Middle East Perspective on Burden of CVD
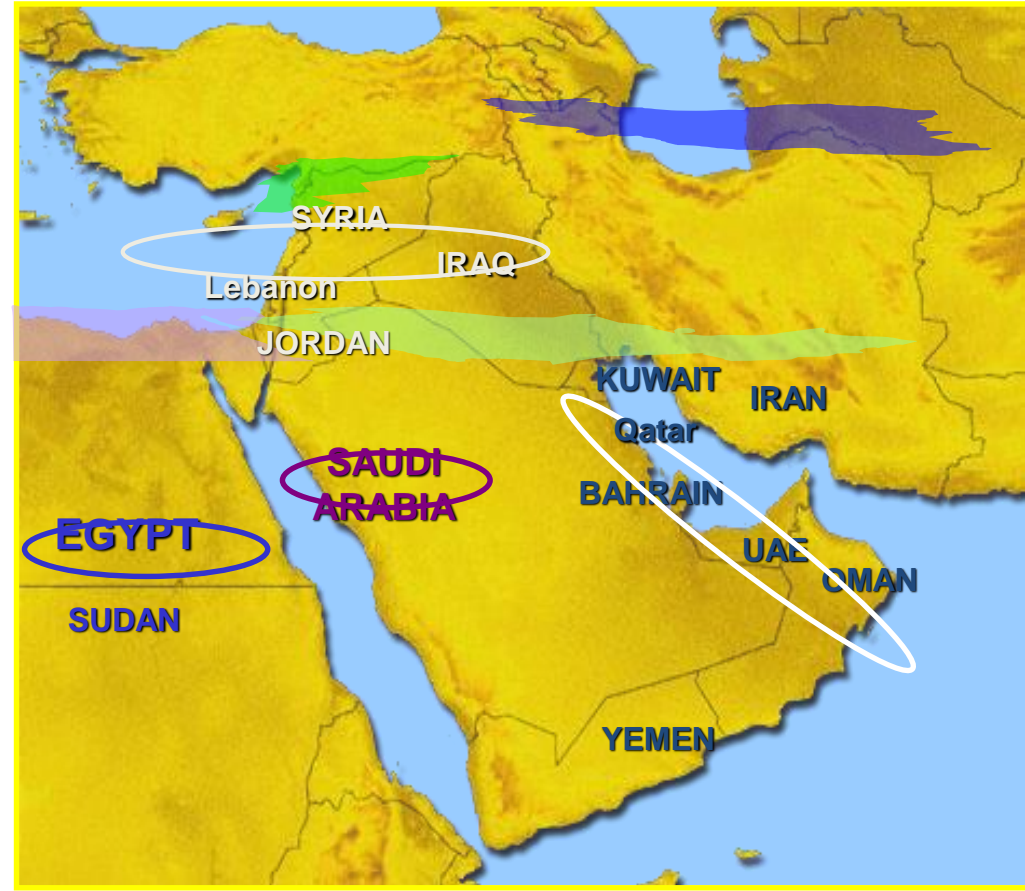
Hani Najm, MD, Msc, FACC

Vice President of Saudi Heart Association

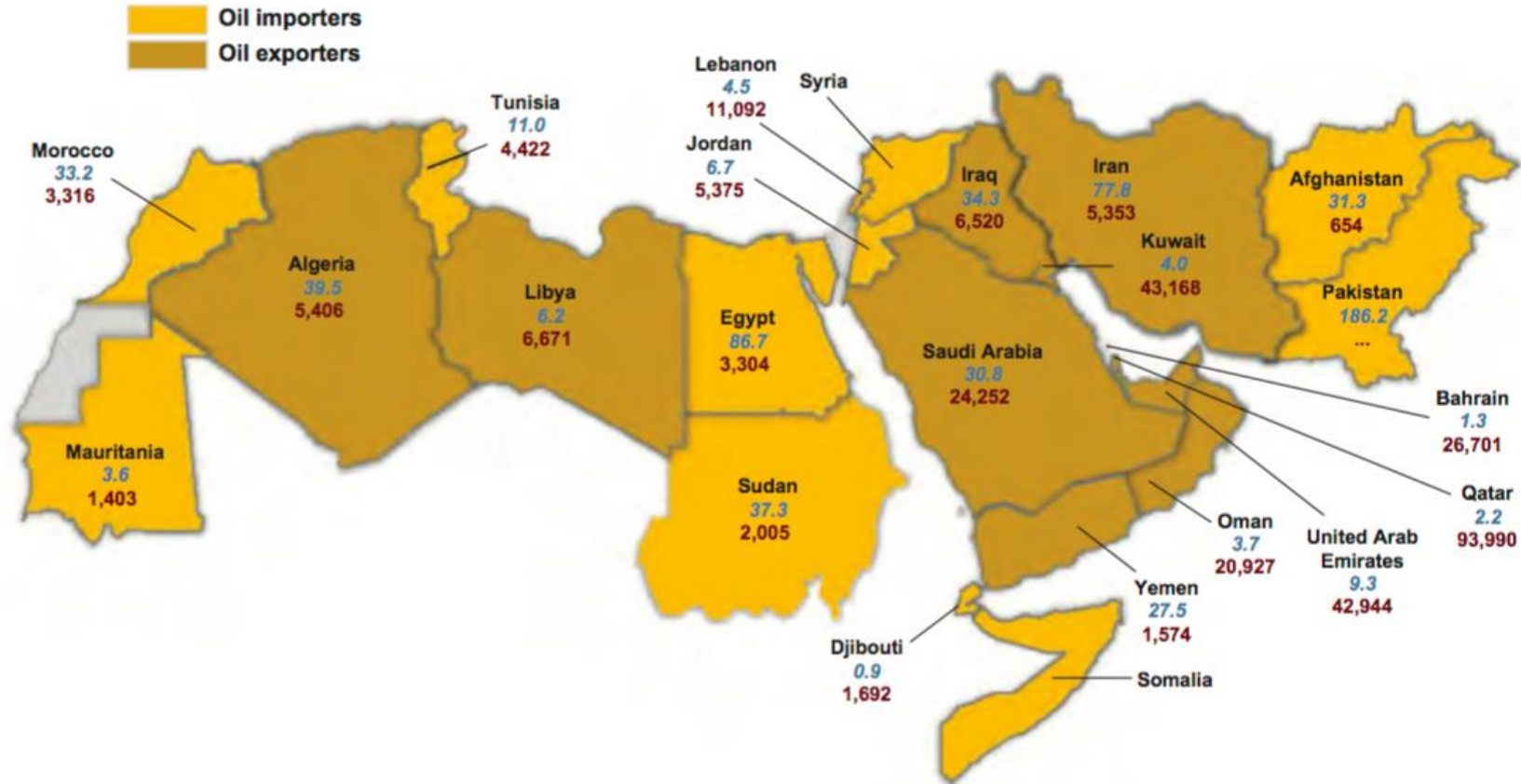# Middle East Region

Demographics

- 14 countries
- Population : 330 million
- Some of the richest & some of the poorest countries
- Different political, economic environments

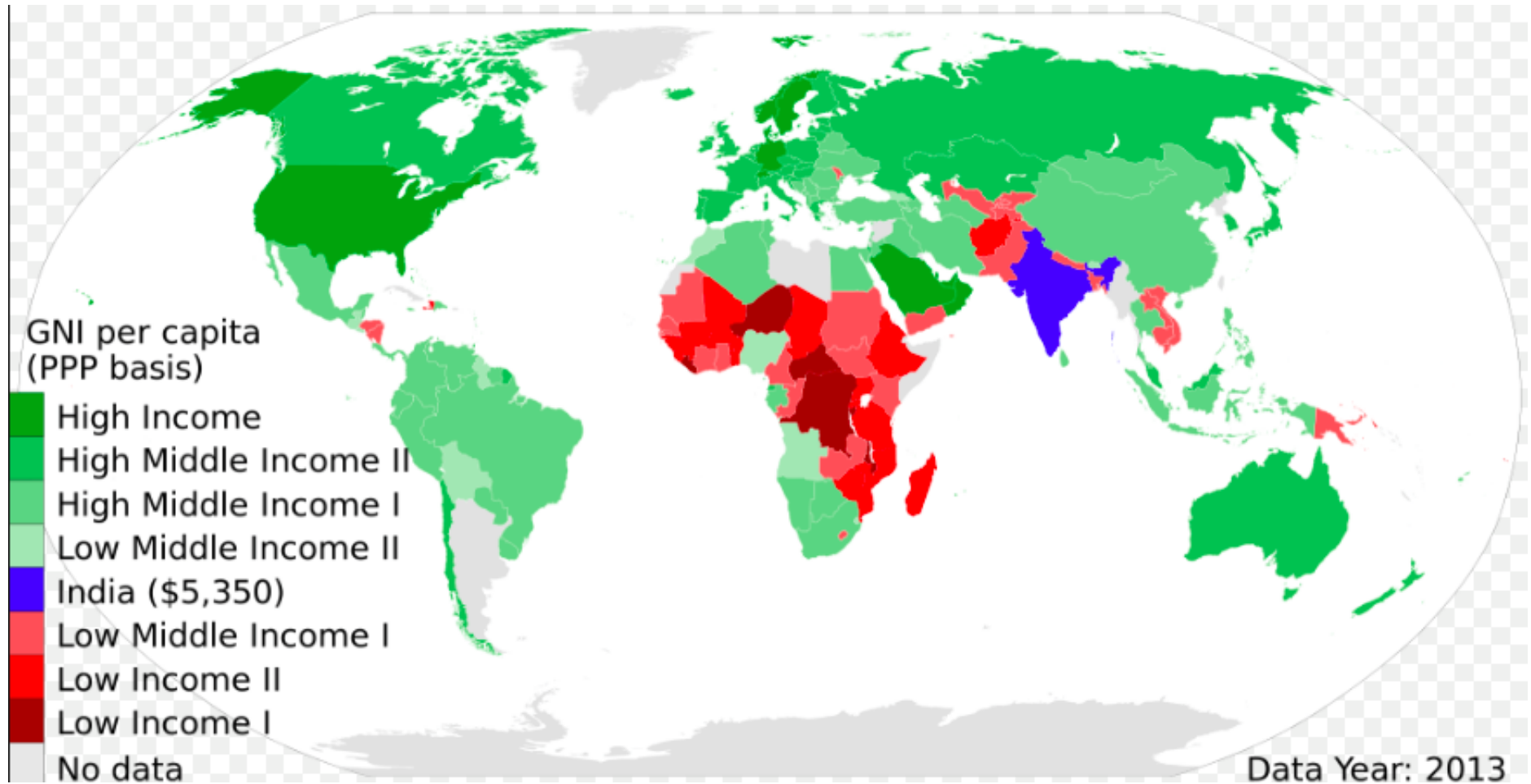# GDP per Capita

Population, millions (2014)
GDP per capita, U.S. dollars (2014)

Oil importers
Oil exporters

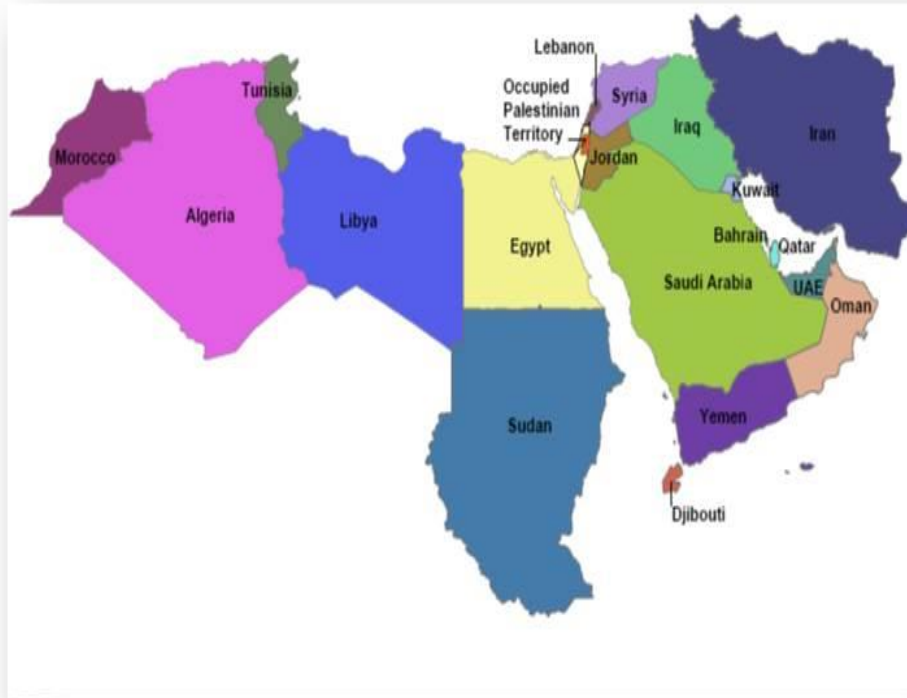| Country	Population (millions)	GDP per capita (USD)
Morocco	33.2	3,316
Tunisia	11.0	4,422
Algeria	39.5	5,406
Libya	6.2	6,671
Egypt	86.7	3,304
Mauritania	3.6	1,403
Sudan	37.3	2,005
Lebanon	4.5	11,092
Jordan	6.7	5,375
Iraq	34.3	6,520
Iran	77.8	5,353
Afghanistan	31.3	654
Kuwait	4.0	43,168
Pakistan	186.2	...
Saudi Arabia	30.8	24,252
Bahrain	1.3	26,701
Qatar	2.2	93,990
Oman	3.7	20,927
United Arab Emirates	9.3	42,944
Yemen	27.5	1,574
Djibouti	0.9	1,692

Sources: IMF Regional Economic Outlook database; and Microsoft Map Land.
Note: The country names and borders on this map do not necessarily reflect the IMF's official position.

