 000
people will die from chronic diseases in 2005



60% of all deaths are due to chronic diseases

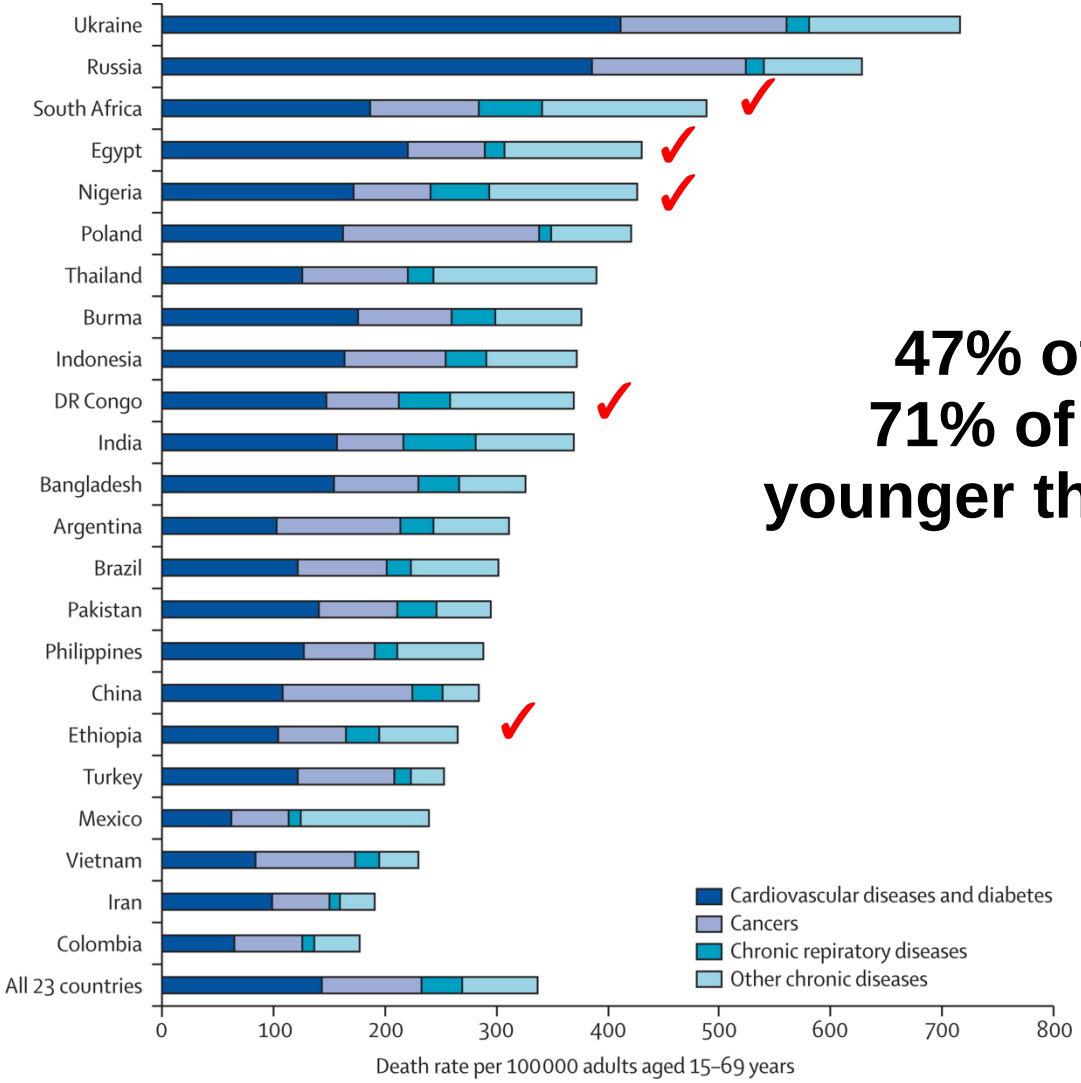
64 million deaths in 2015



World Health Organization

Preventing CHRONIC DISEASES
a vital investment

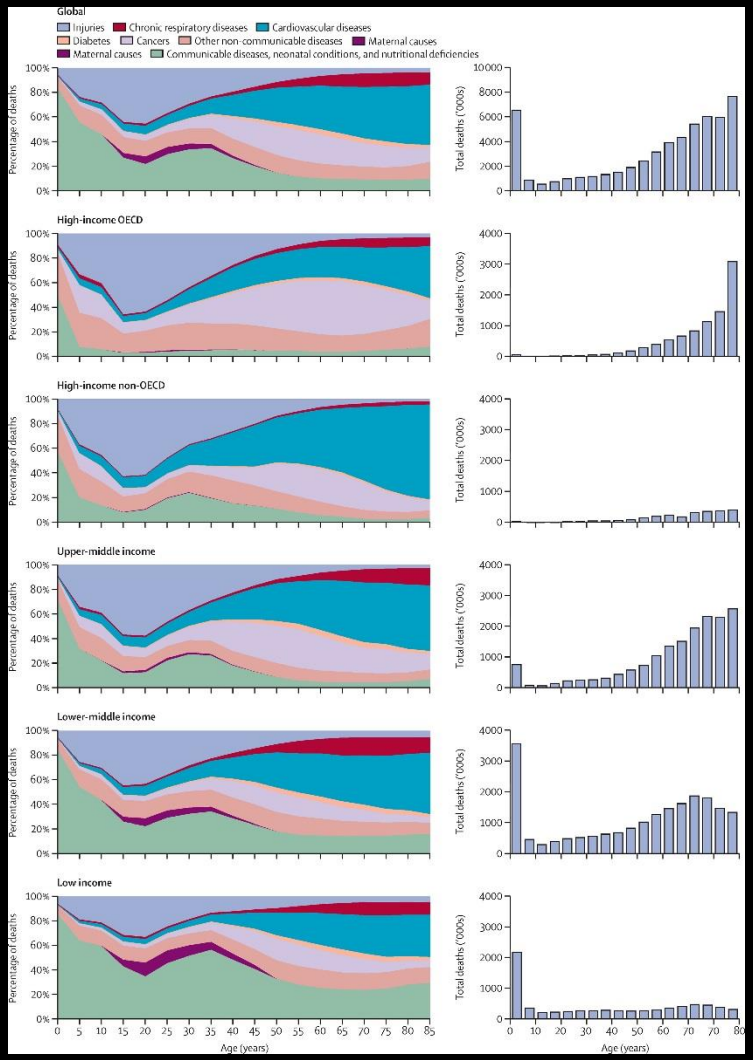
Death rates from non-communicable diseases per 100,000 adults aged 15-69 years in 23 high-burden countries



47% of all NCD deaths
71% of deaths in people younger than 70 years globally

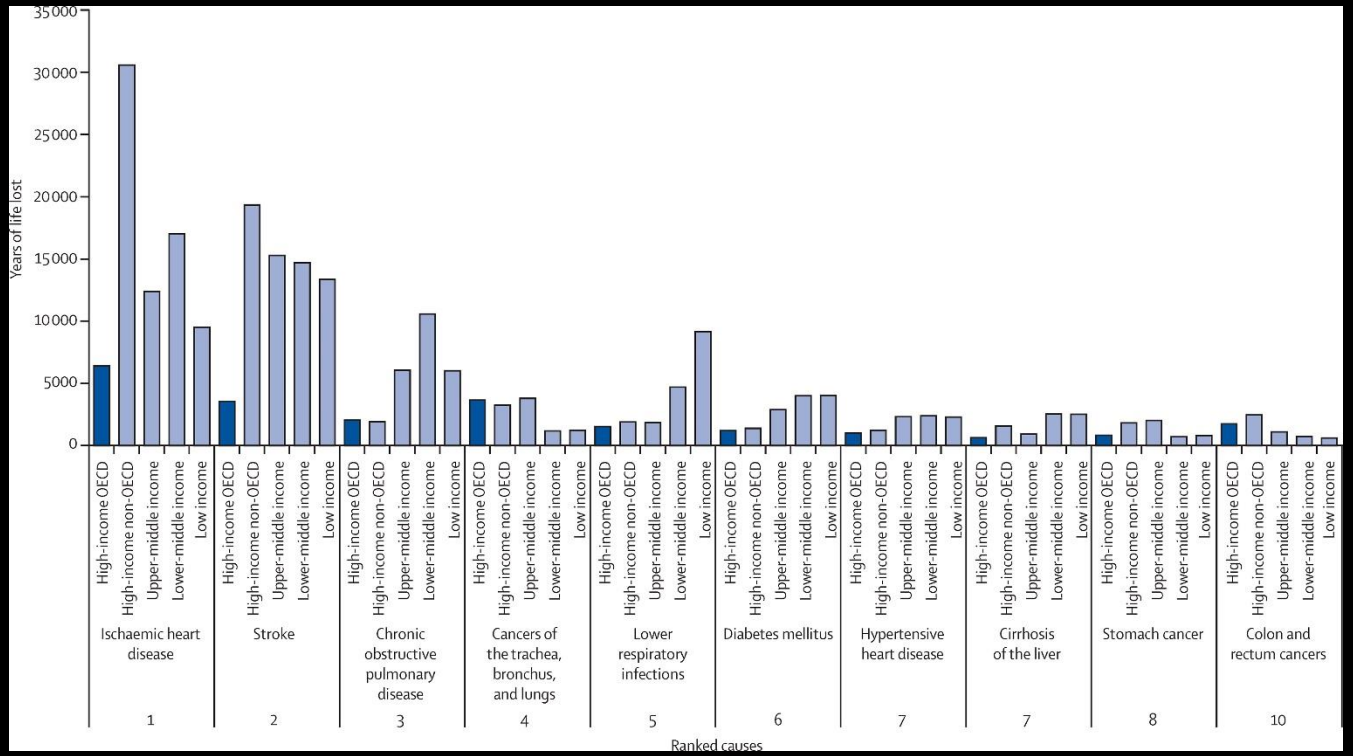
Alwan et al. (2010). *The Lancet,* 376:1861-21.

Figure 1



The Lancet 2016 387, 2145-2154DOI: (10.1016/S0140-6736(15)00516-4)

Figure 2



The Lancet 2016 387, 2145-2154DOI: (10.1016/S0140-6736(15)00516-4)

Important Facts

- 80% of chronic disease deaths in LMIC
- Chronic diseases are concentrated
- among the poor
  - Increased exposure to risks and decreased access to health services
  - Poor and children have limited choices
- 80% of CVD and 40% cancer preventable
- Chronic disease prevention and control is NOT expensive!

WHO, 2005

Estimated costs of five priority interventions for non-communicable disease (NCDs) in three countries.

	Interventions	Cost per person per year (US$)		
		China	India	Russia
1. Tobacco use	Accelerated implementation of the WHO Framework Convention on Tobacco Control[9]	0·14	0·16	0·49
2. Dietary salt	Mass-media campaigns and voluntary action by food industry to reduce consumption[9]	0·05	0·06	0·16
3. Obesity, unhealthy diet, and physical inactivity	Mass-media campaigns, food taxes, subsidies, labelling, and marketing restrictions[16]	0·43	0·35	1·18
4. Harmful alcohol intake	Tax increases, advertising bans, and restricted access[13]	0·07	0·05	0·52
5. Cardiovascular risk reduction	Combination of drugs for individuals at high risk of NCDs[10]	1·02	0·90	1·73
Total cost per person*	..	1·72	1·52	4·08

Beaglehole et al. (2011). *Lancet,* 377:1438-47.

Table 1 Cost for each case of RHD prevented in regions where RHD is highly endemic

Table 1 | Cost for each case of RHD prevented in regions where RHD is highly endemic

Population/ outcome	*n*	Intervention	Unit cost (US$)	Total cost (US$)	DALY averted (US$; calculation‡)	Cost per DALY averted (US$)
Healthy children*	10,000	Vaccine	3–10	30,000–100,000	218 (287.4×0.8×0.95)	137–458
Cases of pharyngitis	100,000	Primary prevention	10–15	1.0–1.5 million	45 (287.4×0.8×0.25)	22,075–33,113
Cases of RF	39	Secondary prevention	5,890–6,620	229,710–258,180	230 (287.4×0.8)	999–1,123
Deaths§	13.65	Surgery	13,949	320,966	172 (287.4×0.6)	1,861

*Hypothetical cohort of children aged 5–14 years observed for 10 years. ‡Calculations are based on the following assumptions: for vaccination, 80% efficacy with coverage of 95%. For primary prevention, 90% efficacy, 70% of patients being symptomatic, approximately 25% of whom might seek a medical consultation. For successful secondary prevention programmes, 100% coverage by the health sector, 100% provider performance, and 80% patient compliance. For surgery (valve replacement or repair), efficacy is assumed to be 60% after 10 years. These assumptions were used to calculate DALYs averted. §Hypothetical number of deaths extrapolated from speculative RF mortality of 35% over 10 years. Figure 29-8 from Michaud, C., Rammohan, R. & Narula, J. Cost-effectiveness analysis of intervention strategies for reduction of the burden of rheumatic heart disease. *Rheumatic Fever* (eds Narula, J., Virmani, R., Reddy, K. & Tandon, R), © American Registry of Pathology, 1999). Abbreviations: DALY, disability-adjusted life year; RF, rheumatic fever; RHD, rheumatic heart disease.

