Cardiovascular Disease – the global virus

Dr Justin Zaman
BSc MBBS MRCP MSc PhD

Consultant Cardiologist, James Paget University Hospital, Norfolk, UK
Honorary Senior Lecturer, University of East Anglia, Norwich, Norfolk, UK

Previously Clinical Lecturer in Cardiology and Epidemiology, University College London
and Visiting International Research Fellow, The George Institute for Global Health, Sydney
Conflicts of interest

- I am a clinical cardiologist
Conflicts of interest

• I am a clinical cardiologist
• AND an academic epidemiologist!
Aims of this talk

• to describe the global burden of cardiovascular diseases according to stages in the epidemiological transition
• to outline the broader causes for cardiovascular disease
• to draw implications for national and international public health policy and practice.
World Health Organisation

world health statistics

• Age-standardised mortality rates by cause (per 100 000 population)
• European Region – communicable disease 51, non-communicable disease 532
World Health Organisation

World health statistics

- Age-standardised mortality rates by cause (per 100 000 population)
- European Region – communicable disease 51, non-communicable disease 532
- South-East Asia Region – communicable disease 334, non-communicable disease 676
World Health Organisation
world health statistics

• Age-standardised mortality rates by cause (per 100 000 population)
• European Region – communicable disease 51, non-communicable disease 532
• South-East Asia Region – communicable disease 334, non-communicable disease 676
• Africa Region – communicable disease 798, non-communicable disease 779
economic development

• Better public health – sanitation, vaccinations, resulting increased survival - began in the 19th century
• Thus the increase in cardiovascular diseases can be attributed to a reduction of diseases from infection and other conditions related with poverty.
• but...
• Economic development has however resulted in widespread urbanisation
Urbanisation – the benefits

- Better health services
- Better education
- Better financial and social services
- Cultural opportunities
- Networking opportunities
Urbanisation – the harms

• Diseases of poverty and crowding
• Environmental hazards – pollution, traffic injuries
• facilitation of microbial traffic via contact and sexual behaviours
• changes in human behaviour - tobacco smoking, adult obesity through easier access to energy-dense processed foods, decline in physical activity.. the effects of which are not immediately obvious..
• Cardiovascular disease is linked intimately with a society's **economic development**
  – in almost EVERY country
  – (even the Japanese are catching up their lag)

  – So it WILL be coming to Nigeria...
Epidemiological transition

• a framework in which to understand cardiovascular disease in its global context.
• The decline of infectious diseases in the late 19th century followed by the sharp increase in the prevalence of cardiovascular disease in the 20th
<table>
<thead>
<tr>
<th>STAGES OF DEVELOPMENT</th>
<th>DEATHS FROM CARDIOVASCULAR DISEASE, % OF TOTAL DEATHS</th>
<th>PREDOMINANT CARDIOVASCULAR DISEASES AND RISK FACTORS</th>
<th>REGIONAL EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age of pestilence and famine</td>
<td>5–10</td>
<td>Rheumatic heart disease, infections, and nutritional cardiomyopathies</td>
<td>Sub-Saharan Africa, rural India, South America</td>
</tr>
<tr>
<td>2. Age of receding pandemics</td>
<td>10–35</td>
<td>As above + hypertensive heart disease and hemorrhagic strokes</td>
<td>China, urban Africa</td>
</tr>
<tr>
<td>3. Age of degenerative and man-made diseases</td>
<td>35–65</td>
<td>All forms of strokes, ischemic heart disease at young ages, increasing obesity, and diabetes</td>
<td>Urban India, former socialist economies, aboriginal communities</td>
</tr>
<tr>
<td>4. Age of delayed degenerative diseases</td>
<td>&lt;50</td>
<td>Stroke and ischemic heart disease at old age</td>
<td>Western Europe, North America, Australia, New Zealand</td>
</tr>
<tr>
<td>5. Age of health regression and social upheaval</td>
<td>35–55</td>
<td>Re-emergence of rheumatic heart disease, infections, increased alcoholism, and violence</td>
<td>Russia</td>
</tr>
</tbody>
</table>
A Nigerian cardiac clinic

- Abuja Heart Study of urban Nigerians
- All consecutive patients referred for the first time to the Cardiology clinic of the University of Abuja Teaching Hospital during the period April 2006 to April 2010.
- A total of 1,586 subjects were recruited for the study
Urban Nigeria – in stage 2

• Hypertension was the primary diagnosis in 45.8% of the cohort, comprising more women than men
• Hypertensive heart failure (HF) was the most common form of HF in 61% of cases
• Compared with a Soweto cohort, the Abuja cohort were more likely to present with a primary diagnosis of hypertension or hypertensive heart disease/failure.
• They were, however, far less likely to present with coronary disease
• But note, it’s not rheumatic heart disease any more.
Nigerian rural behaviours – still stage 1?