GNI per Capita

GNI per capita (PPP basis)

- High Income
- High Middle Income II
- High Middle Income I
- Low Middle Income II
- India ($5,350)
- Low Middle Income I
- Low Income II
- Low Income I
- No data

Data Year: 2013

Introduction

Total population	Life expectancy	GNI per capita
336,632,660	72	$ 3,885

The **Middle East and North Africa- MENA** is a region with rich history, traditions, and geographical, linguistic, ethnic and cultural diversity.
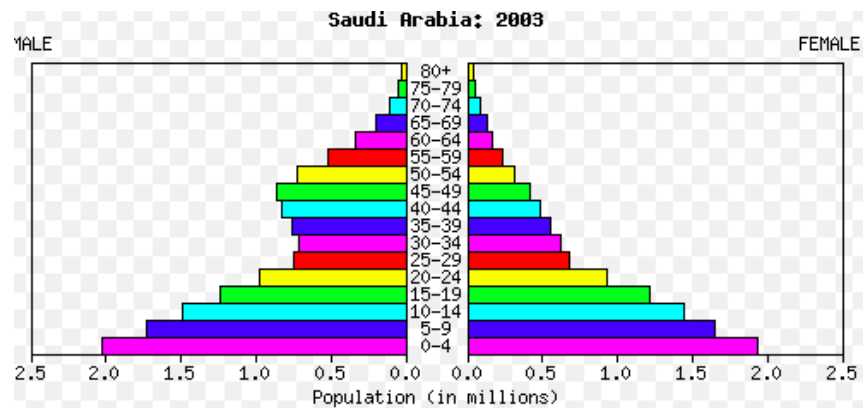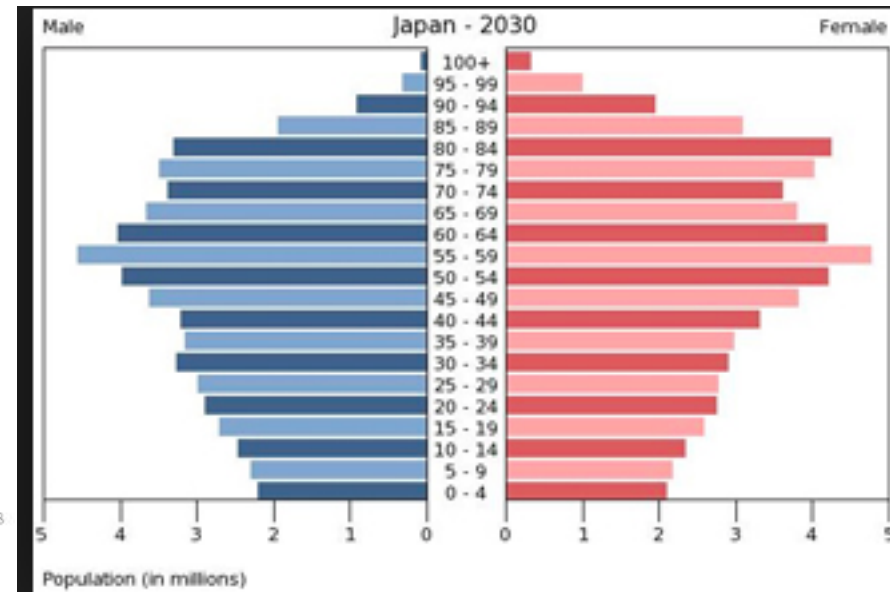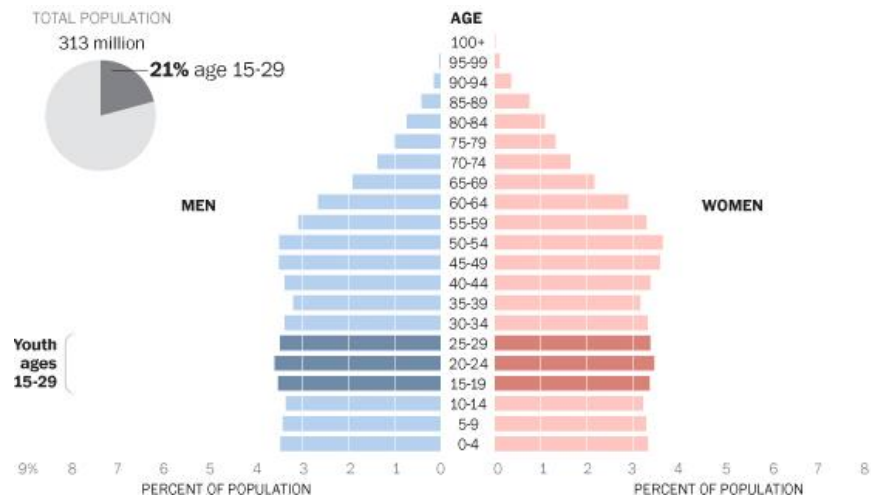
The MENA region had a population of 112 million in 1950. The population is more than 330 million today, about 5-6 percent of the world's population.

Geopolitically and geo-economically, the Middle East is a **region of immense world importance** as it produces about one-third of the world's oil supplies and has 60 percent of the world known petroleum reserves.
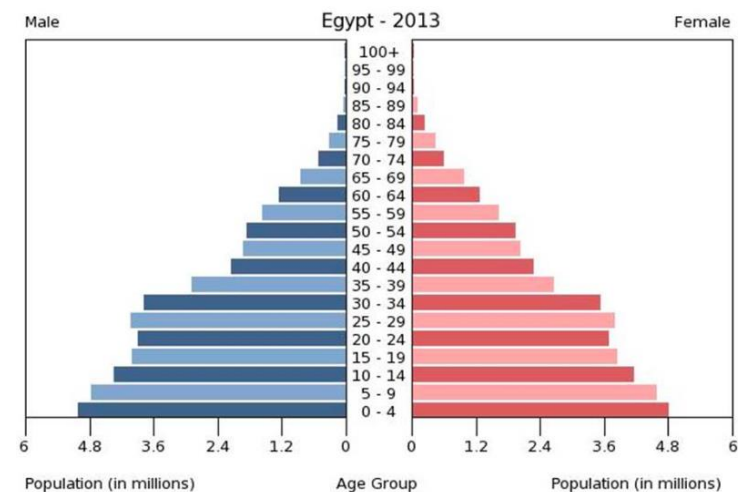
The Middle East -The Rich and The Poor

Group (classified according to WB estimate)	Country	Population (million)	Gross GNI (billion$)	GNI/ Capita (000 $)	GNI/ Capita Rank
Low Income (GNI/Capita = $ 875 or less)	Yemen	21	12.7	600	167
	Sudan	36	23.1	640	164
Low Middle Income (GNI/capita = $ 876 – 3,465)	W. Bank/ Gaza	4	4.5	1,230	143
	Egypt	74	93	1,260	140
	Syria	19	26.3	1,380	136
	Iraq	25	---	---	---
	Jordan	5	13.5	2,460	117
	Iran	68	177.3	2,600	114
High Middle Income (GNI/Capita = $ 3,466 – 10,725)	Lebanon	4	22.6	6,320	75
	Oman	3	23	9,070	62
High Income (GNI/Capita = $ 10,726 or more)	Saudi Arabia	23	289.2	12,510	55
	Bahrain	0.7	10.2	20,758	44
	UAE	5	103.5	23,950	35
	Qatar	0.5	34.7	24,190	34
	Kuwait	3	77.7	30,360	25

TOTAL POPULATION
313 million
21% age 15-29

AGE

MEN

WOMEN

Youth
ages
15-29

9% 8 7 6 5 4 3 2 1 0   0 1 2 3 4 5 6 7 8

PERCENT OF POPULATION

PERCENT OF POPULATION

Male   Japan - 2030   Female

Population (in millions)

Saudi Arabia: 2003

MALE   FEMALE

2.5 2.0 1.5 1.0 0.5 0.0 0.0 0.5 1.0 1.5 2.0 2.5

Population (in millions)

Source: U.S. Census Bureau, International Data Base.

Male   Egypt - 2013   Female

6 4.8 3.6 2.4 1.2 0   0 1.2 2.4 3.6 4.8 6

Population (in millions)   Age Group   Population (in millions)

Demographics

- One of the highest population growth rates:
  - 3.9% in SA
  - 3.5% in Yemen

- Successful family planning programs in some countries: 1.9% now in Egypt

- 40-45% under age of 15
- 6% only above 60

- Increasing life expectancy:
  - 57 in Yemen
  - 69 in Egypt
  - 75 in UAE

- Expat population in the Gulf region: up to 40%:
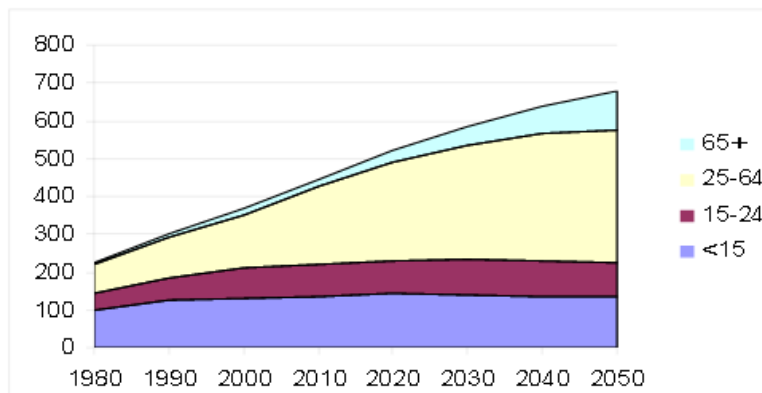 - 25% of population in SA
  - 70% in UAE & Kuwait

Population Growth and the Employment Challenge

**Population Growth in the MENA Regions: 1950, 2007, and 2050**
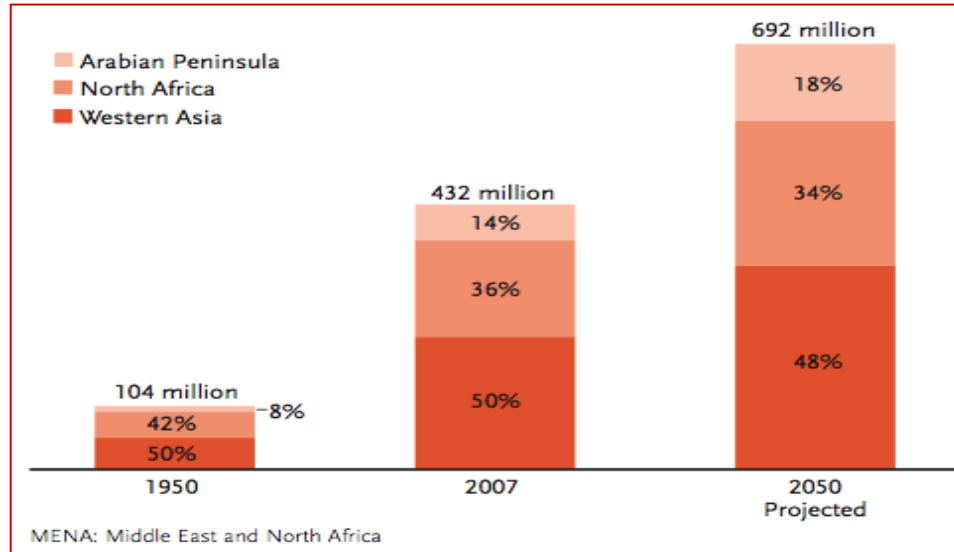
Source: UN Population Division

- Population in the region has **quadruplicated during the last 50 years**, but this trend is expected to slow down. Population growth will not even double itself by 2050.