Figure 29-8 from Michaud, C., Rammohan, R. & Narula, J. Cost-effectiveness analysis of intervention strategies for reduction of the burden of rheumatic heart disease.
Rheumatic Fever (eds Narula, J., Virmani, R., Reddy, K. & Tandon, R),
© American Registry of Pathology, 1999)

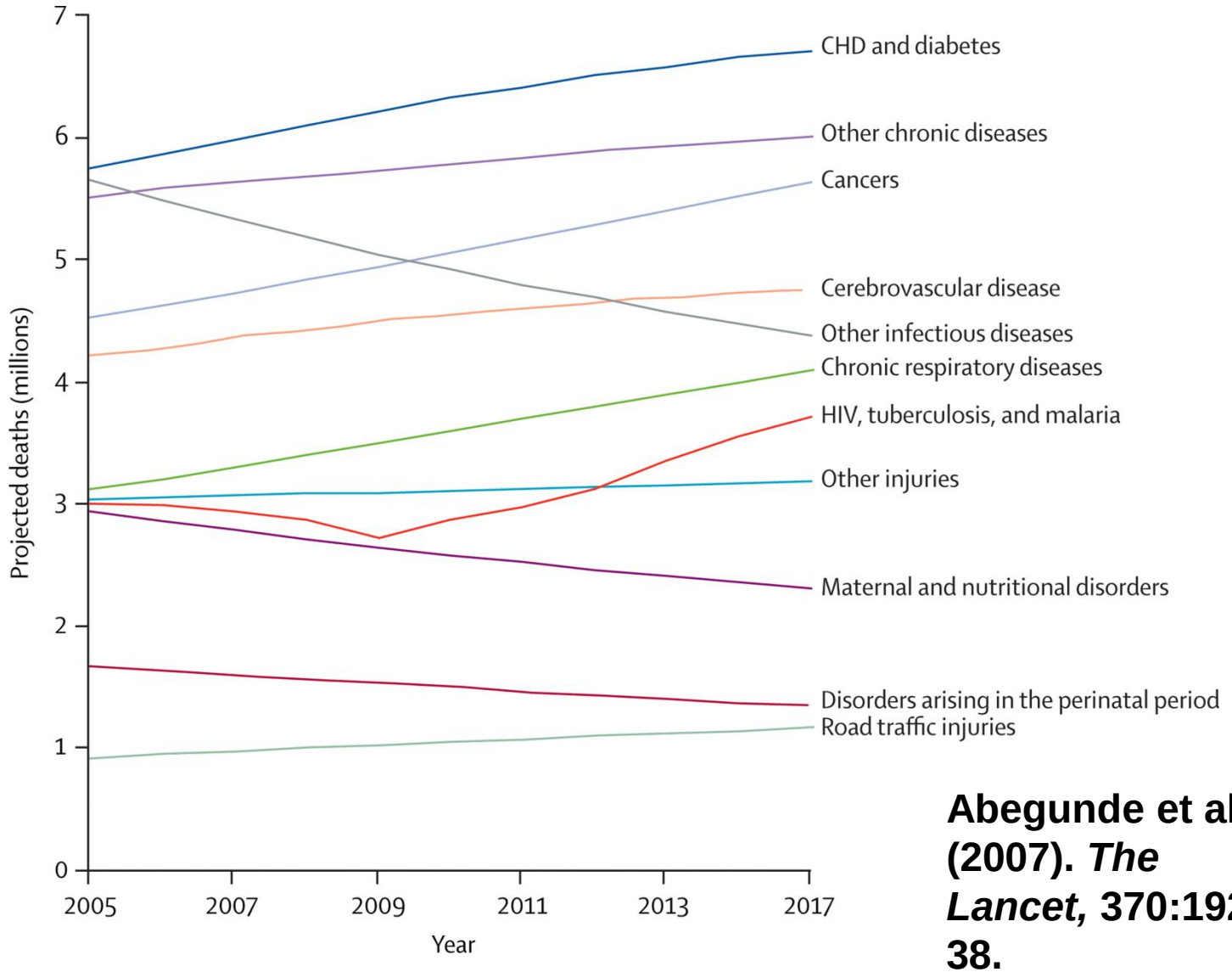
Remenyi, B. *et al.* (2013) Position statement of the World Heart Federation on the prevention and control of rheumatic heart disease
Nat. Rev. Cardiol. doi:10.1038/nrcardio.2013.34

nature REVIEWS CARDIOLOGY

NCDs in sub-Saharan Africa: what we know now (Dalal et al., 2011, *Int J Epi*, 40:885-901)

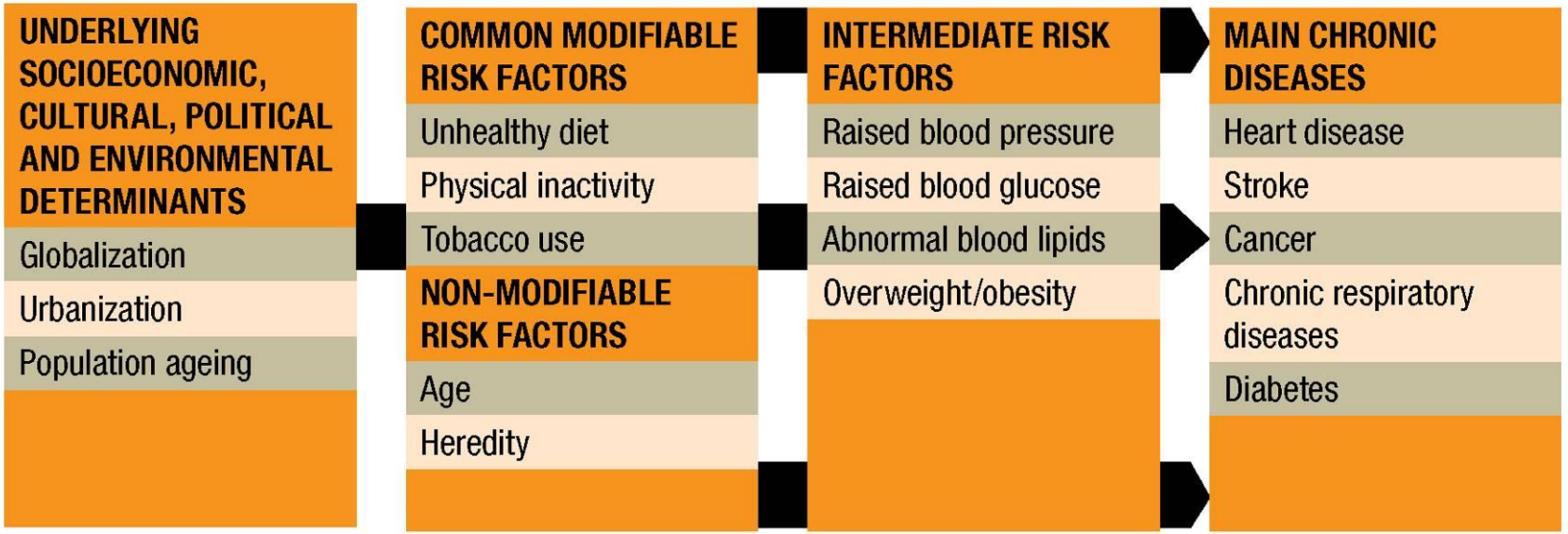
- Disproportionate burden of infectious and chronic diseases – DOUBLE-BURDEN
- Few community-based studies
- South Africa over-represented
- Stroke: 0.07-0.3%
- Diabetes: 0-16%
- Hypertension: 6-48%
- Obesity: 0.4-43% (women)
- Smoking: 0.4-71% (men)
- Lack of vital statistics systems
- Studies needed for in-depth analysis risk factors

Projected global deaths (millions) for major chronic disease groups and other causes of death in 23 selected countries, 2005-2015



Abegunde et al. (2007). *The Lancet,* 370:1929-38.

Causes of chronic diseases



World Health Organization

Preventing CHRONIC DISEASES
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Globalization

- **The increasing interconnectedness of countries and the openness of borders to ideas, people, commerce and financial capital**
- **Positive aspects include availability of new technologies, such as information and communication technologies**
- **Negative effects include the trend known as the "nutrition transition" and less physically active lifestyles**

WHO, 2005

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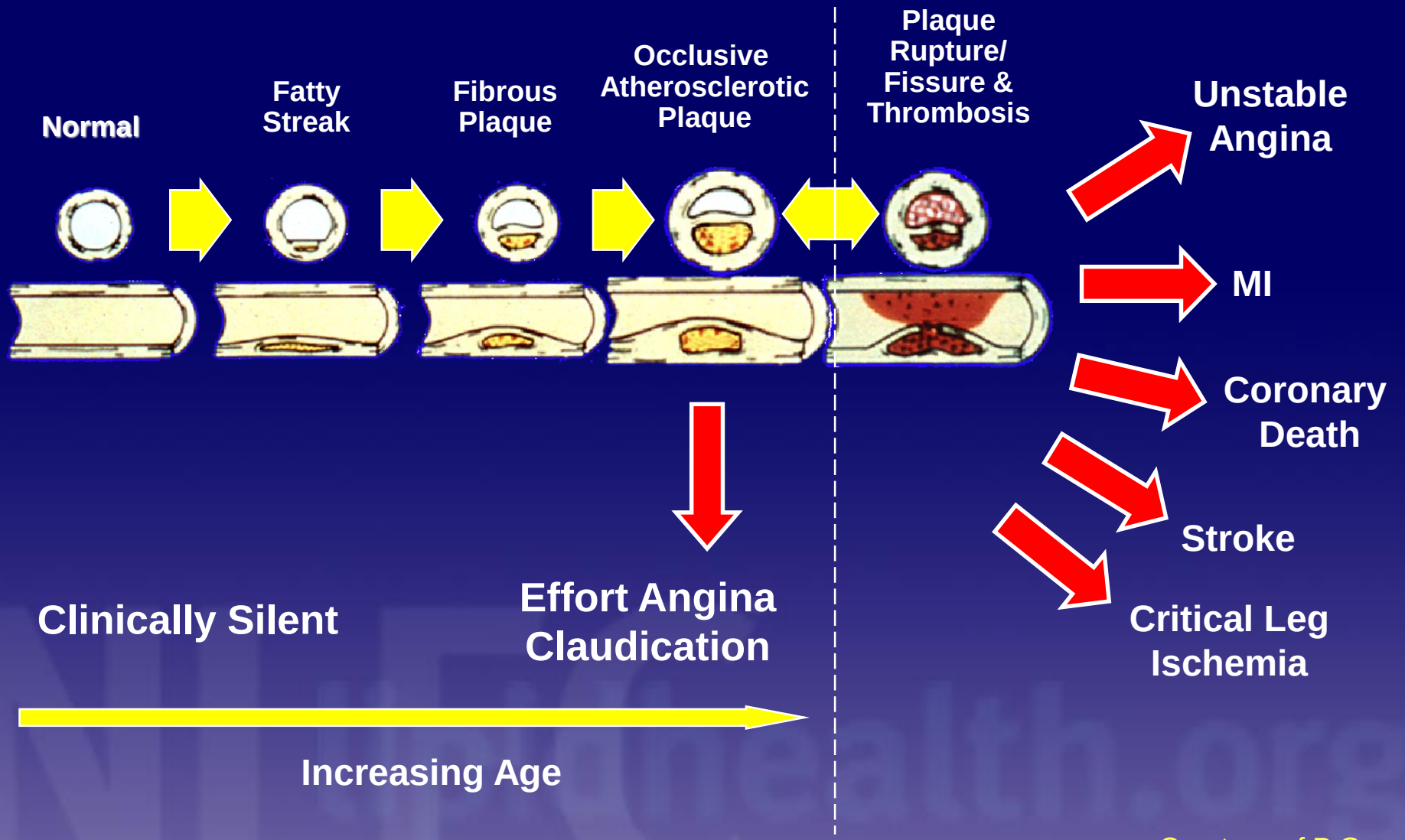
So, globalization is making all regions of the world face similar health threats, thus demanding a unified response by nurses. It also provides us a unique opportunity to be innovative and work together with nurses across the globe.