- Osun State, southwestern Nigeria
- The prevalence of hypertension was 13.16%
- Two hundred and thirty-six (91.1%) undertook daily exercise lasting at least 30 minutes
- 48 (18.5%) had ever taken antihypertensive drugs on a regular basis.
- The average body mass index (BMI) was 23.4 ± 4.9 kg/m²
- 51 (19.6%) had a BMI of 25.0–29.9, and 30 (11.5%) had a BMI ≥ 30.

Socio-economic distribution of cardiovascular risk factors and knowledge in rural India

M Justin Zaman,1,2 Anushka Patel,1,3 Stephen Jan,1 Graham S Hillis,1 P Krishnam Raju,4 Bruce Neal1 and Clara K Chow1,5*

1Cardiovascular Division, The George Institute for Global Health, University of Sydney, NSW, Australia, 2Division of Medicine, University College London, London, UK, 3The George Institute, Hyderabad, India, 4CARE Foundation, Hyderabad, India and 5Department of Cardiology, Westmead Hospital, The University of Sydney, Australia

Current smoker 518 (39.5)
Diabetes 255 (20.1)
Hypertension 417 (31.8)
Overweight 310 (23.7)

IN EDUCATED MEN (at least primary school)
Prevalence of overweight and obesity in adult Nigerians

• This review showed that the prevalence of overweight and obesity in Nigeria ranged from 20.3%–35.1%, and 8.1%–22.2%, respectively.

• The possible predisposing factors include female sex, high socioeconomic class, sedentary lifestyle, age above 40 years, and a high energy diet.

Diabetes Metab Syndr Obes. 2013; 6: 43–47.
• Of WHO's six regions, the African region has the highest prevalence of hypertension estimated at 46% of adults aged 25 and above, according to WHO's *Global status report on noncommunicable diseases 2010*.

• The lack of reliable data further compounds this issue
Rural to Urban migration

• increased salt and fat intake from the consumption of processed foods
• increased tobacco use and sedentary lifestyle
The PERU MIGRANT study investigated health effects of rural-to-urban migration in Peru. Mass-migration from 1980s onwards was largely driven by politically-motivated violence rather than economics, resulting in less ‘healthy migrant’ selection bias.
Zaman et al. BMC Cardiovascular Disorders 2010, 10:50
http://www.biomedcentral.com/1471-2261/10/50
Inequality and socio-economic differences in South America – the future for Africa?

- Marked income inequality
- Socio-economic differences are present in most cities of the region
- Social stresses cause the urban poor to smoke and drink more, and eat more cheap high-fat food — whilst still suffering from diseases of the first stage of the epidemiological transition.
- The paradoxical coexistence of 7.6% over-nutrition and 30% under-nutrition in a population of children in shantytown Sao Paulo, Brazil.
Developing countries in transition

- Differences
  - a double burden with communicable [infectious] disease and non-communicable disease at high rates – happening at the SAME time
  - those that are afflicted are not just the affluent but also increasingly those in lower-income brackets
  - deaths occurring at co-existing younger ages compared with developed countries.
- Cardiovascular diseases commonly disables before it kills – people do not always die from it.
- This has serious economic repercussions through its impact on the health of the workforce.
DETERMINANTS
9 risk factors explain 90% of MI in INTERHEART

- Alcohol 7%
- Diabetes 10%
- Exercise 12%
- Fruit + veg 14%
- Hypertension 18%
- Abdo obesity 20%
- Psychosocial 33%
- Smoking 36%
- ApoB / Apo Al 49%

All 9 factors 90%

Yusuf et al Lancet 2004

A standardized case-control study that screened all patients admitted to the coronary care unit or equivalent cardiology ward for a first MI at 262 participating centers in 52 countries throughout Africa, Asia, Australia, Europe, the Middle East, and North and South America.
Social and environmental

- inverse relation between social position and CVD risk in the UK
Nutrition transition
Physical inactivity

- Increased use of motorised transportation
- Use of household labour saving devices
- Physically undemanding leisure time
- Reduction or even elimination of children’s ability to play safely outside the home
- Sitting for long hours watching television and playing computer games

- ....overweight...obesity....diabetes....CHD
Smoking

- Tobacco use is one of the most important causes of myocardial infarction globally
- Rates of smoking have fallen dramatically in many developed nations
- Yet rates are increasing in many developing countries.

- Four fifths of the world's 1.1 billion smokers lived in low- or middle-income countries in 1995

- In the poorest households as much as 20% of total household expenditure is on tobacco
  - ...accentuating health inequalities.
Implications for policy..