- Nevertheless, its population growth rate will still be higher than the rest of the world

Population growth projections: the Middle East compared with the world and Europe, 1990-2030. Index 1990 =

Figure 1. Population Growth in MENA by Age Group, 1980 – 2050 (millions)
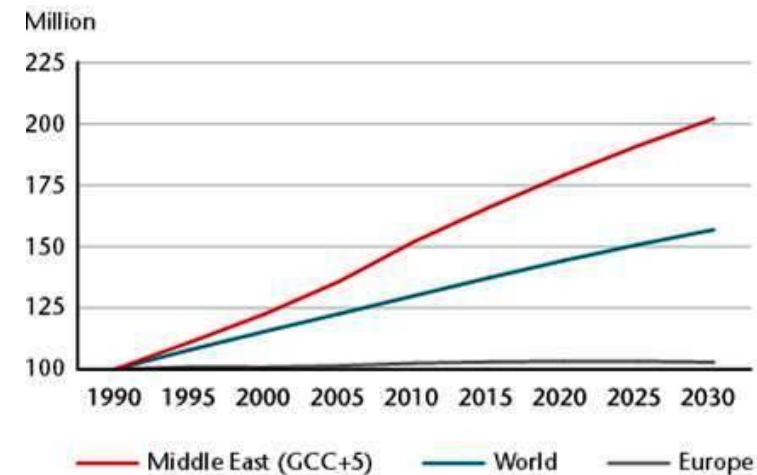
Source: United Nations Population Division

Cardiovascular Diseases: Why Bother?

- The leading cause of death globally: more die from CVD than from any other cause

- ~ 17 million people died from CVD in 2008, representing 30% of all deaths

- Over 80% of CVD deaths occur in low- and middle-income countries

- Less than 5% of global research output in clinical medicine comes from the Middle East*

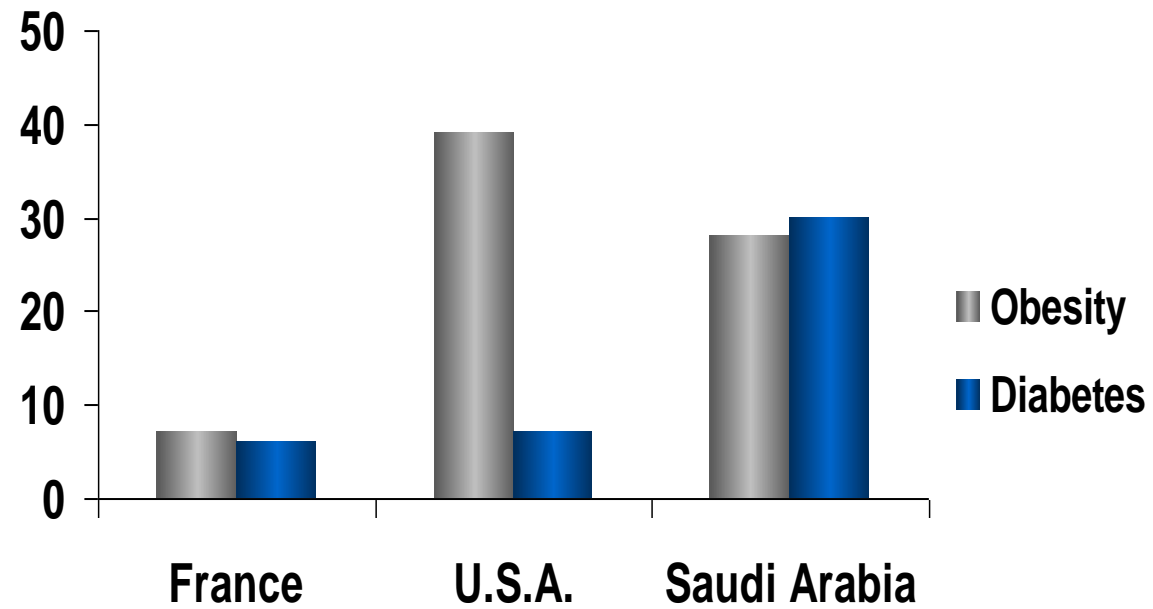* Global Research Report: Middle East. Thomson Reuters 2011

Cardiovascular Disease in the Middle East
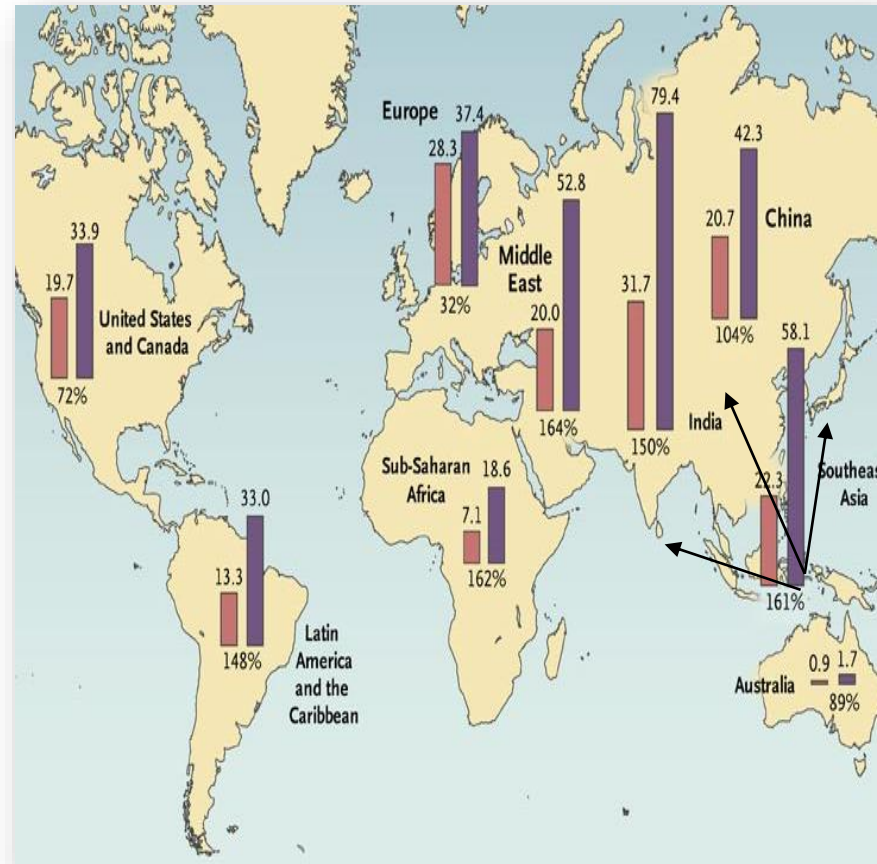## *The 10 things we know!*

---

1. It is a BIG PROBLEM

• *WHO expects the number of diabetic patients in Saudi Arabia to grow by 283% between 2000 and 2030*

Obesity and Diabetes Prevalence, Saudi Arabia and Other Leading Markets
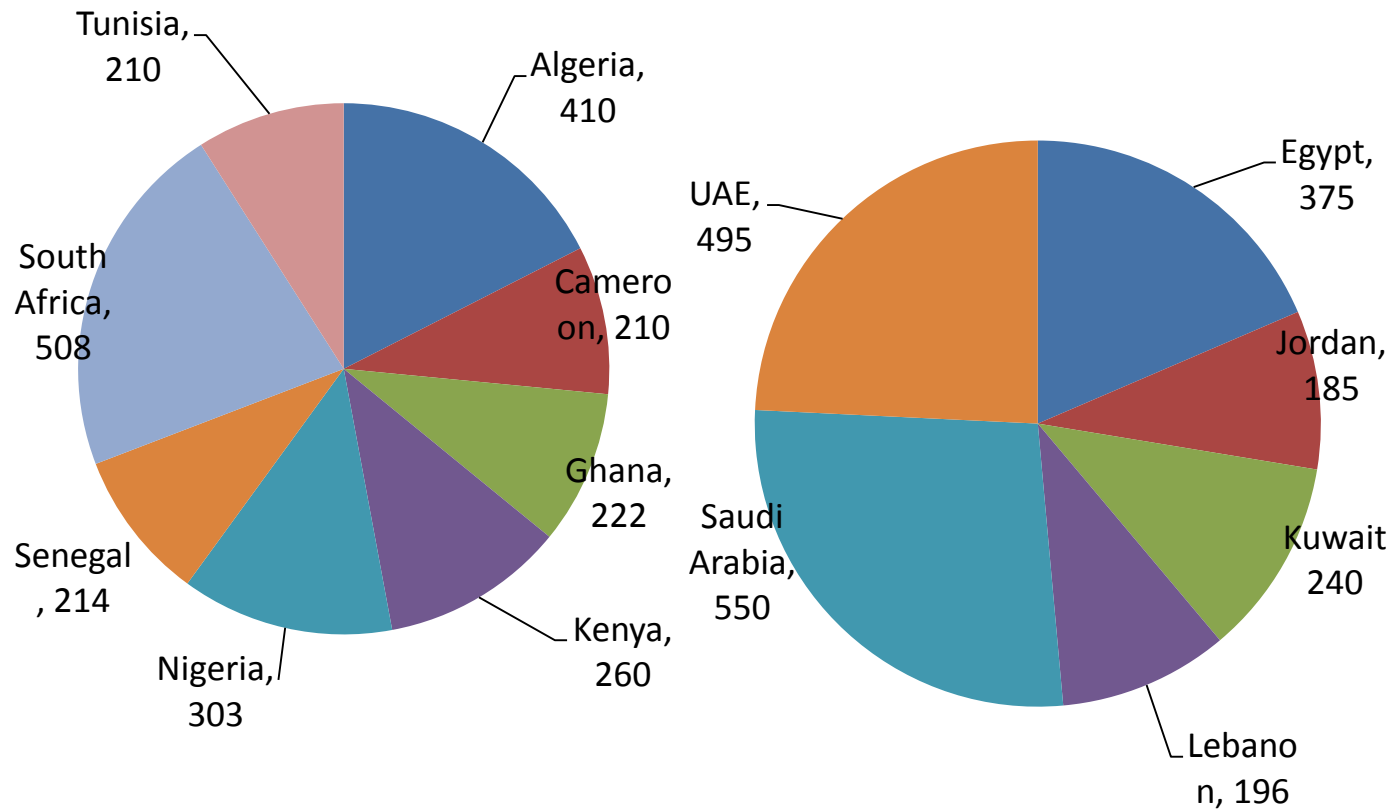
# Global Projections for the Diabetes Epidemic: 2003-2025

PREVALENCE OF CARDIOVASCULAR RISK FACTORS IN AFRICA AND THE MIDDLE EAST: THE ACE STUDY

- Total Enrolled = **4,378** (Africa = 2,337, Middle East = 2,041)
- Rural communities ~ 1/3 (31%)
- Female ~ ½ (52%)
- Mean Age **46**
- Nearly ½ younger than 45 years, and 90% younger than 65 years