Cardiovascular Disease (CVD)

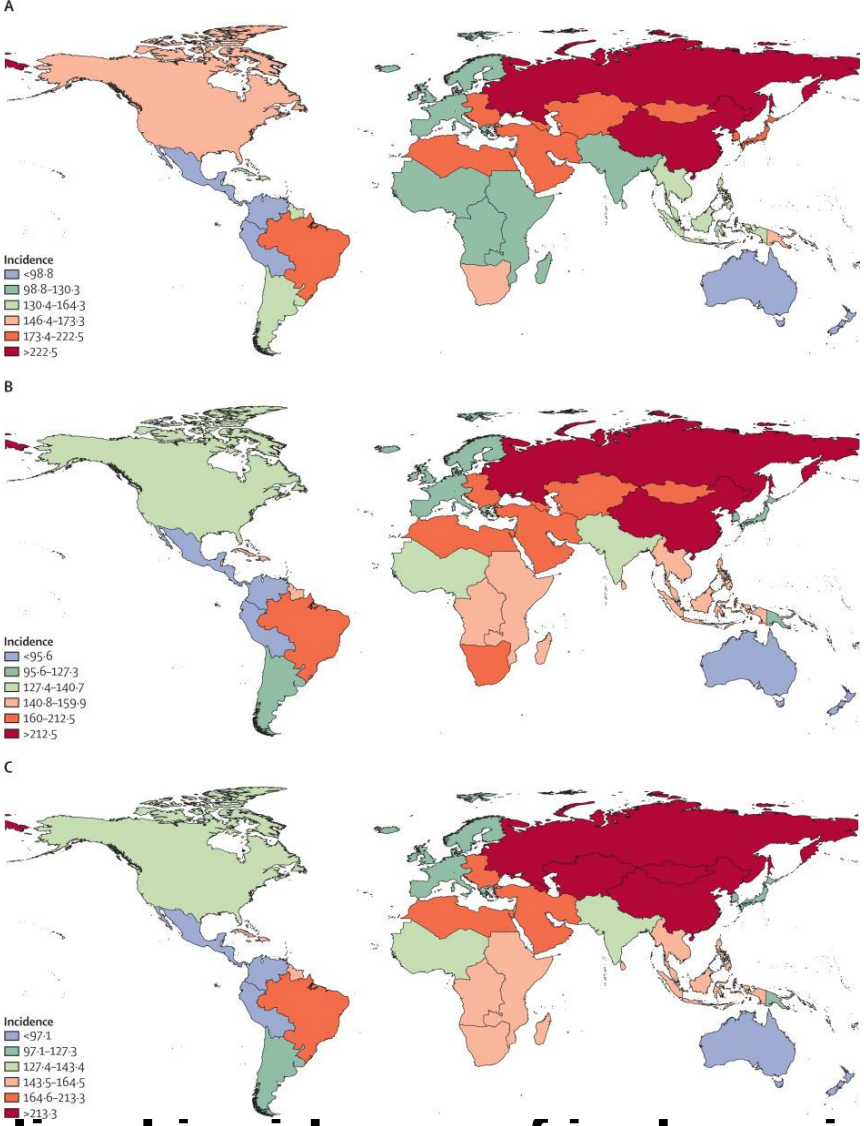
- Coronary heart disease (CHD) [coronary artery disease (CAD), ischemic heart disease (IHD)] ✔
- Cerebrovascular disease (stroke) ✔
- Peripheral vascular disease
- Heart failure (HF)
- Hypertension (HTN)
- Rheumatic heart disease ✔
- Congenital heart disease
- Deep vein thrombosis and pulmonary embolism

lipidhealth.org
NLEC
National Lipid Education Council™

Atherosclerosis: A Progressive Process

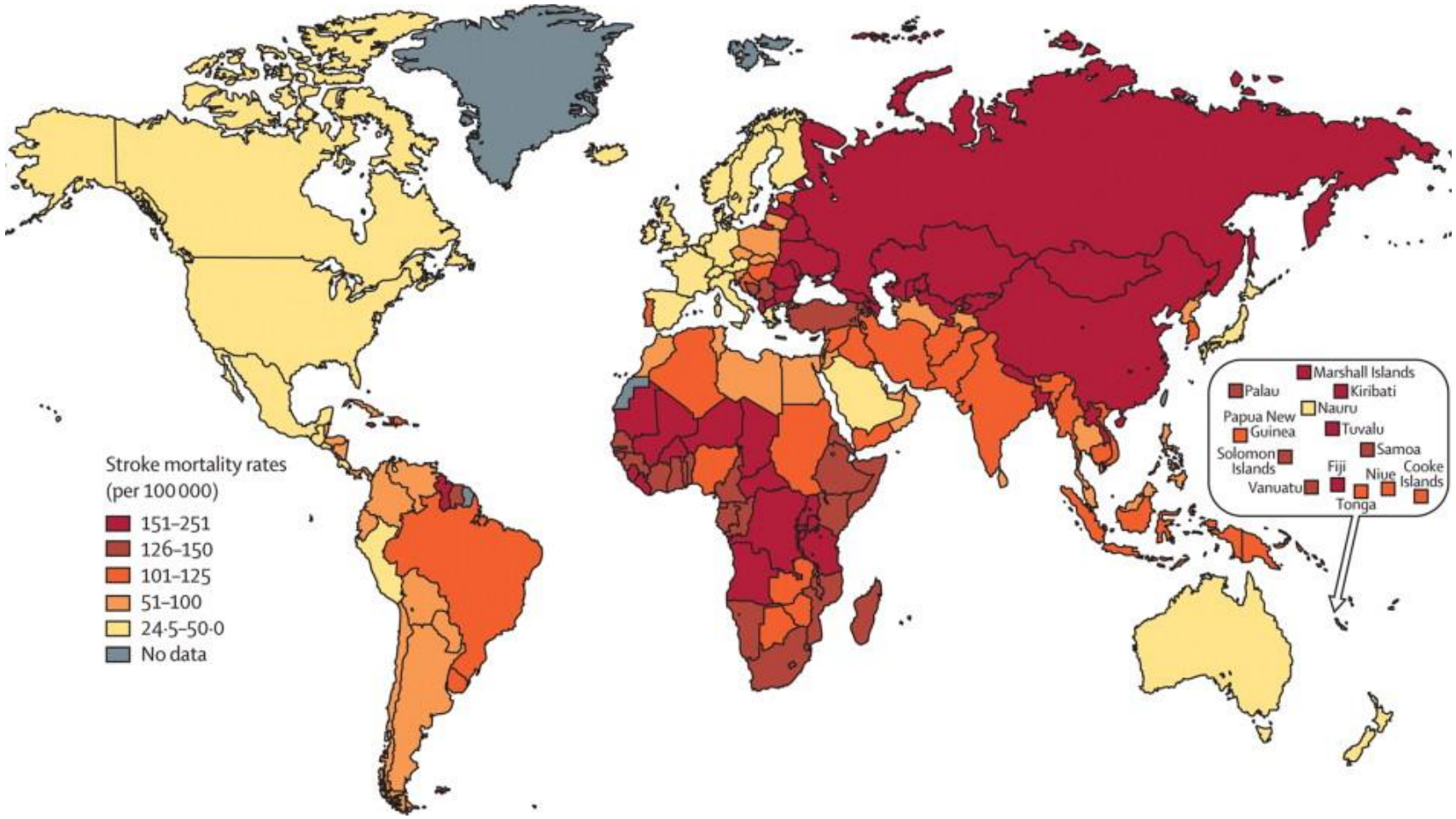


Courtesy of P Ganz.



Age-standardised incidence of ischaemic stroke per 100 000 person-years for 1990 (A), 2005 (B), and 2010 ©

Lancet Global Health, 1, e259-e281



Age-adjusted and sex-adjusted stroke mortality rates Rates are highest in eastern Europe, north Asia, central Africa, and the south Pacific.

Johnston, Lancet Neurology, 8, 345-354

ELSEVIER

ClinicalKey®

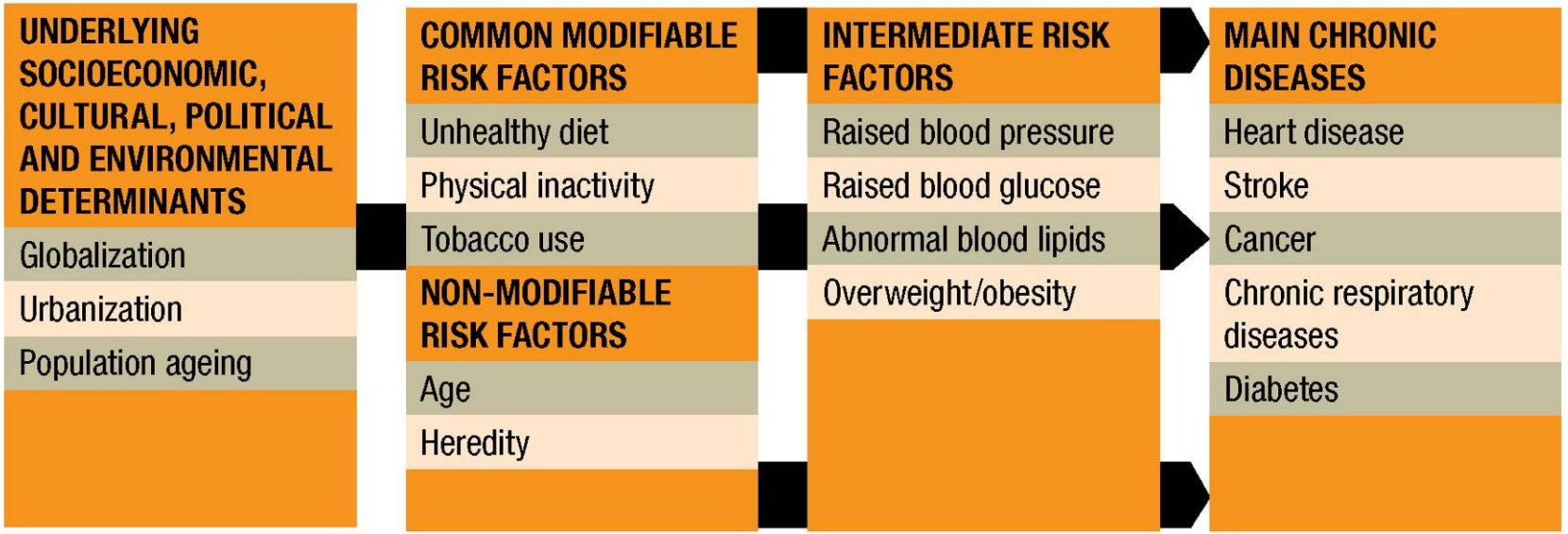
Ranking of 10 selected risk factor causes of death in world (WHO, 2009)

	Deaths (Millions)	% of Total
1. High blood pressure	7.5	12.8
2. Tobacco use	5.1	8.7
3. High blood glucose	3.4	5.8
4. Physical inactivity	3.2	5.5
5. Overweight and obesity	2.8	4.8
6. High cholesterol	2.6	4.5
7. Unsafe sex	2.4	4.0
8. Alcohol use	2.3	3.8
9. Childhood underweight	2.2	3.8
10. Indoor smoke from solid fuels	2.0	3.3