• Heart disease is preventable...
• Up to 90% of cardiovascular disease events are preventable by mitigating the effects of known risk factors
Explaining the fall in CHD deaths in the US: 1980-2000

Risk Factors worse
- Obesity (increase) +17%
- Diabetes (increase) +10%

Risk Factors better
- Population BP fall -65%
- Smoking -20%
- Smoking -12%
- Cholesterol (diet) -24%
- Physical activity -5%

Treatments
- AMI treatments -47%
- Secondary prevention -10%
- Heart failure -11%
- Angina: CABG & PTCA -9%
- Hypertension therapies -7%
- Statins (primary prevention) -5%

Unexplained -9%

341,745 fewer deaths in 2000 in US
### Explaining the fall in CHD deaths in the US: 1980-2000

#### Risk Factors worse
- Obesity (increase): +7%
- Diabetes (increase): +10%

#### Risk Factors better
- Population BP fall: -20%
- Smoking: -12%
- Cholesterol (diet): -24%
- Physical activity: -5%

#### Treatments
- AMI treatments: -10%
- Secondary prevention: -11%
- Heart failure: -9%
- Angina: CABG & PTCA: -5%
- Hypertension therapies: -7%
- Statins (primary prevention): -5%

#### Unexplained
- -9%

341,745 fewer deaths in 2000 in US
• Don’t forget, by the time your patient has angina or an ACS, risk factors are irrelevant.

• (as the incident disease presentation has already occurred – your job is to improve prognosis)
But don’t worry that prevention will make you unemployed cardiologists - I am busier than ever!

• Age and the percentage of the population over the age of 65 is increasing.

• Thus, the absolute number of people living with cardiovascular disease is increasing.

• Aided by improved survival following heart attack.

• Obesity epidemic.

• C-T surgeons still busy!
World Health Organisation Taxonomy of chronic disease

Causes of chronic diseases

UNDERLYING SOCIOECONOMIC, CULTURAL, POLITICAL AND ENVIRONMENTAL DETERMINANTS
- Globalization
- Urbanization
- Population ageing

COMMON MODIFIABLE RISK FACTORS
- Unhealthy diet
- Physical inactivity
- Tobacco use

NON-MODIFIABLE RISK FACTORS
- Age
- Heredity

INTERMEDIATE RISK FACTORS
- Raised blood pressure
- Raised blood glucose
- Abnormal blood lipids
- Overweight/obesity

MAIN CHRONIC DISEASES
- Heart disease
- Stroke
- Cancer
- Chronic respiratory diseases
- Diabetes
A new strain of communicable virus

- Global trade liberalisation
- Globalisation of communications media
- Improved international transport
  - allow cardiovascular risk factors to jump easily from one country to another
A new strain of communicable virus

• Spread amongst the newly-infected country depends on
  – the rate at which newly-infected individuals infect others (shared socio-economic circumstances)
  – this depends on factors such as geographical homogeneity (urbanisation)
  – and ease of transmission in a susceptible environment (high penetration of behavioural changes and acceptance)
  – with some having a lower resistance to infection (lower socio-economic status) than others
  – cross-infection (already high levels of blood pressure in Africa)
Social model of health

• Public health policies need to take into account the role that agriculture, trade, education, the physical environment, town planning and transport have on cardiovascular disease aetiology
  – these are the true risk factors that cause incident disease
1. To raise the priority accorded to noncommunicable disease in development work at global and national levels, and to integrate prevention and control of such diseases into policies across all government departments.

2. To establish and strengthen national policies and plans for the prevention and control of noncommunicable diseases.

3. To promote interventions to reduce the main shared modifiable risk factors for noncommunicable diseases: tobacco use, unhealthy diets, physical inactivity and harmful use of alcohol.

4. Working in partnership to prevent and control the 4 noncommunicable diseases — cardiovascular diseases, diabetes, cancers and chronic respiratory diseases and the 4 shared risk factors — tobacco use, physical inactivity, unhealthy diets and the harmful use of alcohol.

5. To promote partnerships for the prevention and control of noncommunicable diseases.

6. To monitor noncommunicable diseases and their determinants and evaluate progress at the national, regional and global levels.

2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases
Conclusions

• Unfavorable social and environmental conditions support unhealthy lifestyles – not just individual behavior
• By changing the environment that causes cardiovascular disease, the causes of the causes (economic and social) are being treated.
  – Focussing on the individual will not work
Thank you for listening.
Nigerian problems

• Reduced access to health care
• Affordability of drugs - Population below poverty line high
• Fake drugs
• Sugar companies and cooking oil companies which make consumables foods high in cholesterol level and sugar
• Tobacco companies located in several states
Nigerian problems

• Medical Personnel Brain Drain
• Lack of local evidence to convince high-level policy makers
• Lack of government interest - 4.6% of GDP goes to health
• Corruption
• Obesity may be seen as a sign of “good living”
• Executive, Legislature and the Judiciary need to come together and agree