The vast majority of subjects (**91%**) had at least one of the six
modifiable cardiovascular risk factors we measured,
and **52%** had ≥ 3 risk factos
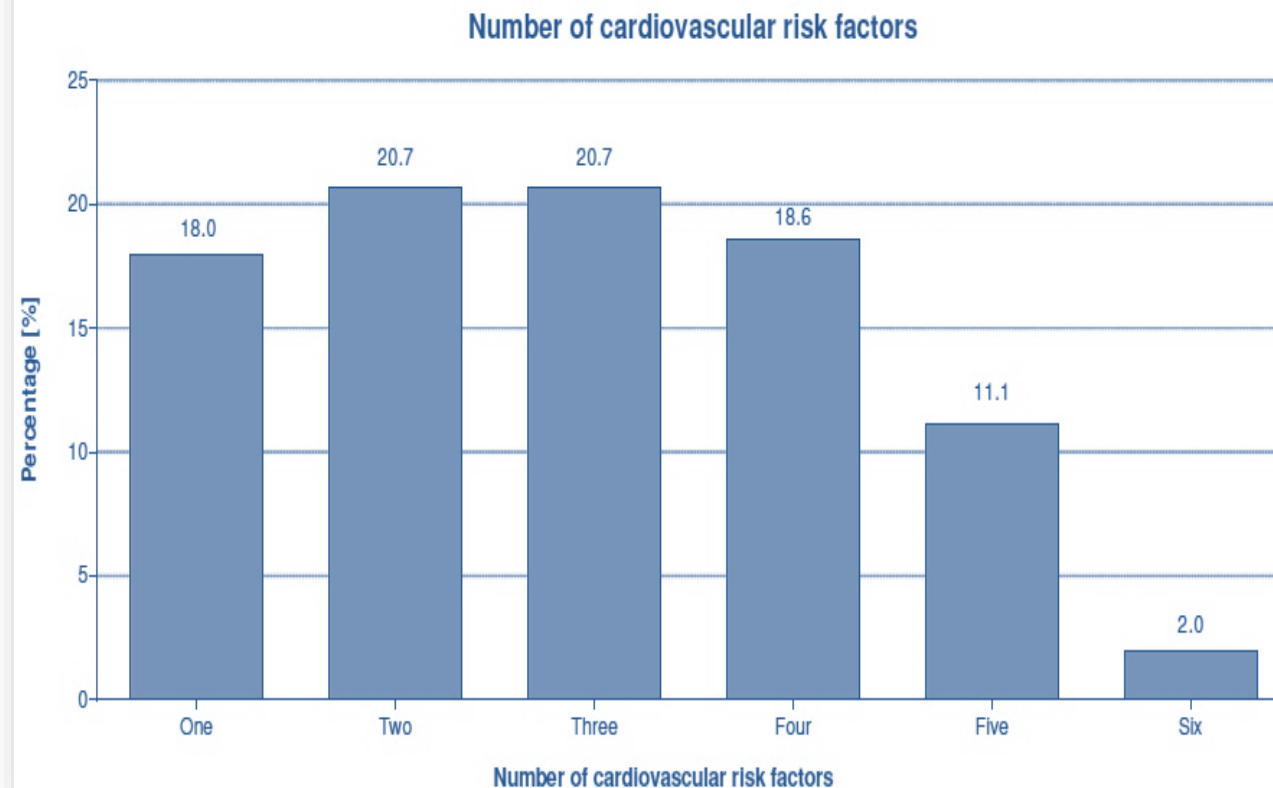
* Dyslipidemia, hypertension, diabetes, obesity (BMI ≥30 kg/m^2), abdominal obesity and current smoking.
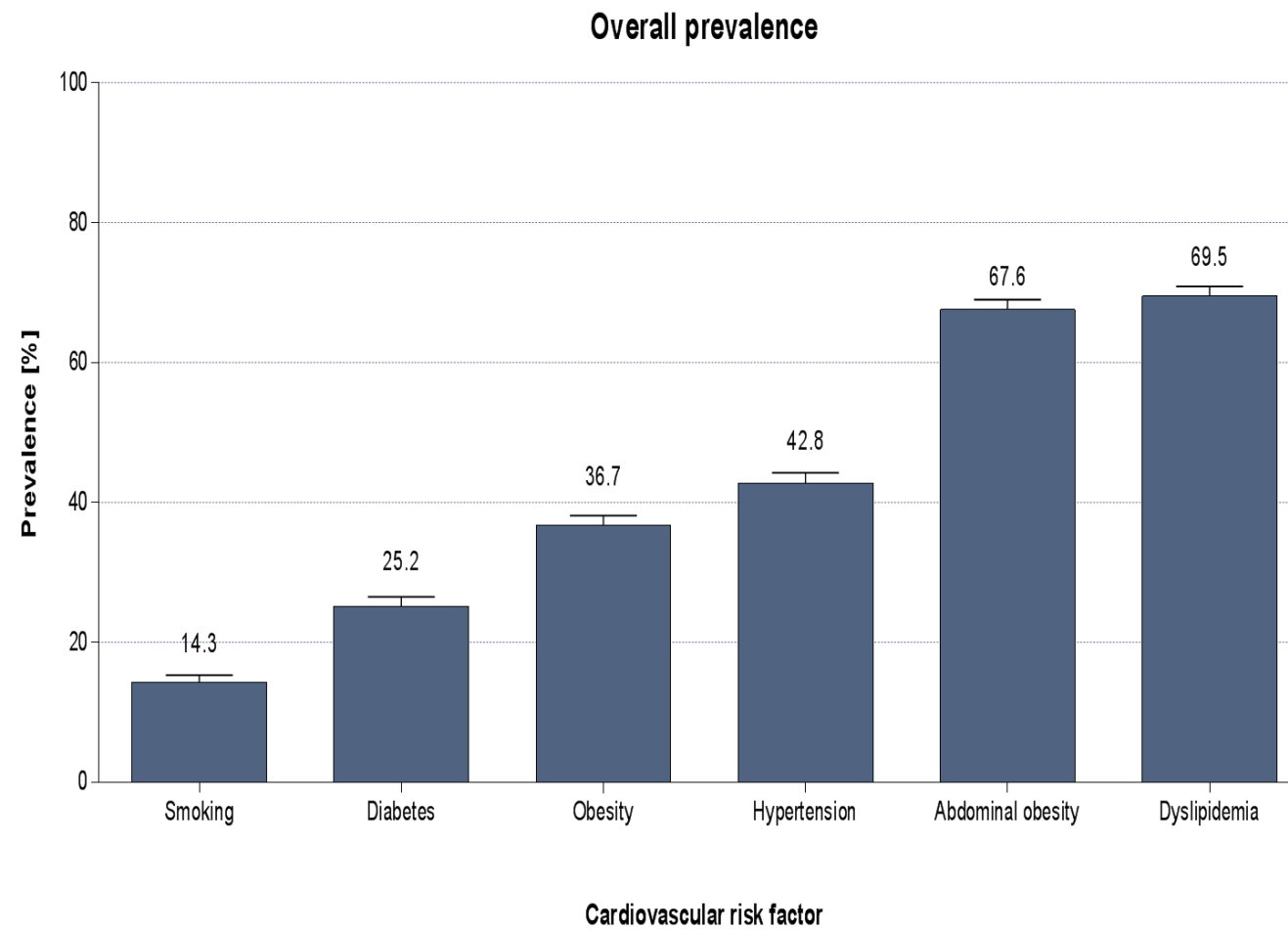
- The prevalence of dyslipidemia exceeded 50% in all countries
- For ~ every two subjects without a prior diagnosis of dyslipidemia, screening at study encounter identified one new dyslipidemia diagnosis (2,131 patients; 48%).

Dyslipidemia
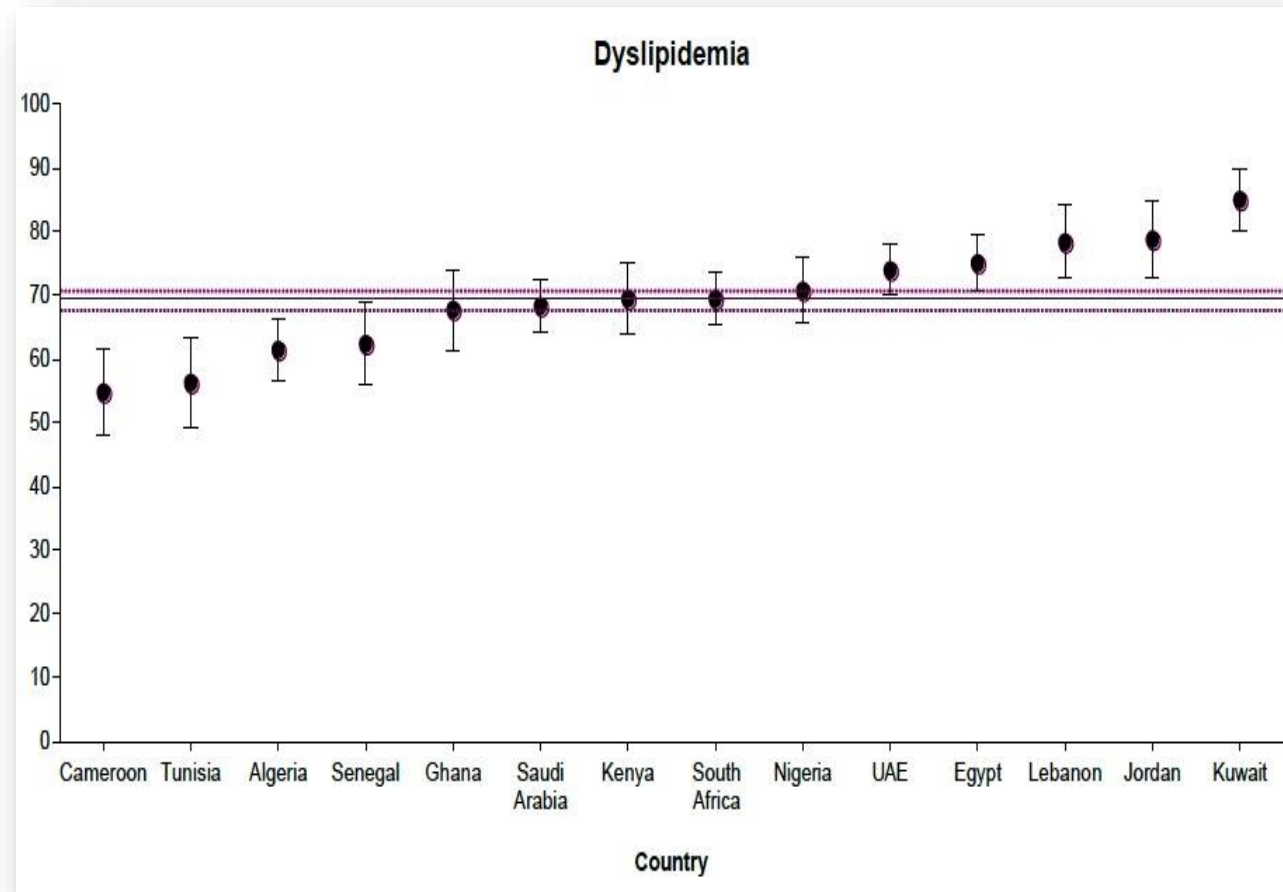
- The prevalence of hypertension at least 25% in all countries
- For ~ every 10 subjects without a prior diagnosis of hypertension, screening at study encounter identified one subject with an elevated blood pressure (434 patients; 10%).
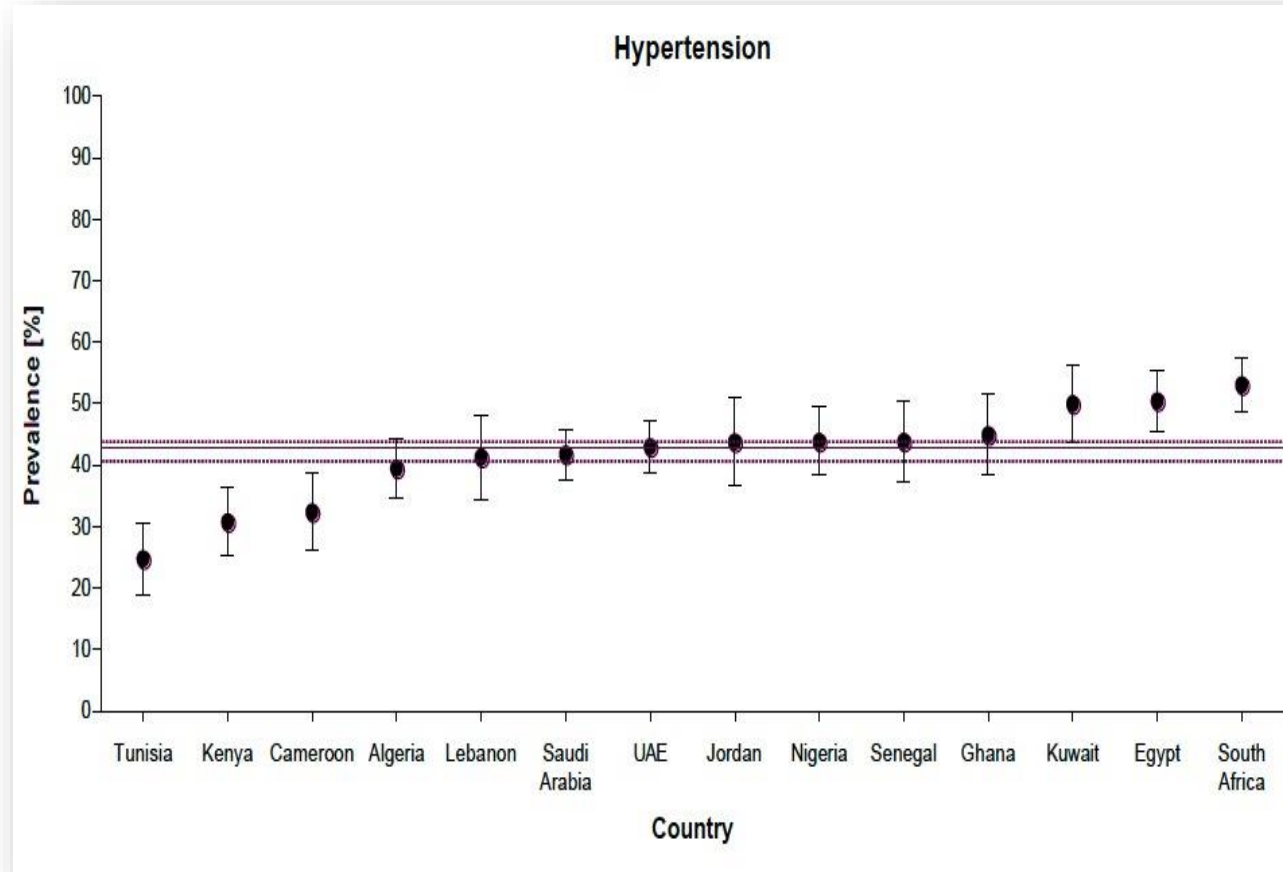
- The median BMI was 28 [25, 32] kg/m^2
- One subject with BMI ≥30 kg/m^2 for approximately every three screened (1,606 patients; 37%).