Alcohol Psychosocial factors

Genetic factors Infectious agents

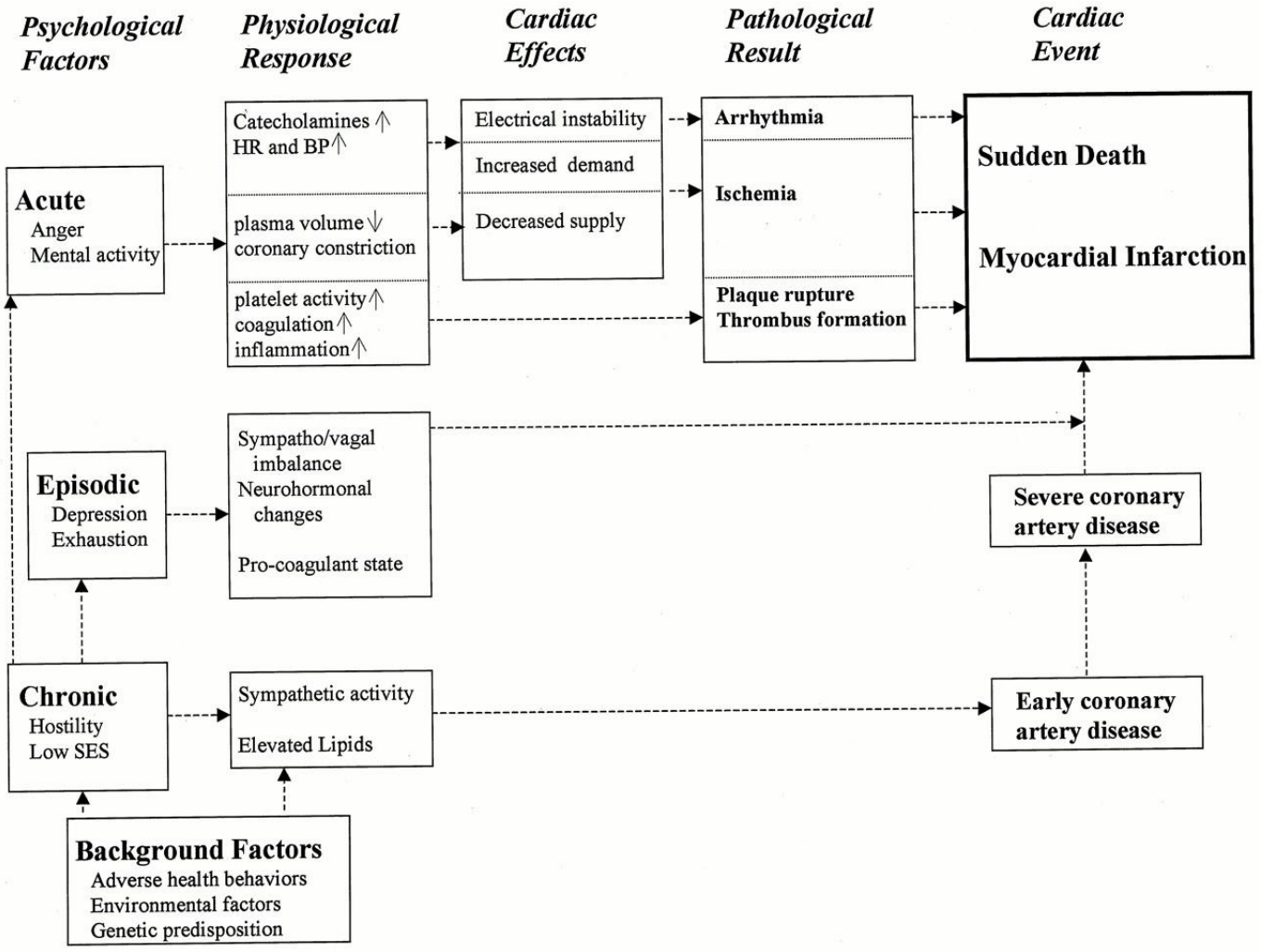
Causes of chronic diseases



Environmental factors

World Health Organization

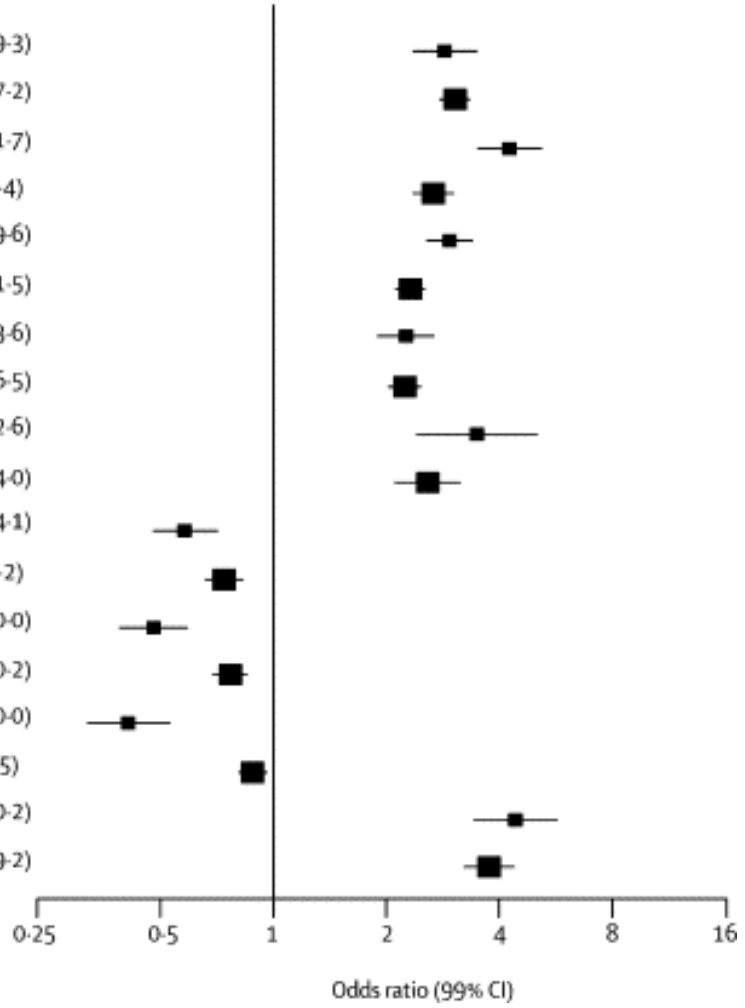
Preventing CHRONIC DISEASES a vital investment



Kop W J Psychosom Med 1999;61:476-487.

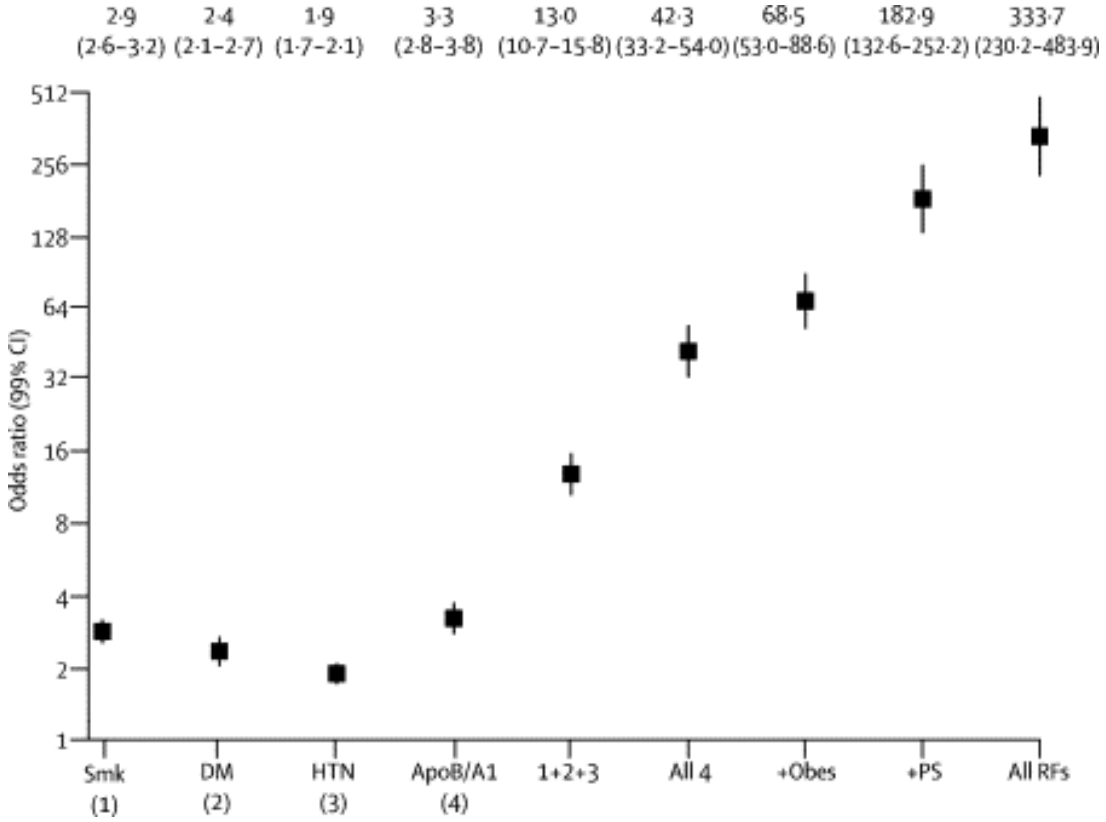
Association of risk factors with acute myocardial infarction in men and women after adjustment for age, sex, and geographical region: INERHEART

Risk factor	Sex	Control (%)	Case (%)	Odds ratio (99% CI)	PAR (99% CI)
Current smoking	F	9·3	20·1	2·86 (2·36–3·48)	15·8% (12·9–19·3)
	M	33·0	53·1	3·05 (2·78–3·33)	44·0% (40·9–47·2)
Diabetes	F	7·9	25·5	4·26 (3·51–5·18)	19·1% (16·8–21·7)
	M	7·4	16·2	2·67 (2·36–3·02)	10·1% (8·9–11·4)
Hypertension	F	28·3	53·0	2·95 (2·57–3·39)	35·8% (32·1–39·6)
	M	19·7	34·6	2·32 (2·12–2·53)	19·5% (17·7–21·5)
Abdominal obesity	F	33·3	45·6	2·26 (1·90–2·68)	35·9% (28·9–43·6)
	M	33·3	46·5	2·24 (2·03–2·47)	32·1% (28·0–36·5)
Psychosocial index	F	–	–	3·49 (2·41–5·04)	40·0% (28·6–52·6)
	M	–	–	2·58 (2·11–3·14)	25·3% (18·2–34·0)
Fruits/veg	F	50·3	39·4	0·58 (0·48–0·71)	17·8% (12·9–24·1)
	M	39·6	34·7	0·74 (0·66–0·83)	10·3% (6·9–15·2)
Exercise	F	16·5	9·3	0·48 (0·39–0·59)	37·3% (26·1–50·0)
	M	20·3	15·8	0·77 (0·69–0·85)	22·9% (16·9–30·2)
Alcohol	F	11·2	6·3	0·41 (0·32–0·53)	46·9% (34·3–60·0)
	M	29·1	29·6	0·88 (0·81–0·96)	10·5% (6·1–17·5)
ApoB/ApoA1 ratio	F	14·1	27·0	4·42 (3·43–5·70)	52·1% (44·0–60·2)
	M	21·9	35·5	3·76 (3·23–4·38)	53·8% (48·3–59·2)



Yusuf et al. (2004). *The Lancet,* 364:937-52.

Risk if acute myocardial infarction associated with exposure to multiple risk factors: INTERHEART



Yusuf et al. (2004). *The Lancet,* 364:937-52.

Region	n	Control (%)	Case (%)	Odds ratio (99% CI)	PAR (99% CI)
Overall	21408	20·0	33·5	3·87 (3·39–4·42)	54·1% (49·6–58·6)
W Eur	1047	13·8	29·4	3·76 (2·10–6·74)	44·6% (23·5–67·8)
CE Eur	2618	20·3	29·4	2·20 (1·52–3·18)	35·0% (19·2–54·9)
MEC	3291	29·9	49·6	5·33 (3·48–8·18)	70·5% (57·8–80·7)
Afr	1037	18·0	39·0	7·93 (4·32–14·58)	74·1% (59·7–84·6)
S Asia	2820	27·7	42·7	3·81 (2·49–5·83)	58·7% (42·7–73·1)
China/HK	5400	7·3	14·3	3·43 (2·61–4·51)	43·8% (36·7–51·2)
SE Asia	1858	22·7	48·0	6·22 (3·71–10·41)	67·7% (52·0–80·2)
ANZ	487	13·8	26·8	3·97 (1·71–9·22)	43·4% (16·0–75·6)
S Am	2644	27·1	40·6	2·79 (1·85–4·23)	47·6% (29·6–66·2)
N Am	206	12·4	28·8	4·75 (1·34–16·86)	50·5% (18·2–82·4)

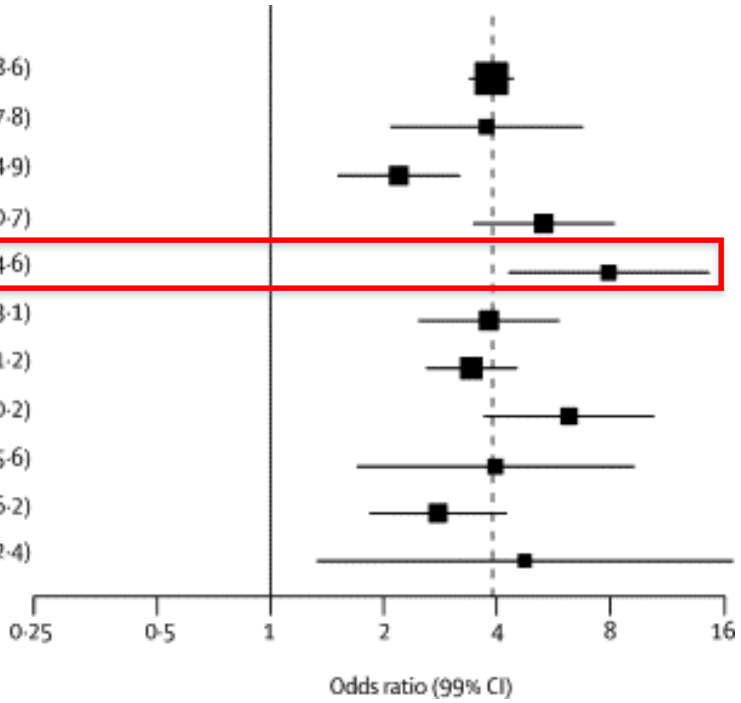


Figure 6. Risk of acute myocardial infarction associated with ApoB/ApoA1 ratio (top vs lowest quintile), overall and by region after adjustment for age, sex, and smoking PAR is for the top four quintiles versus the lowest quintile.