Obesity

BMI ≥30 kg/m^2
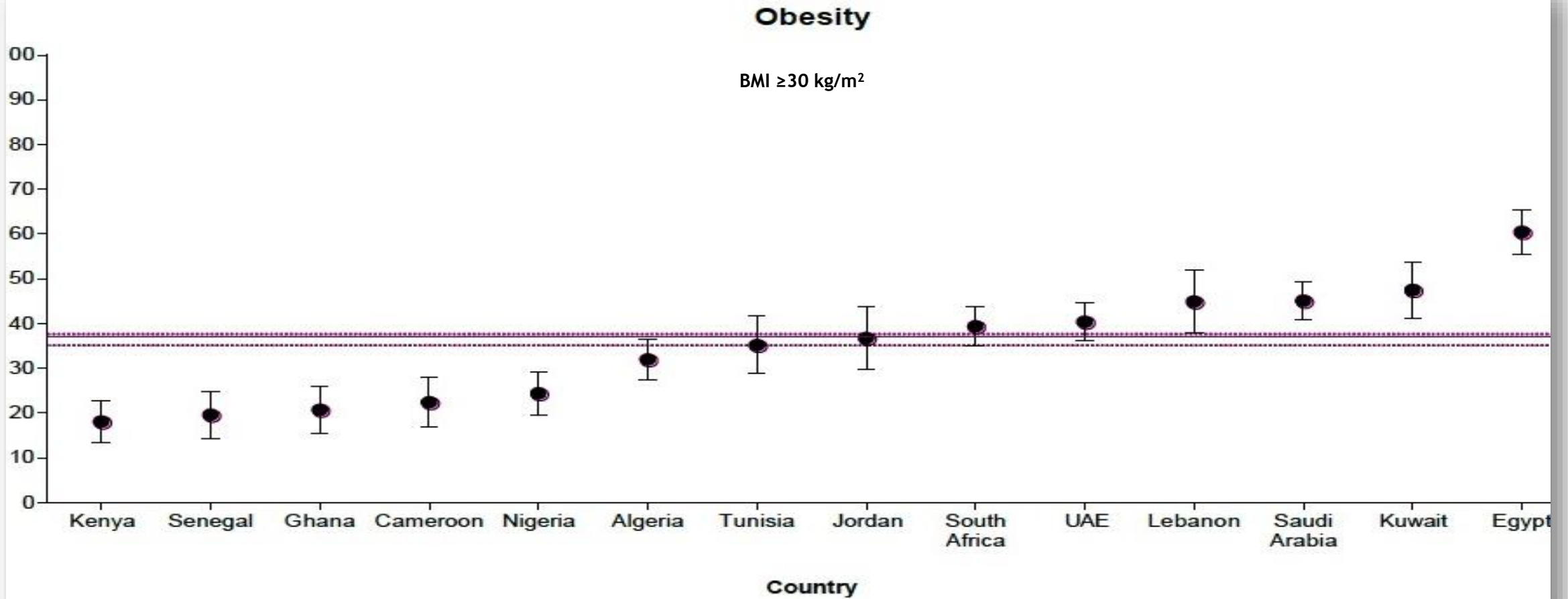
- Median waist circumference was 94 [86, 103.1] cm in men and 94 [84, 104] cm in women.
- Prevalence of obesity as defined by waist circumference was ~ twice as common compared to when defined by BMI ≥30 mg/m^2
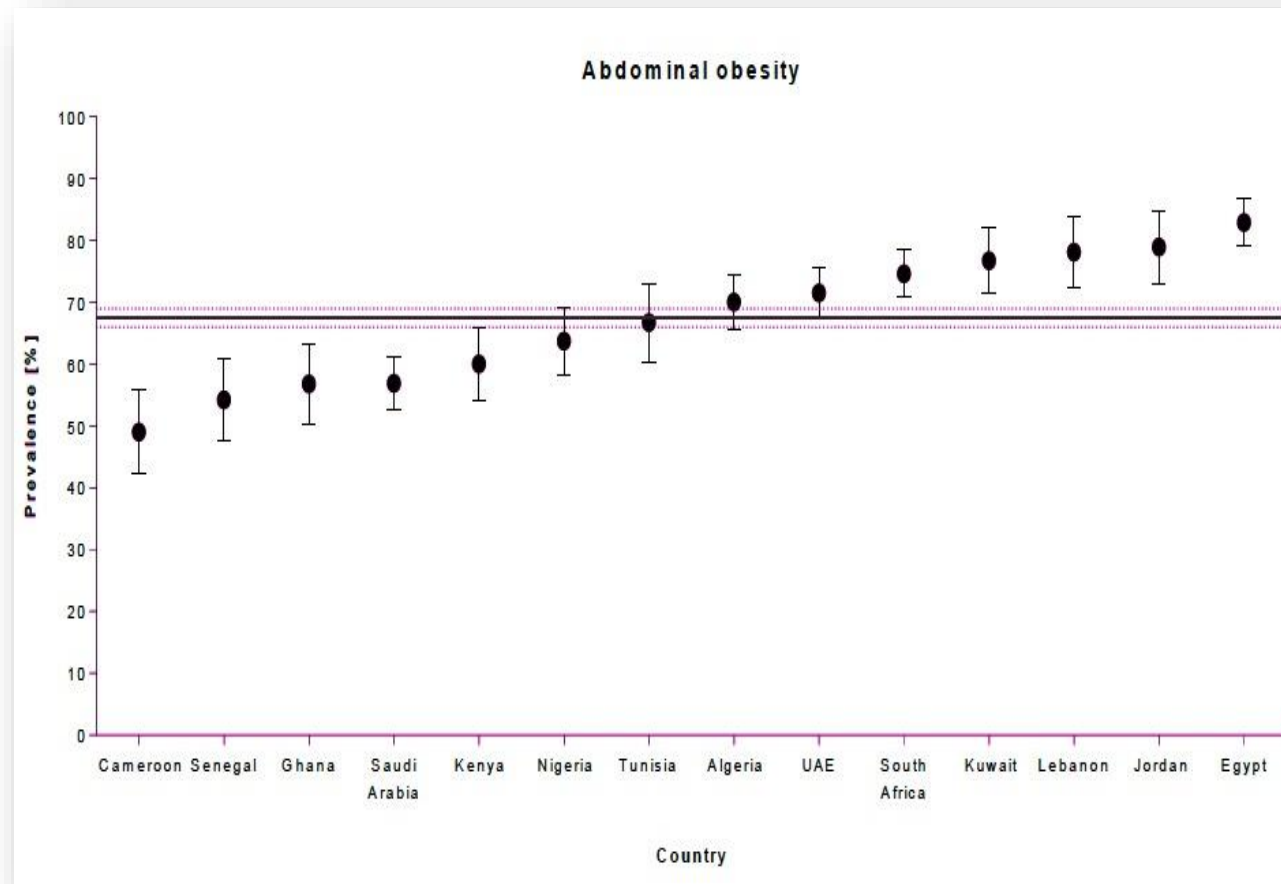
- ~ 25% had DM (19% with a pre-existing diagnosis and 5% diagnosed at the time of study entry based on a single fasting serum glucose of ≥7 mmol/L).
- For every 20 subjects without a prior diagnosis of diabetes mellitus, screening at study encounter uncovered one subject with a new diagnosis of diabetes (211 patients; 5%).

Diabetes
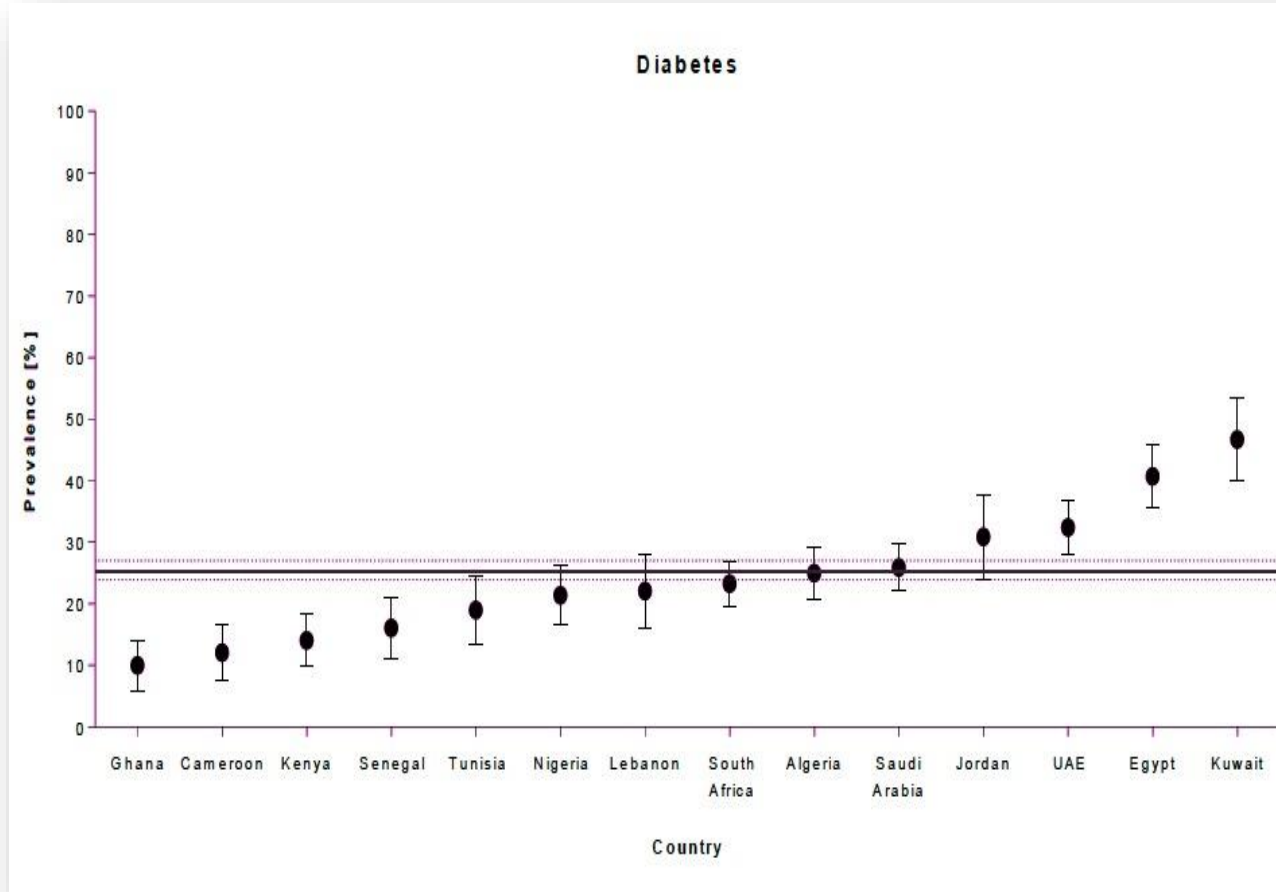
- The prevalence of smoking was 25% (14% current smokers, and 11% past smokers).
- Among current smokers, the majority (88%) reported smoking cigarettes and 1.2% reported pipe smoking (shisha).
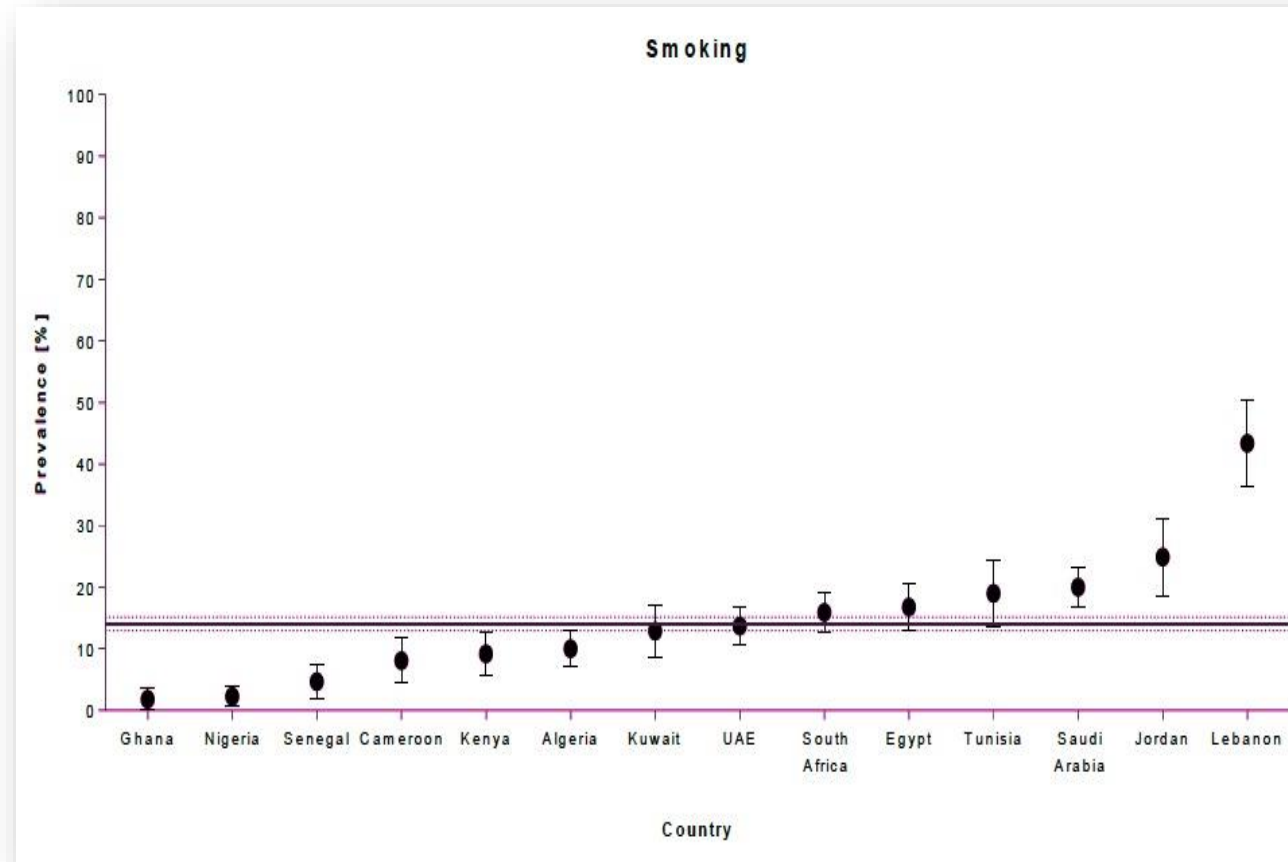
Cardiovascular Disease in the ME
The 10 things we know

1. It is a BIG PROBLEM

2. They are YOUNG

A Heart Attack Strikes Early

Typical ACS patient in the Gulf is ~ 10 years younger than her Western counterpart

Gulf RACE

75 <
8%

65-74
18%

55 >
47%

55-64
27%

GRACE

75 <
27%

55 >
23%

65-74
24%

55-64
26%
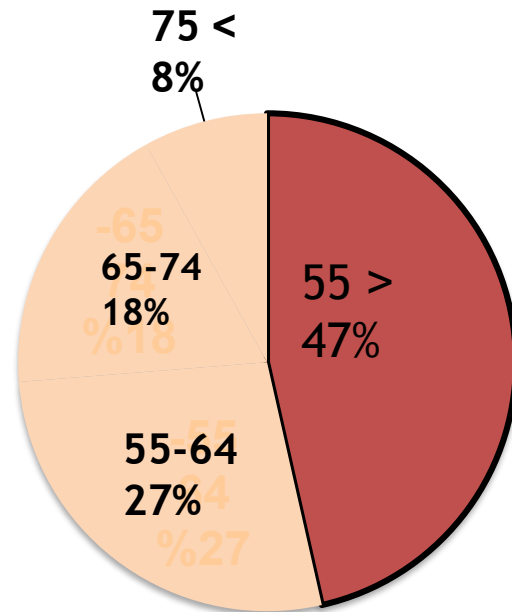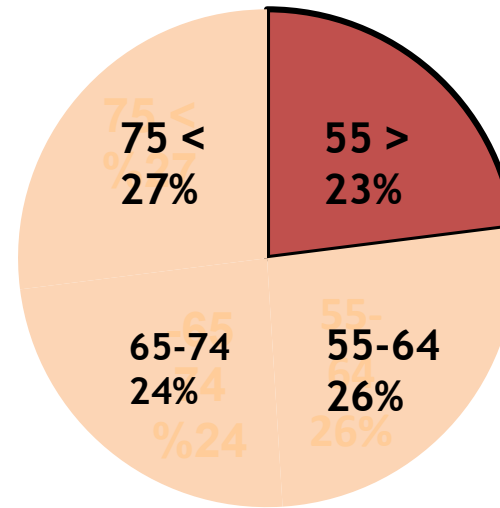
~ half of ACS patients in the Gulf are < 55 years old compared to ~ one quarter of ACS patients in the West

Awad H, Zubaid M, Alsheikh-Ali AA, et. al., American Journal of Cardiology 2011

Younger Age across the CVD Spectrum

Mean or Median Age in Years in Disease-based Registries

	Gulf	North America & Europe
ACS (Gulf RACE)	56	65
Atrial Fibrillation (Gulf SAFE)	57	67
Heart Failure (Gulf CARE)	59	70-73
ICD (Gulf ICD)	58	68

INTER-HEART   MIDDLE EAST

The Middle East INTER-HEART Investigators

Coordinated by the Population Health Research Institute,   McMaster University, Canada

Dr. Afzal Yusufali. MD, FRCP (Glasg),

Consultant Cardiologist,

Dubai Heart Centre.

Dubai Health Authority

LIST OF COUNTRIES BY REGION

- **AFRICA-** Botswana, Cameroon, South Africa, Zimbabwe.
- **ASIA -** Bangladesh, China, Hong Kong, India, Japan, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand.

- **EUROPE -**Belgium, Croatia, Czech Republic, Germany, Greece, Hungary, Italy, Ireland, Netherlands, Poland, Portugal, Russia, Spain, Sweden, Switzerland, UK.
- **MIDDLE EAST-** Bahrain, Egypt, Iran, Israel, Kuwait, Lebanon, Qatar, Sultanate of Oman, Syria, U.A.E.
- **NORTH AMERICA -**Canada, USA.
- **SOUTH AMERICA -**Argentina, Brazil, Chile, Colombia, Guatemala, Mexico, Peru, Trinidad/Tobago.

- **AUSTRALIA/NEW ZEALAND**

Distribution of case/control sample by region

- Middle East 13%
- Africa 5%
- S.Asia 15%
- SE.Asia/ Japan 8%
- Australia/NZ 4%
- S.America 12%
- N.America 2%
- China/HK 22%
- E.Europe 14%
- W.Europe 5%
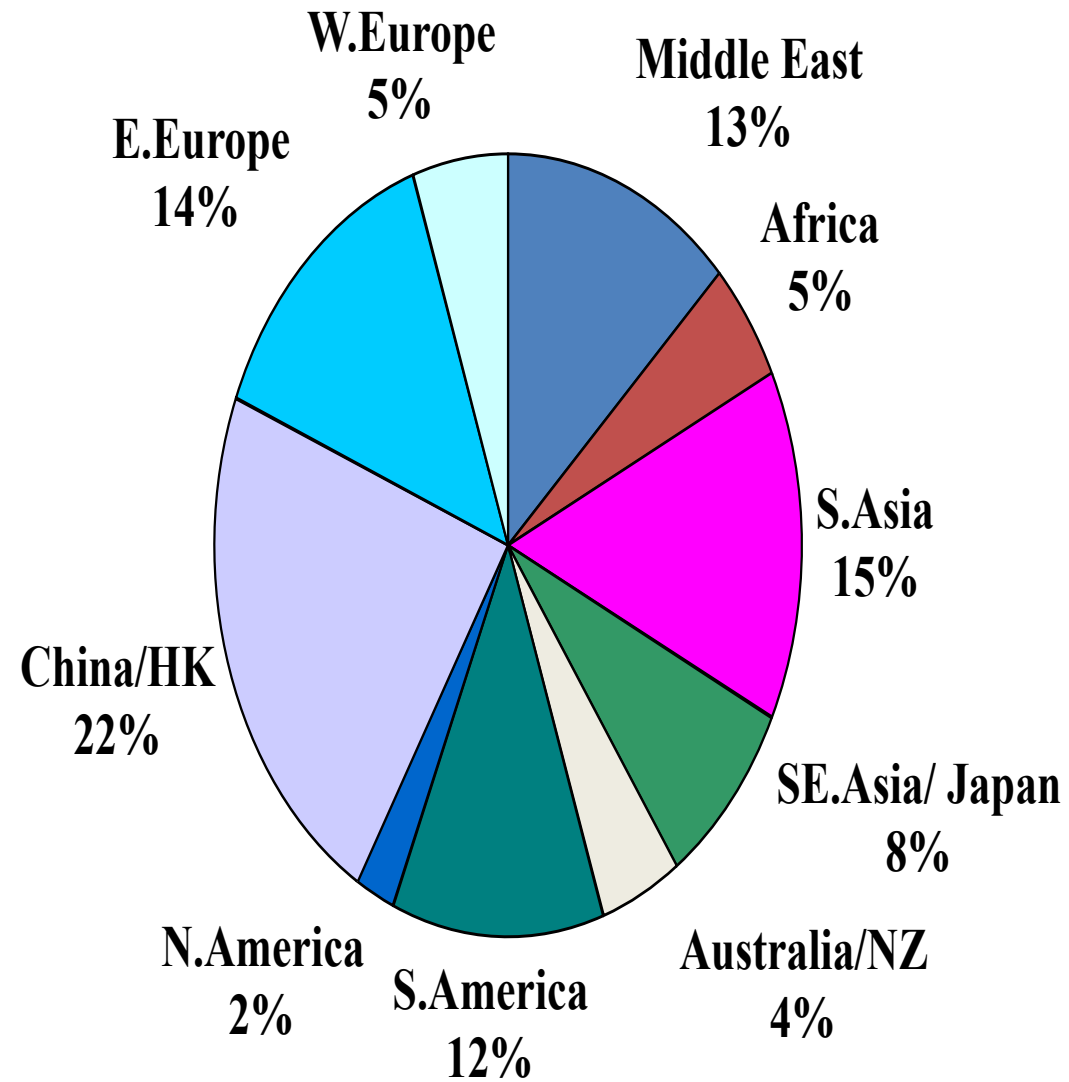
12536 cases and 14577 controls worldwide

1364 cases and 1525 controls in Middle East

Age distribution for cases by region INTERHEART Study

Region	Mean age	<40yrs %	>70yrs%
Overall	58.1	6	17.1
W. Europe	62.6	2.7	29.2
E.Europe	61.2	2.9	24.7
Mid East	51.7	11.1	4.2
Africa	54.3	9.8	7.8
S. Asia	53.9	8.9	7.0
China/HK	61.1	4.5	22.1
SE Asia	56.7	7.0	12.1
ANZ	59.7	5.2	22.1
S America	60.4	3.5	23.0
N America	60.0	4.0	25.3

Age distribution for cases by ethnicity
INTERHEART Study

Ethnicity	Mean age	<40 yrs (%)	>70yrs (%)
Overall	58.1	6.0	17.1
European	61.4	3.2	25.9
Chinese	61	4.4	21.7
S Asians	52.8	10.6	6.1
Other Asians	56.7	7.0	12.2
Arabs	53	9.0	5.1
Latin Americans	59.7	3.7	21.3
Black Africans	53.8	14.0	11.5
Coloured Africans	54.6	9.0	7.1