Yusuf et al., *Lancet,* 2004, 364, 937-52

http://dx.doi.org/10.1016/S0140-6736(04)17018-9

Region	n	Control (%)	Case (%)	Odds ratio (99% CI)	PAR (99% CI)
Overall	26916	22·3	38·6	2·48 (2·30–2·68)	23·4% (21·7–25·1)
W Eur	1425	16·4	33·0	2·22 (1·62–3·05)	21·9% (15·6–30·0)
CE Eur	3636	32·7	46·0	2·11 (1·76–2·53)	24·5% (19·2–30·6)
MEC	3404	20·2	25·9	1·84 (1·45–2·33)	9·2% (5·7–14·4)
Afr	1355	21·6	43·4	3·34 (2·40–4·65)	29·6% (22·8–37·3)
S Asia	3881	13·8	31·1	2·89 (2·31–3·60)	19·3% (15·7–23·4)
China/HK	6075	21·1	37·3	2·41 (2·06–2·80)	22·1% (18·7–26·0)
SE Asia	2141	15·3	46·8	5·63 (4·26–7·45)	38·4% (33·3–43·6)
ANZ	1269	22·0	37·8	1·94 (1·40–2·68)	22·6% (15·6–31·6)
S Am	3100	27·7	49·3	2·48 (2·03–3·04)	32·7% (27·2–38·8)
N Am	630	28·6	38·8	1·58(1·01–2·47)	19·0% (9·2–35·2)

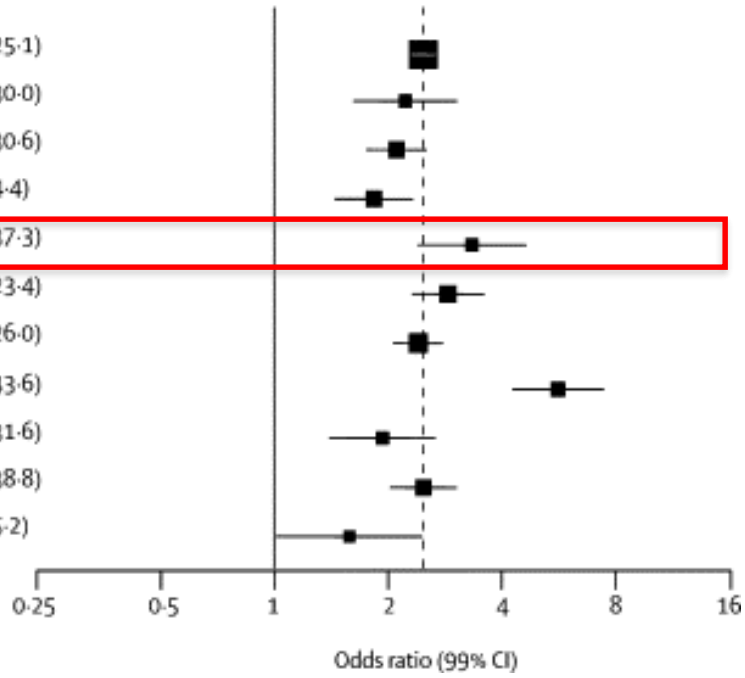


Figure 7. Risk of acute myocardial infarction associated with self-reported hypertension, overall and by region after adjustment for age, sex, and smoking

Yusuf et al., *Lancet,* 2004, 364, 937-52

http://dx.doi.org/10.1016/S0140-6736(04)17018-9

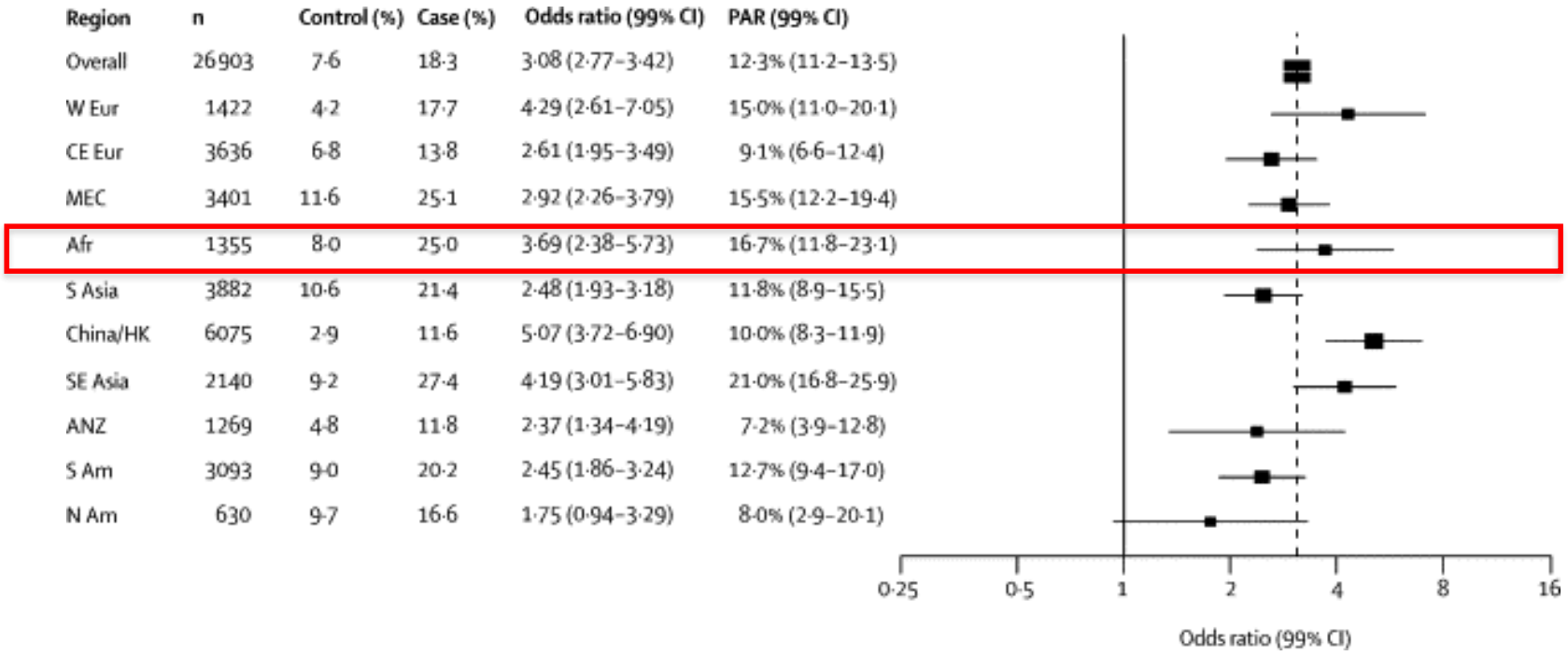


Figure 8. Risk of acute myocardial infarction associated with self-reported diabetes, overall and by region after adjusting for age, sex, and smoking

Yusuf et al., *Lancet,* 2004, 364, 937-52

http://dx.doi.org/10.1016/S0140-6736(04)17018-9

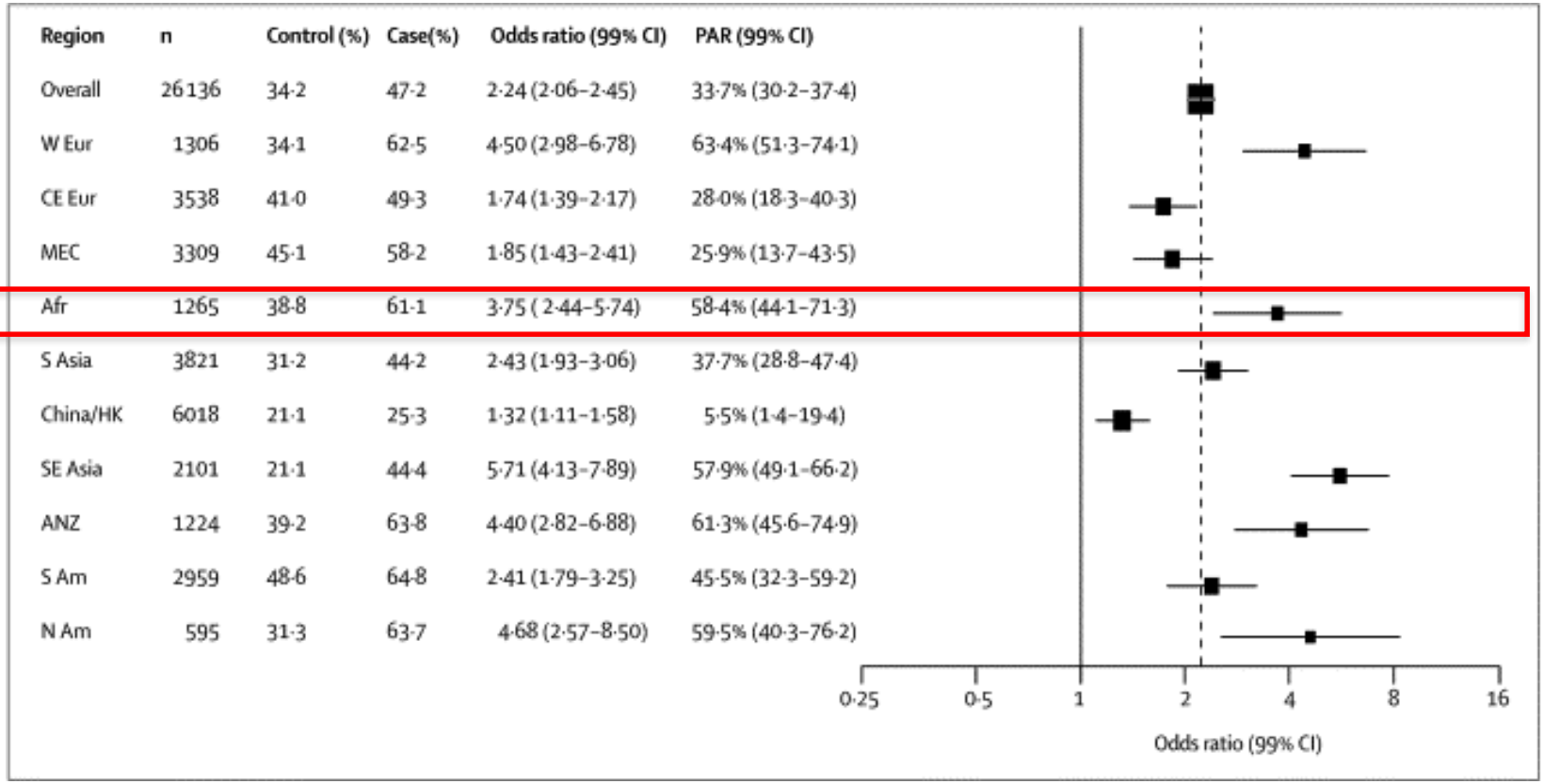


Figure 9. Risk of acute myocardial infarction associated with abdominal obesity measured as waist/hip ratio (upper tertile vs lowest tertile), overall and by region after adjusting for age, sex, and smoking PARs are for top two tertiles vs lowest tertile.