Risk of AMI associated with IHD Risk Factors in Middle East Population

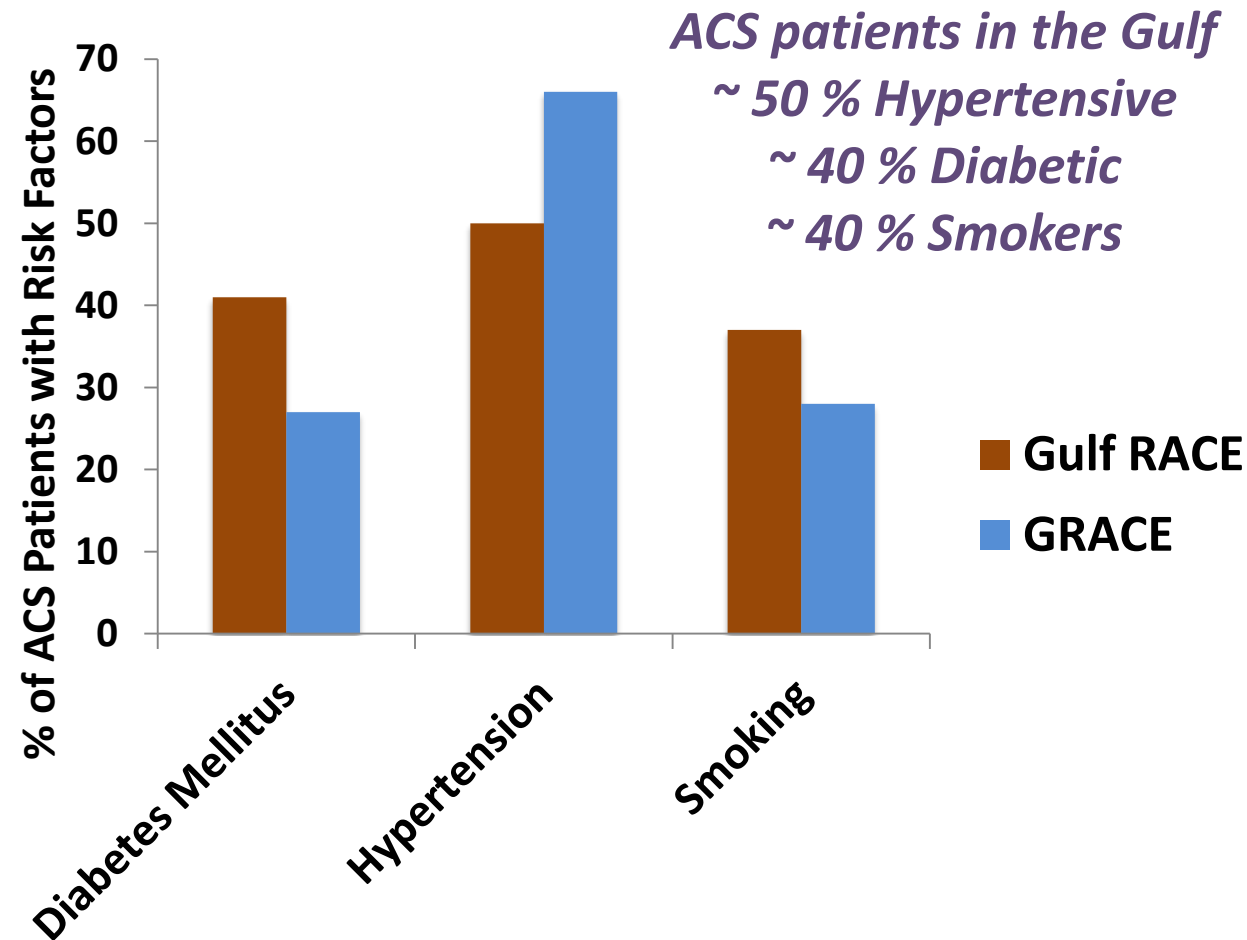| Risk Factors	Odds Ratio (95% CI)	P value
Smoking	3.63 (3.03-4.35)	<.0001
ApoB/ApoA1	3.43 (2.80-4.21)	<.0001
Diabetes	3.42 (2.71-4.30)	<.0001
Abd. obesity	2.12 (1.74-2.57)	<.0001
Depression	1.97 (1.56-2.49)	<.0001
Hypertension	1.89 (1.54-2.33)	<.0001
Veg and Fruits	0.71 (0.57-0.88)	0.0021
Exercise	0.83 (0.61-1.12)	0.2223
Alcohol Intake	0.98 (0.70-1.37)	0.9078

Interesting findings

- High BMI (27.4) was associated with high WHR (0.92) making women in the Middle East the most obese group of women in the entire INTERHEART study.

- Exercise (7.89%) had the lowest prevalence.

- alcohol (5.41%) had the lowest prevalence.

Cardiovascular Disease in the ME

The 10 things we know

---

1. It is a BIG PROBLEM
2. They are YOUNGER

3. They are SICKER

A Large Burden of Risk

ACS patients in the Gulf
~ 50 % Hypertensive
~ 40 % Diabetic
~ 40 % Smokers

Legend: Gulf RACE, GRACE

Y-axis: % of ACS Patients with Risk Factors (0–70)

X-axis: Diabetes Mellitus, Hypertension, Smoking

Awad H, Zubaid M, Alsheikh-Ali AA, et. al., American Journal of Cardiology 2011

A Large Burden of Adverse Outcomes

ACS patients in the Gulf
~ twice as likely to have heart failure
~ 40 % more cardiogenic shock

% In-Hospital Outcomes with ACS

- Gulf RACE
- GRACE

Heart Failure — Cardiogenic Shock — Death

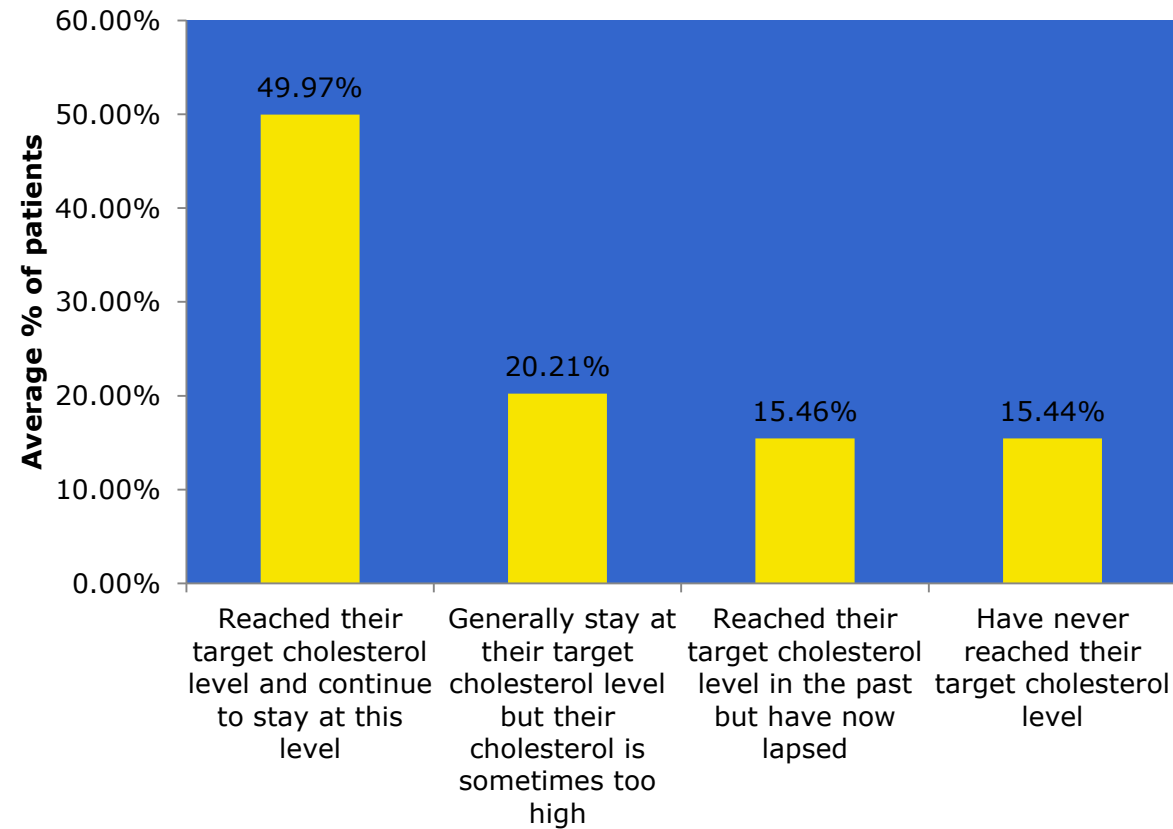*Awad H, Zubaid M, Alsheikh-Ali AA, et. al., American Journal of Cardiology 2011*
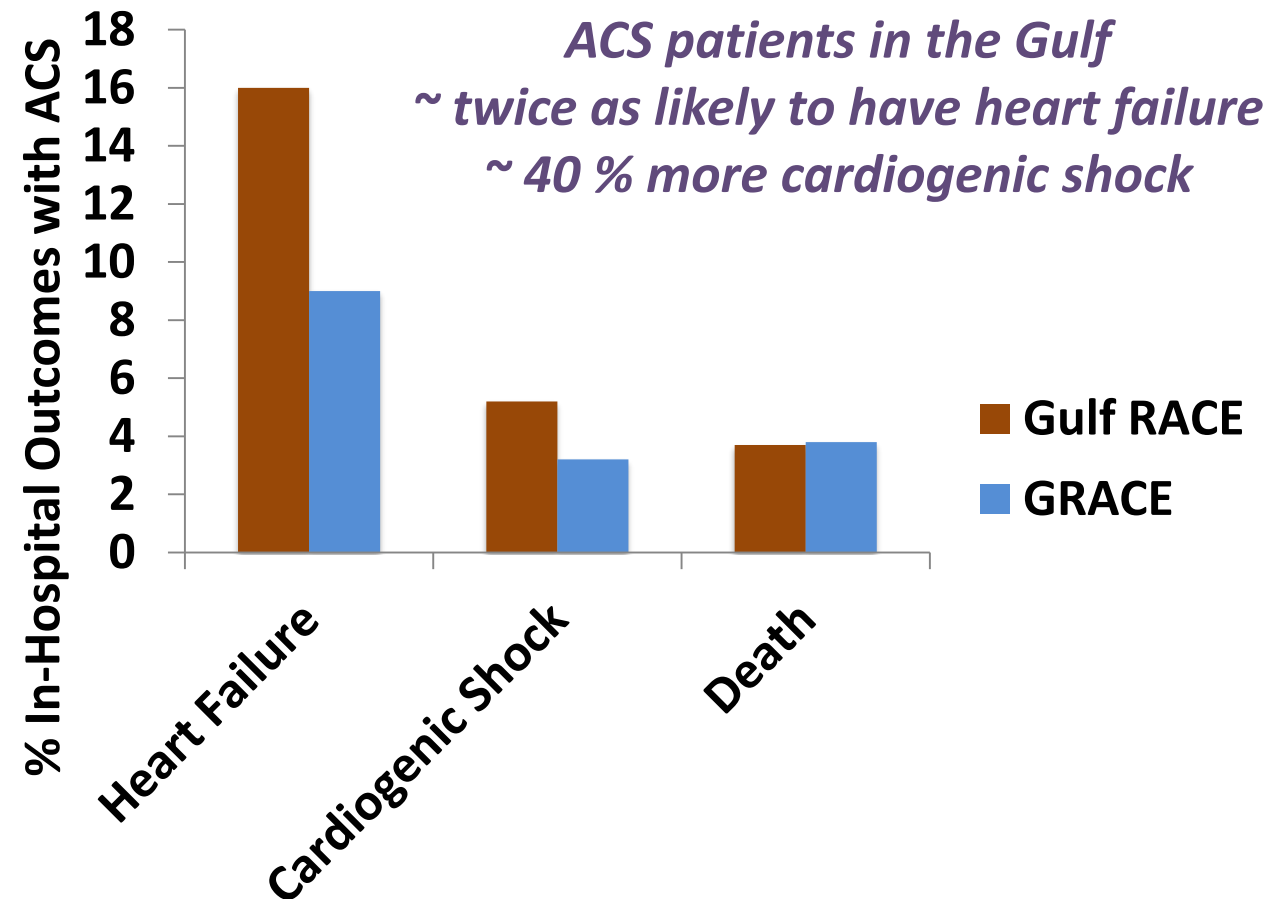
Centralized **P**an-Middle East Survey on t**he u**ndertreatment of hyperchole**S**terolemia

- Determining the number and percentage of subjects achieving the guidelines.