Yusuf et al., *Lancet,* 2004, 364, 937-52

http://dx.doi.org/10.1016/S0140-6736(04)17018-9

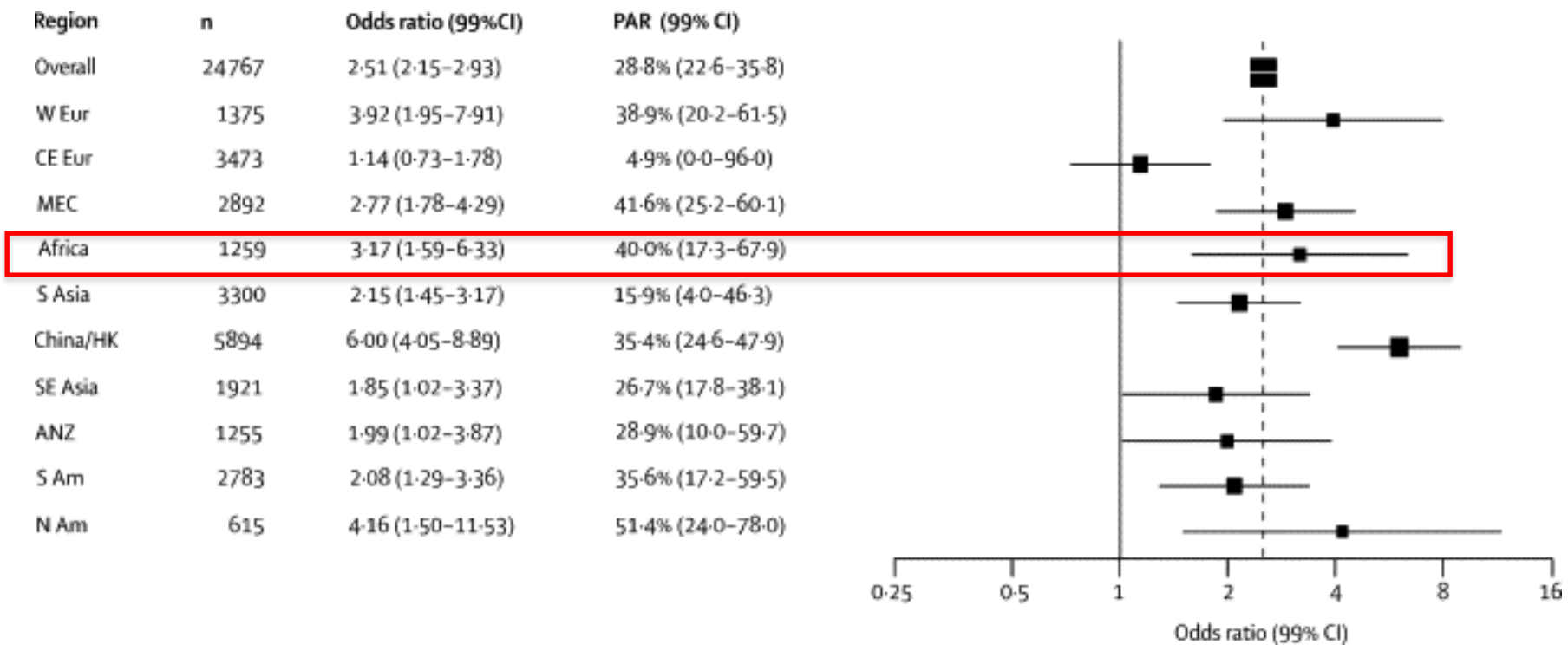


Figure 10. Risk of acute myocardial infarction associated with the composite psychosocial index, overall and by region

Yusuf et al., *Lancet,* 2004, 364, 937-52

http://dx.doi.org/10.1016/S0140-6736(04)17018-9

Comparison of the population-attributable risk (99% CI) for common risk factors in the INTERSTROKE and INTERHEART studies

	INTERSTROKE (all stroke; 3000 cases, 3000 controls)[3]*	INTERHEART (acute myocardial infarction; 15 152 cases, 14 820 controls)[4]†
Hypertension	34·6% (30·4–39·1)	17·9% (15·7–20·4)
Smoking	18·9% (15·3–23·1)	35·7% (32·5–39·1)
Waist-to-hip ratio (abdominal obesity)	26·5% (18·8–36·0)	20·1% (15·3–26·0)
Diet		
Diet risk score	18·8% (11·2–29·7)	..
Fruits and vegetables daily	..	13·7% (9·9–18·6)
Regular physica	28·5% (14·5–48·5)	12·2% (5·5–25·1)
Diabetes	5·0% (2·6–9·5)	9·9% (8·5–11·5)
Alcohol intake	3·8% (0·9–14·4)	6·7% (2·0–20·2)
Psychosocial factors		
All psychosocial factors	..	32·5% (25·1–40·8)
Psychosocial stress	4·6% (2·1–9·6)	..
Depression	5·2% (2·7–9·8)	..
Cardiac causes	6·7% (4·8–9·1)	..
Ratio of apolipoproteins B to A1	24·9% (15·7–37·1)	49·2% (43·8–54·5)

90%

90% men
94% women

Tu. (2010). *The Lancet,* 376:74-5.

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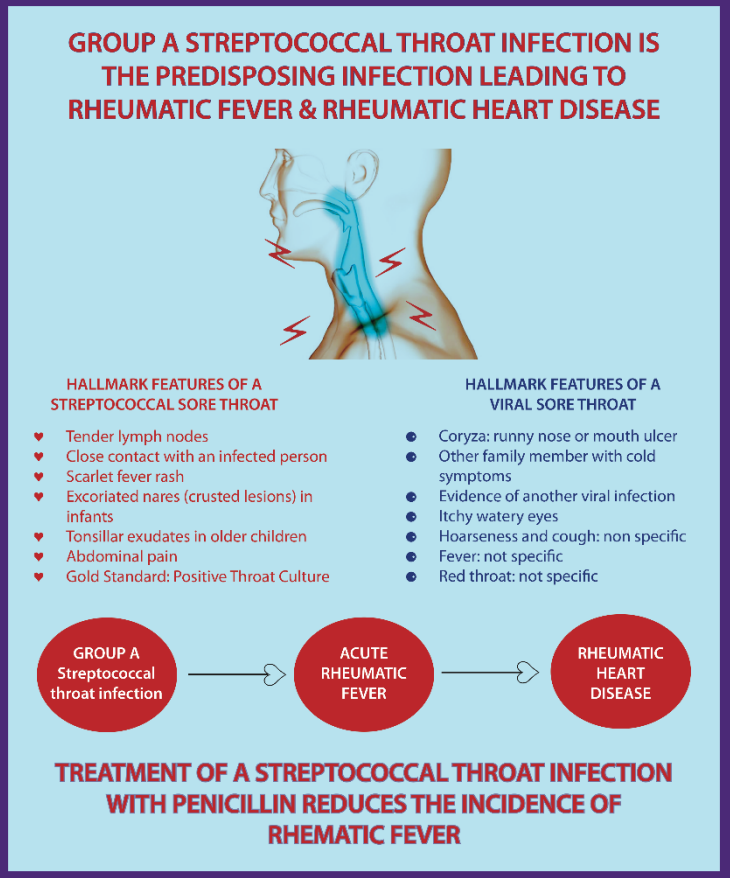
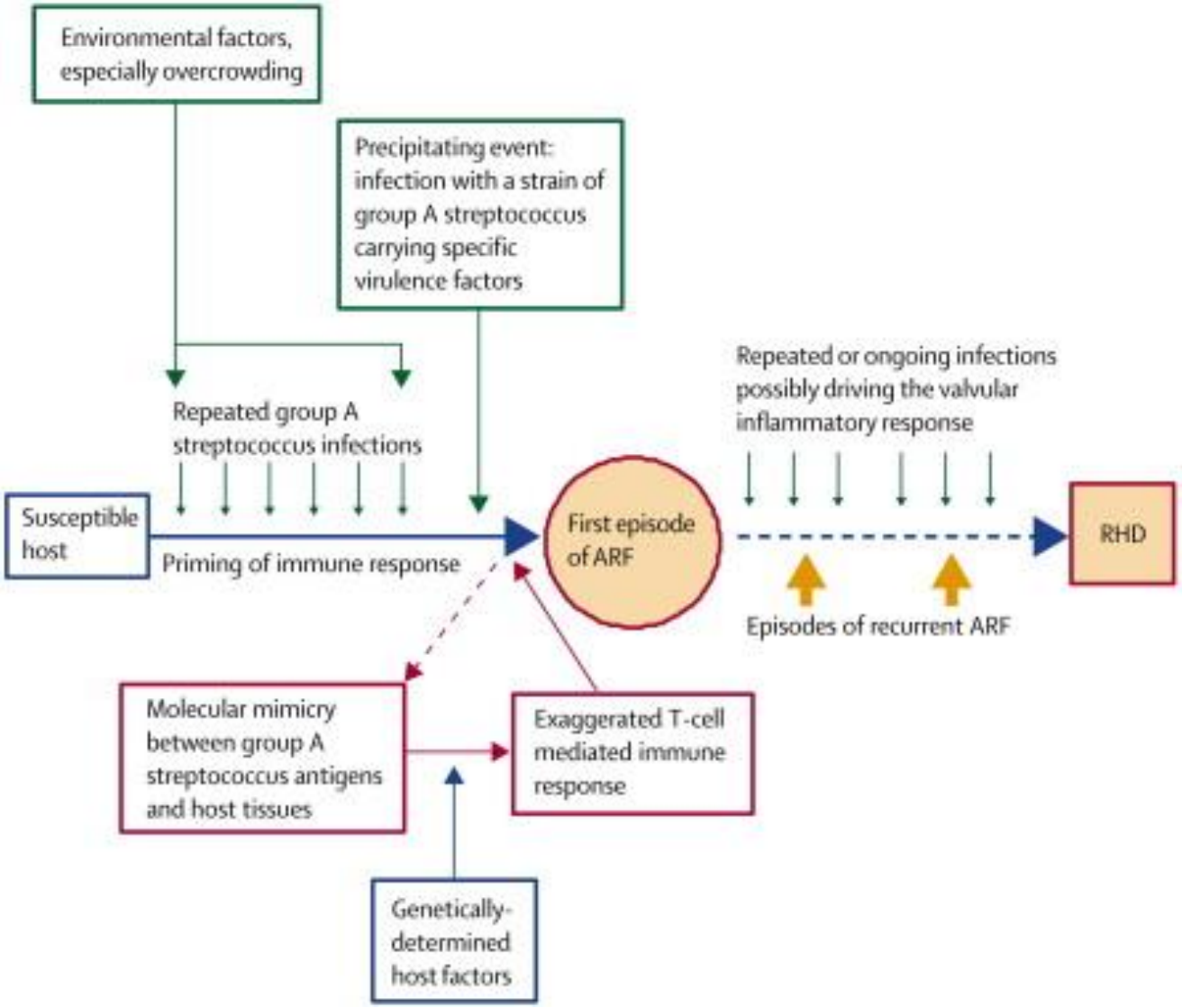
“Rheumatic heart disease is a marker of inequity, of social injustice, and of neglect of vast populations living in poverty’...”

Srinath Reddy, President of the World Heart Federation

Maurice, *Lancet,* 2013, 382:1085-6





Pathogenetic pathway for ARF and RHD

Carapetis et al., 2005, 366, 155–168

Awareness and Education in Prevention and Control RHD

- **Case detection of ARD and RHD – all members aware of presentation & diagnosis**
  - **Highest among HC workers**
- **Public education into RHD control strategies**
  - **Potential consequences**
  - **School and educational facilities**
- **Strategic design**
  - **Collaboratively designed, locally adapted, implemented on multiple levels, and comprehensively evaluated**

Zuhlke et al., *Global Heart,* 2013; 8:235-9

Advocacy, Policy, Public Health and Government Engagement

- National level advocacy and notification policy
  - Surveillance data
  - Politicizing the issue
  - Leveraging millennium development goals
  - Aligning RHD with issues of child health, maternal morbidity/mortality and NCD agendas
  - Activate community – literacy
- Health workforce training
- Benzathine penicillin
  - Availability, quality and safety (anaphylaxis)
  - Dosing
  - Rx sore throat

Zuhlke et al., *Global Heart,* 2013; 8:235-9

News | About | Projects | Contacts | Resources

PREVENTION

ABOUT

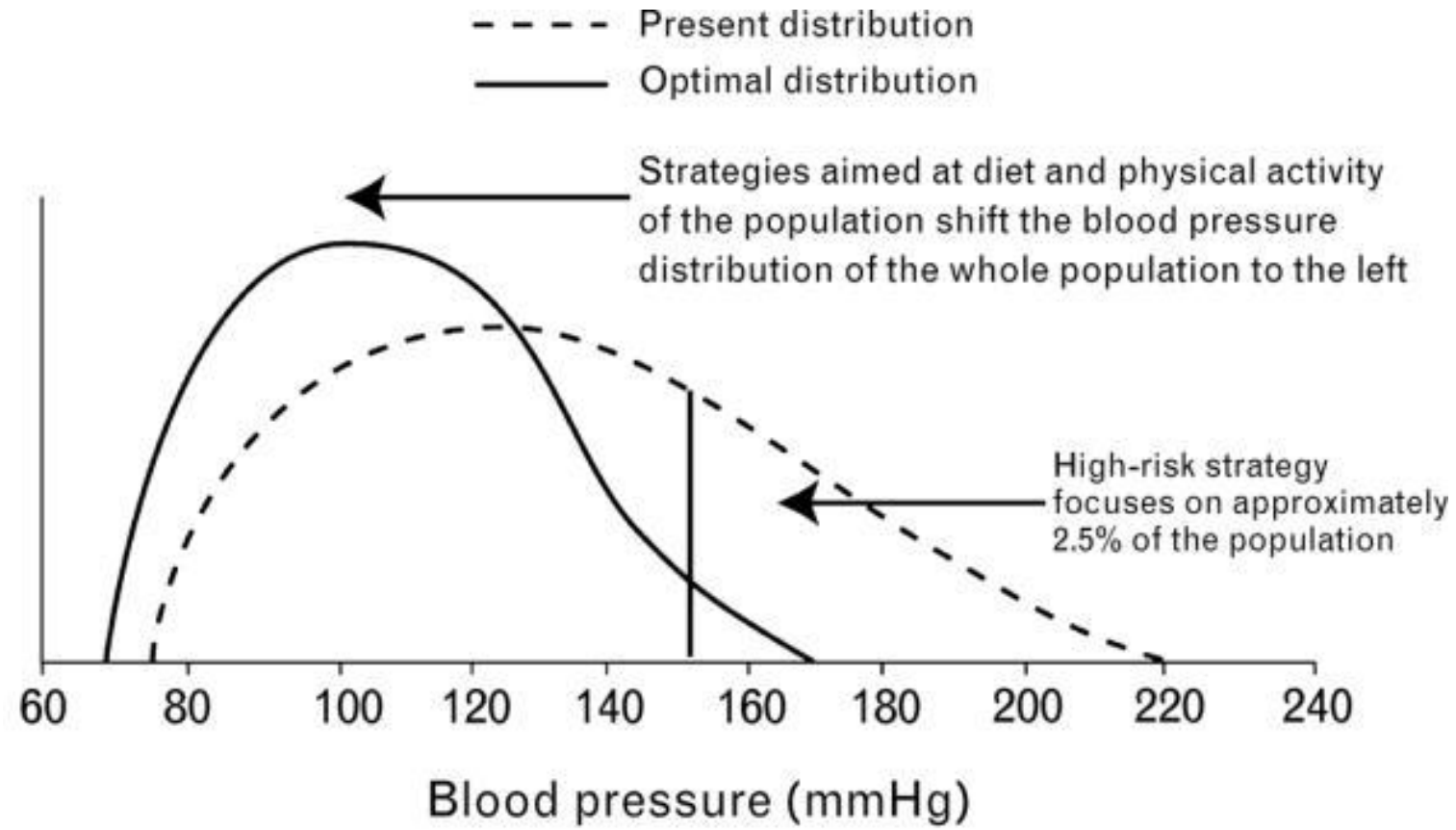
RHD Africa

RHD Africa serves as a platform to bring together researchers, communities and resources to advance the combat against rheumatic heart disease on the continent. Africa continues to face unacceptably high rates of rheumatic fever (RF) and rheumatic heart disease (RHD), despite readily available and inexpensive preventive measures. However, in the past several years, key players from many African nations have come together to acknowledge the persistent health burden attributable to RF/RHD and have agreed to a pledge of action to reduce it. The plan of action is a comprehensive RF/RHD prevention and treatment programme known as the ASAP Programme.

The A.S.A.P. programme focuses on four areas of activity: (i) raising the **awareness** of the public and healthcare workers about RHD, (ii) determining the incidence and prevalence of RHD through epidemiological **surveillance**, (iii) improving **advocacy** to influence public policy for the prevention and treatment of RHD, and (iv) working towards the establishment of primary and secondary **prevention** programmes of RHD at the community level.

Principles of Risk Reduction

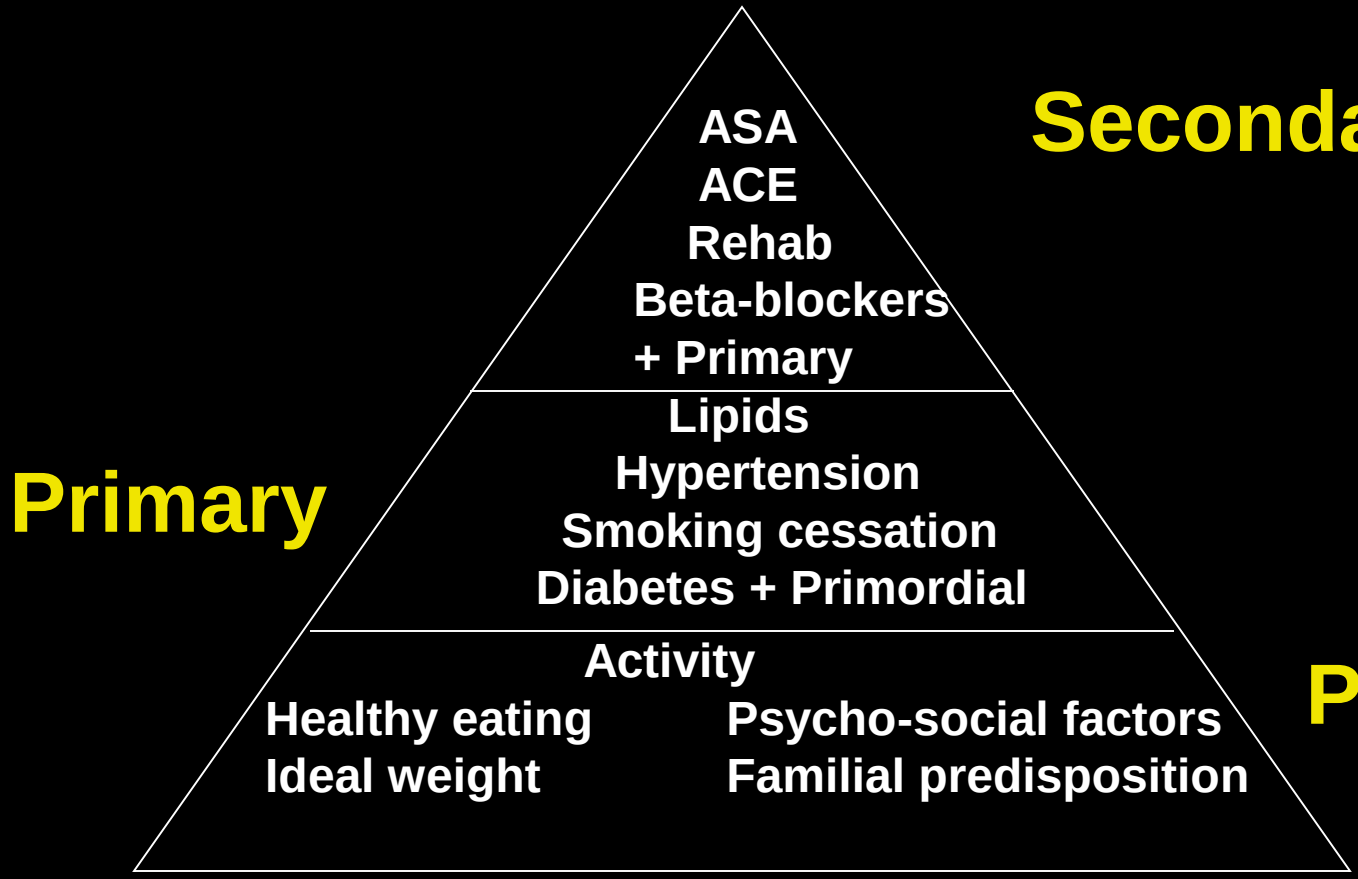
- Population versus individual
- Primary prevention focuses on individuals known to be at risk
  - Screen and treat
- Most events occur in individuals with only moderate elevation of numerous risk factors
  - Population-based strategies needed
  - Developmentally appropriate, culturally sensitive student-level school-based interventions WITH modifications of school food and physical activity



Impact of a combination of population-wide prevention and targeting high-risk subjects on the effective control of blood pressure.

Pais PS, Journal of Hypertension - Supplement. 24(2):S25-30, 2006 Apr.

CVD Prevention Opportunities



Benjamin and Smith et al., JACC 2002;40:579-61

Concepts of Prevention

- **The power of primordial prevention**
- ***CVD and risk factors develop early in life***
- **Balance of population-level approaches for health promotion and disease prevention and individualized high-risk approaches**

Lloyd-Jones et al., Circulation, 2010;121:586-613

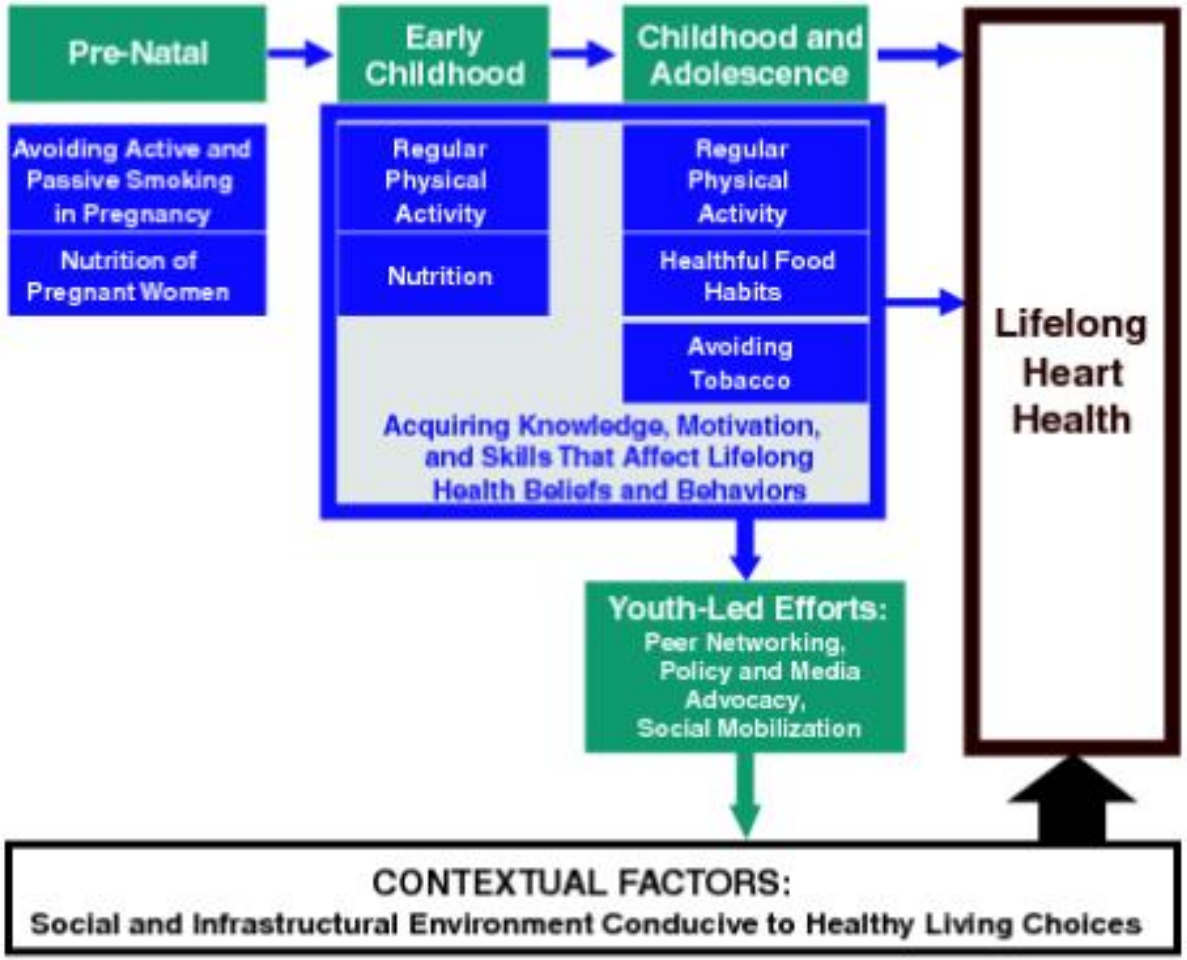
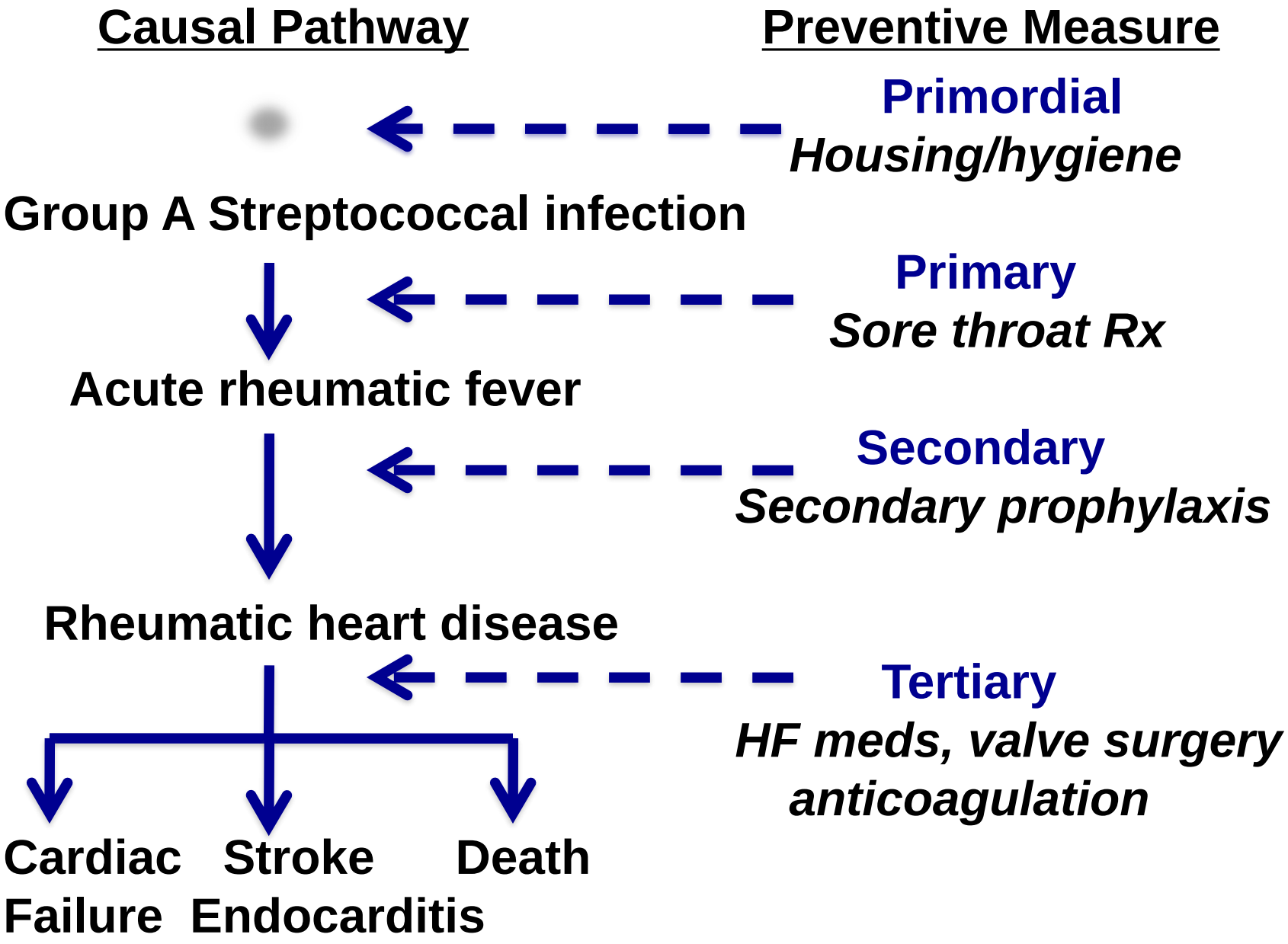


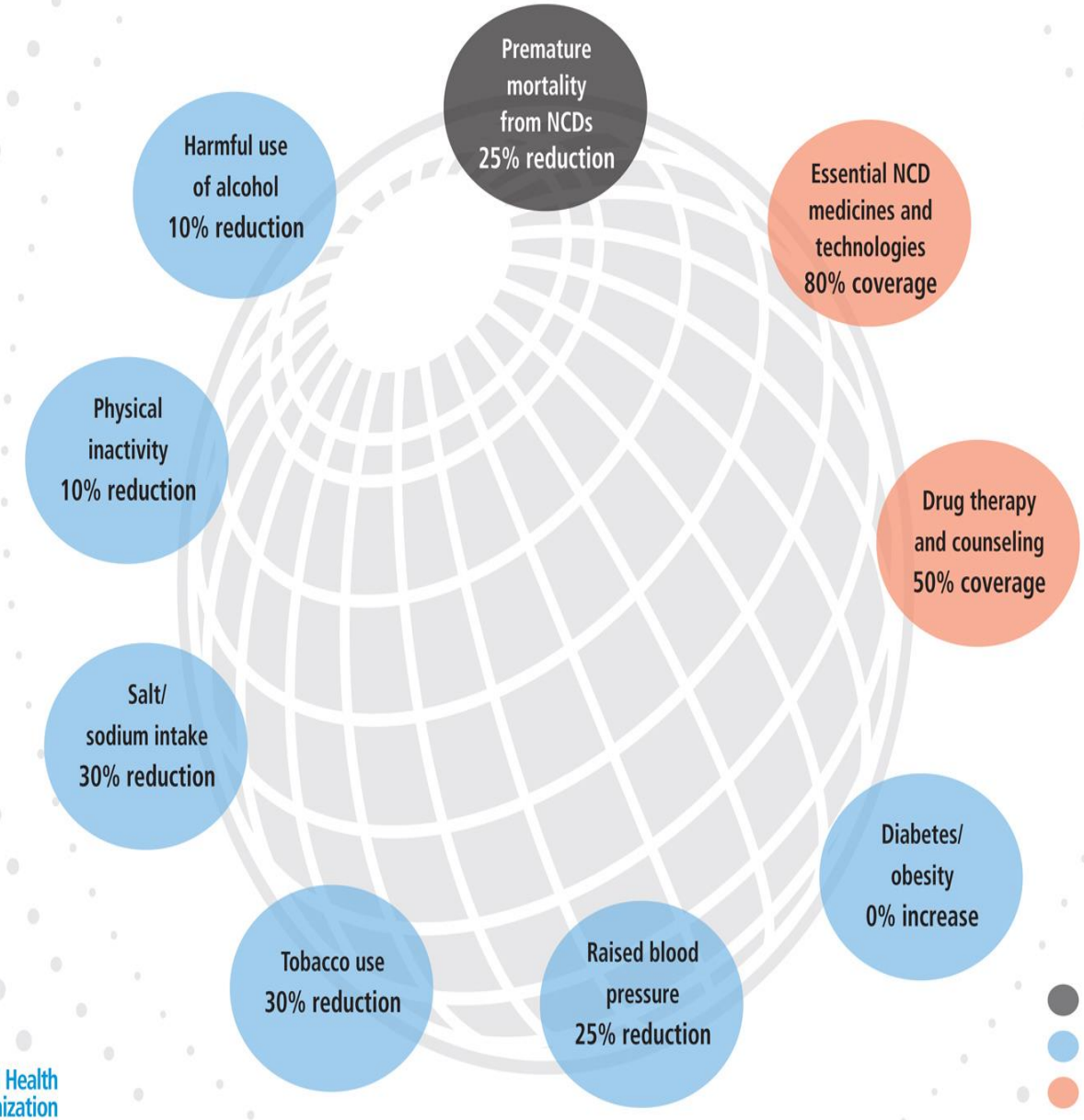
FIGURE 6.1 Growing toward heart health: Influences and opportunities into adulthood.

National Academy of Sciences. Promoting Cardiovascular Health in the Developing World, 2010.



Carapertis, NEJM, 2007, 357:429-42

Set of 9 voluntary global NCD targets for 2025



World Health Organization

World Heart Federation Vision

- **Coalitions & partnerships across health disciplines, non- & medical organizations & governments for NCD control**
- **Develop reliable health-information systems to monitor mortality, morbidity & health behaviors**
- **Enforce tobacco control, implement HTN detection and control, & secondary prevention**
- **Develop efficient systems of integrated care with trained non-physician healthworkers for HTN, secondary prevention in uncomplicated and to counsel lifestyle modification**

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Yusuf, *Lancet*, 2015, 399-402

World Heart Federation Vision

- Improve access and affordability of proven drugs with facilitation of low-cost combination pills
- Develop expertise in knowledge translation and implementation
- Engage civil society and community organizations in CVD control
- Build partnerships between hi- and low-resource countries for CVD & control of NCD with use of transfer of expertise and modest funding
- Establish large population studies in different regions of the world (diet, PA, ETOH, tobacco)

10 Best Buys to combat heart disease, diabetes and stroke in Africa

1. Provide multidrug regimens and adopt absolute risk approach to prevent
2. Food control legislation with public education for reducing salt and saturated fat
3. Promotion of physical activity in schools, workplaces and built environment
4. Maintain and extend tobacco control activities especially in young, and encourage quitting (counseling, nicotine replacement)
5. Syndromic treatment of sore throat with penicillin in children to prevent RF

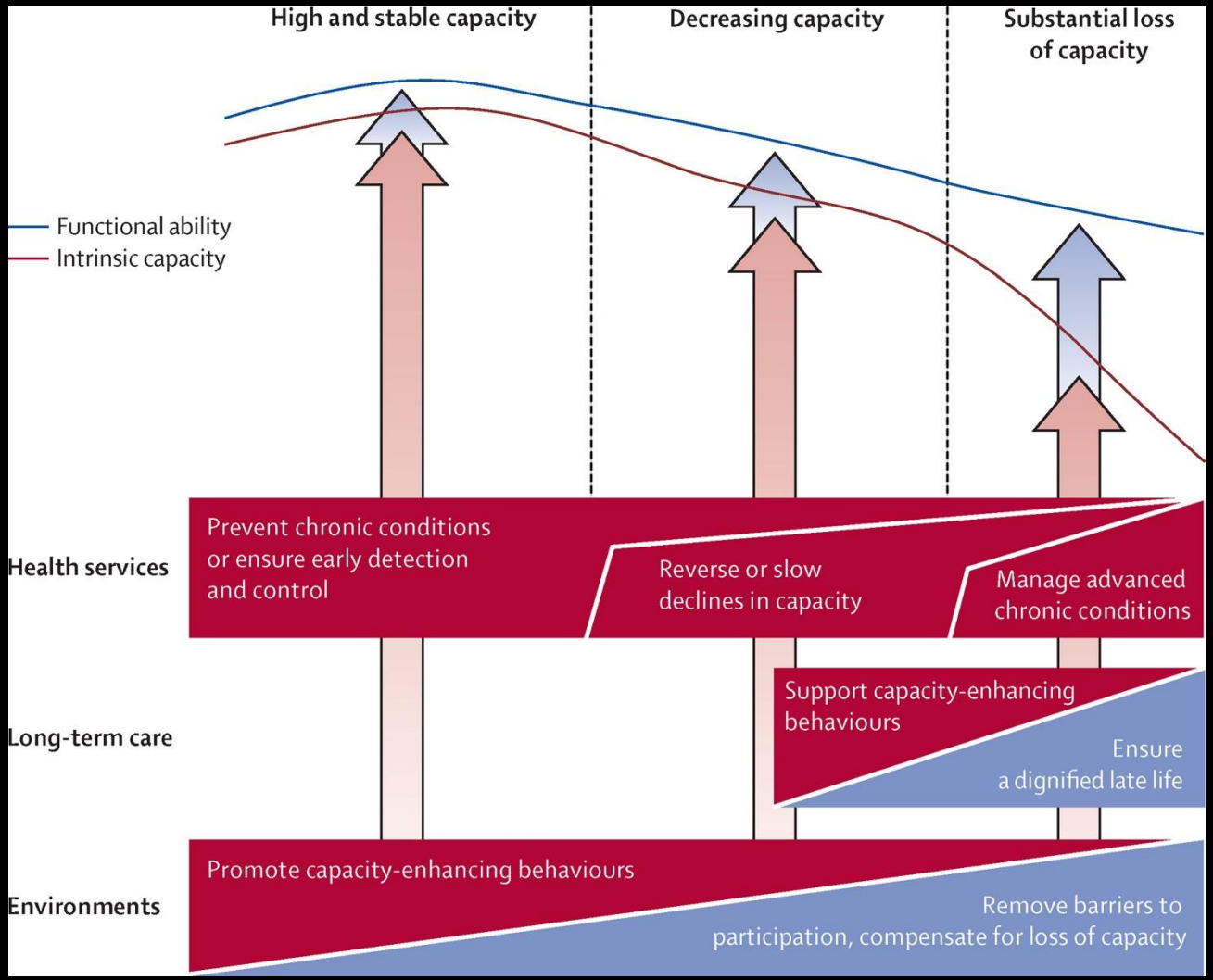
Mayosi, *Heart,* 2013,

10 Best Buys to combat heart disease, diabetes and stroke in Africa

6. Establish register-based secondary RF and RHD prevention
7. Needs-driven modular training of health professionals to meet needs of the population
8. Strengthen district-based primary health systems, and integration of care of communicable and NCD
9. Creation of regional centers of excellence for specialist medical and surgical care
10. Develop surveillance and quality assurance systems for CVD, DM, and stroke

Mayosi *Heart* 2012

Figure 5



The Lancet 2016 387, 2145-2154DOI: (10.1016/S0140-6736(15)00516-4)

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Ensuring a strong nursin voice in all health and social system policy, development and plannin dialogues

Shamian et al., *Can J Nursing Leadership*

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TAK

谢谢

DANKE

kea leboha

thank you

спасибо

σας ευχαριστώ

감사합니다

ありがとう

terima kasih

Gracias

salamat