Questions to Patients

(% Positive responses)

Q1	Have you ever heard or been told about bad cholesterol, otherwise known as LDL-C?	**38.09%**
Q2	Have you ever heard or been told about good cholesterol, otherwise known as HDL-C?	**39.87%**
Q3	When you were first told by your doctor that you had high cholesterol did your doctor tell you what your cholesterol level was?	**43.82%**
Q4	Did your doctor give you a target cholesterol level to aim for?	**37.90%**

Questions to Patients

Q15-Target cholesterol level (TCL) reached ?
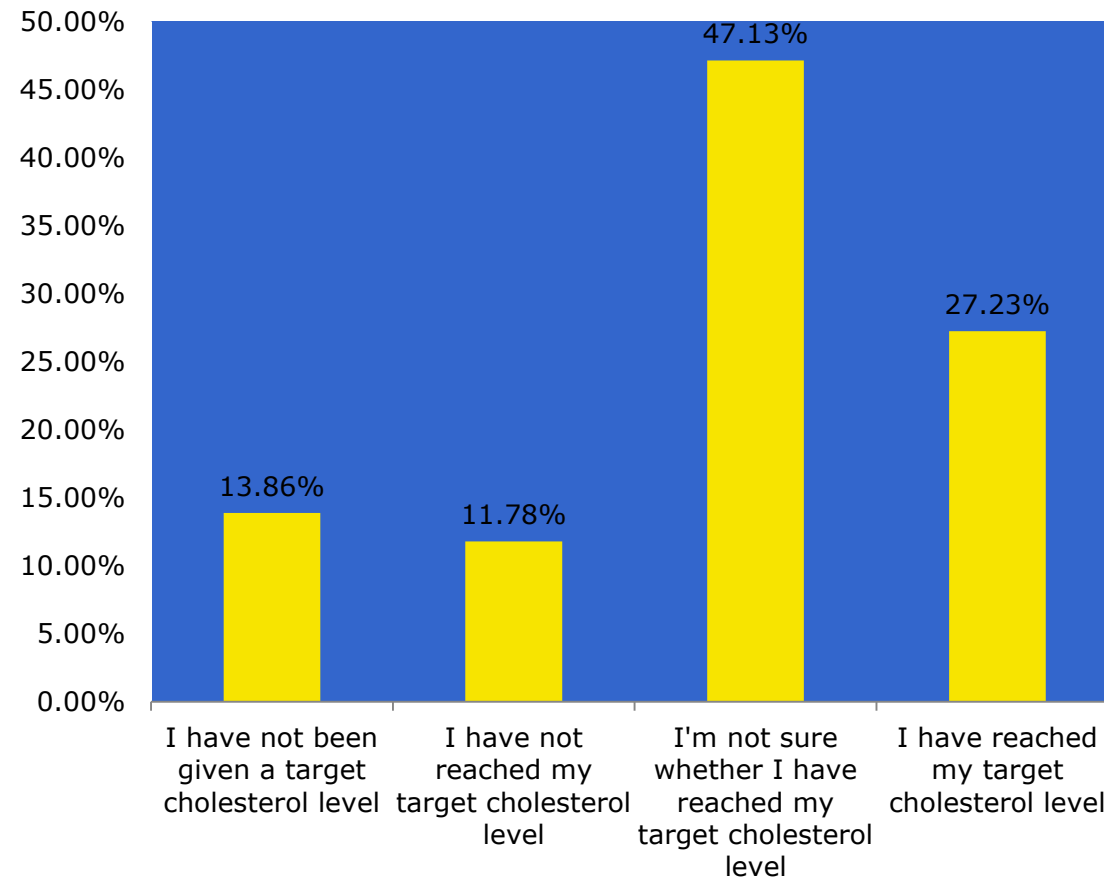
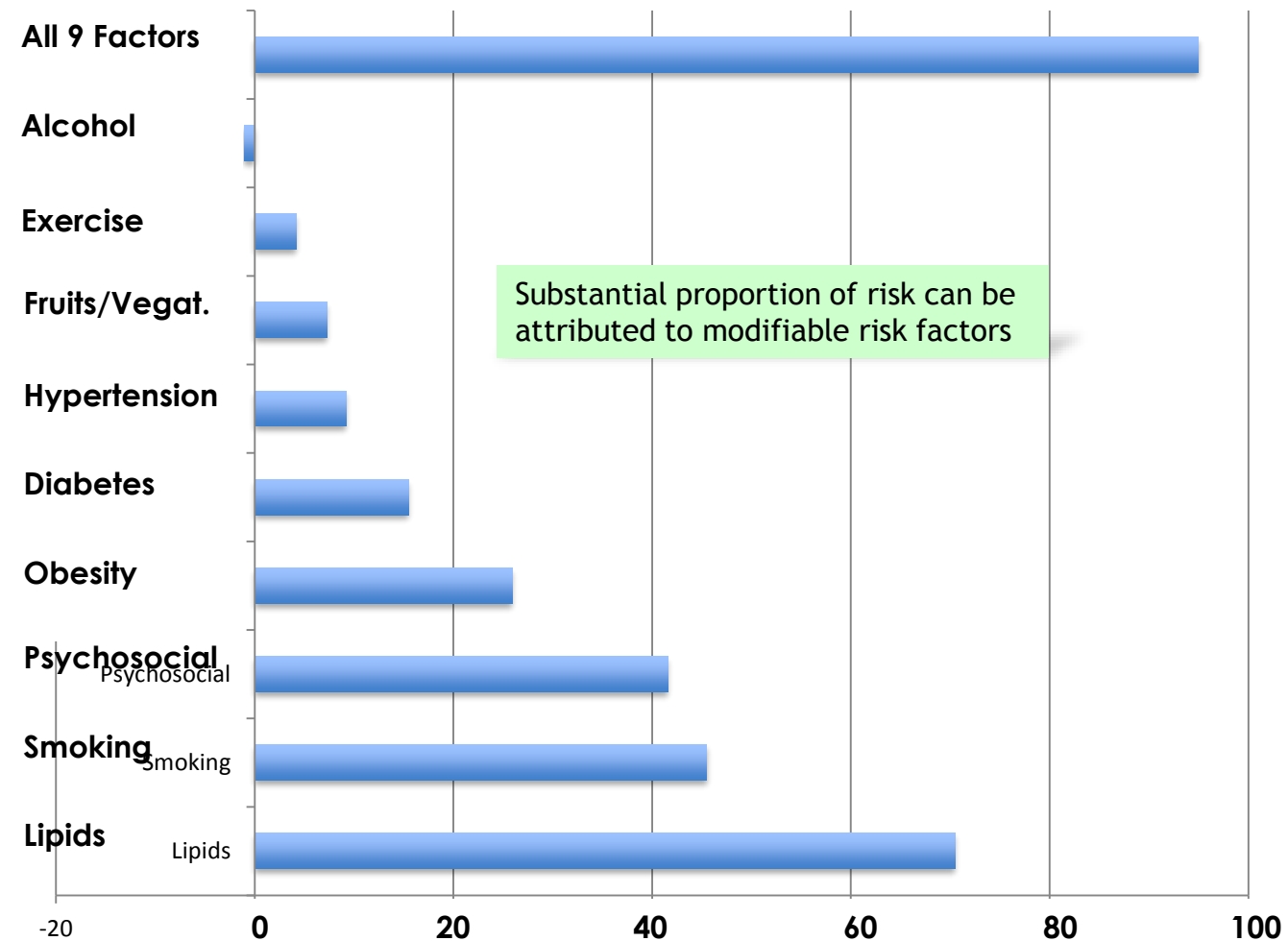# Cardiovascular Disease in the ME

The 10 things we know

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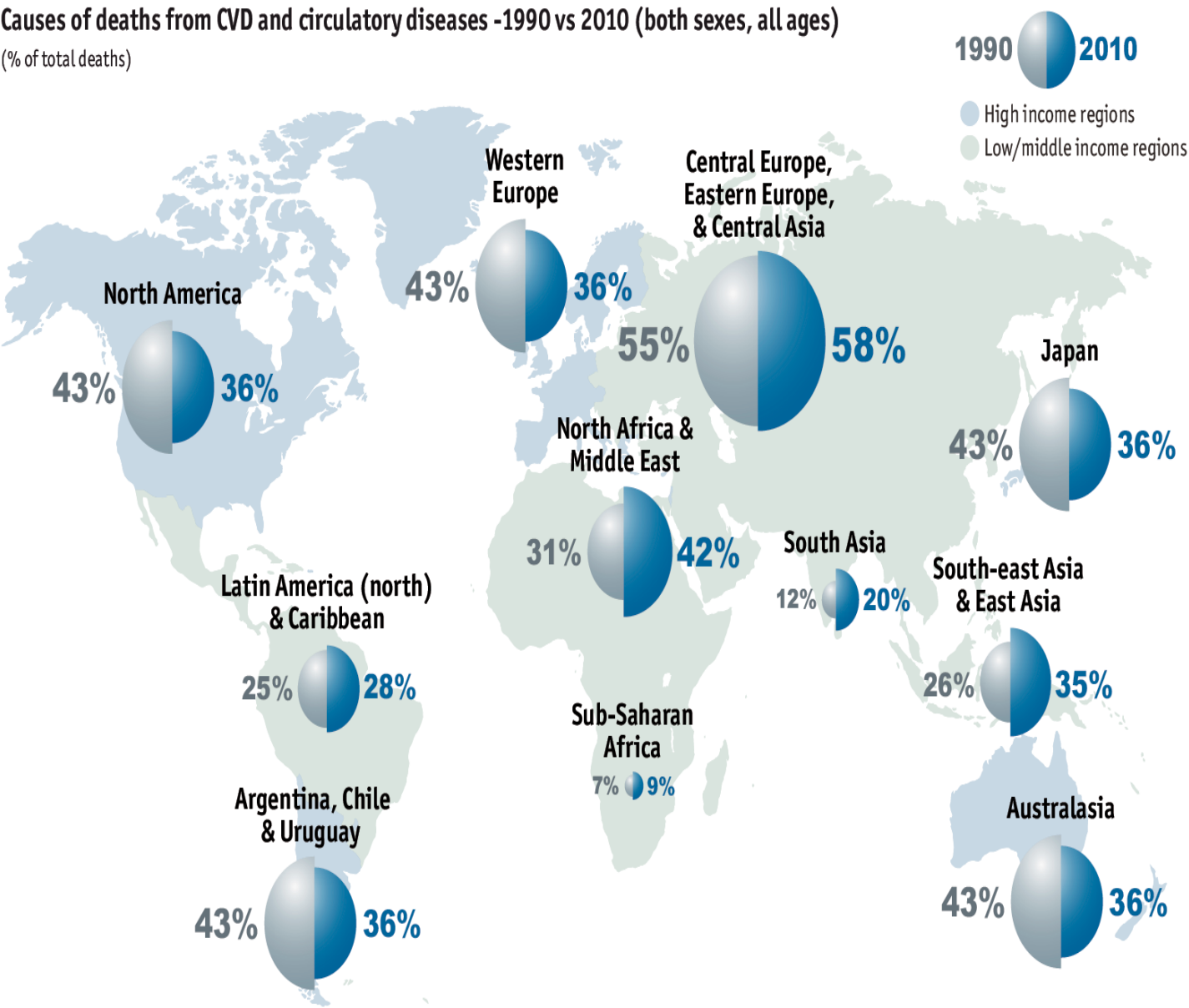2. They are YOUNGER

3. They are SICKER

4. It is here to STAY

Risk Factors for MI in the Middle East

Yusuf Lancet 2004

Globalization of Cardiovascular Diseases

Causes of deaths from CVD and circulatory diseases -1990 vs 2010 (both sexes, all ages)

(% of total deaths)

1990 · 2010

- High income regions
- Low/middle income regions

North America
43% · 36%

Western Europe
43% · 36%

Central Europe, Eastern Europe, & Central Asia
55% · 58%

Japan
43% · 36%

North Africa & Middle East
31% · 42%

South Asia
12% · 20%

South-east Asia & East Asia
26% · 35%

Latin America (north) & Caribbean
25% · 28%

Sub-Saharan Africa
7% · 9%

Argentina, Chile & Uruguay
43% · 36%

Australasia
43% · 36%

Prevalence estimates of diabetes mellitus (20-79 years) Middle East/North Africa

Legend:
- < 5
- 5-8
- 8-10
- 10-12
- 12-15
- > 15
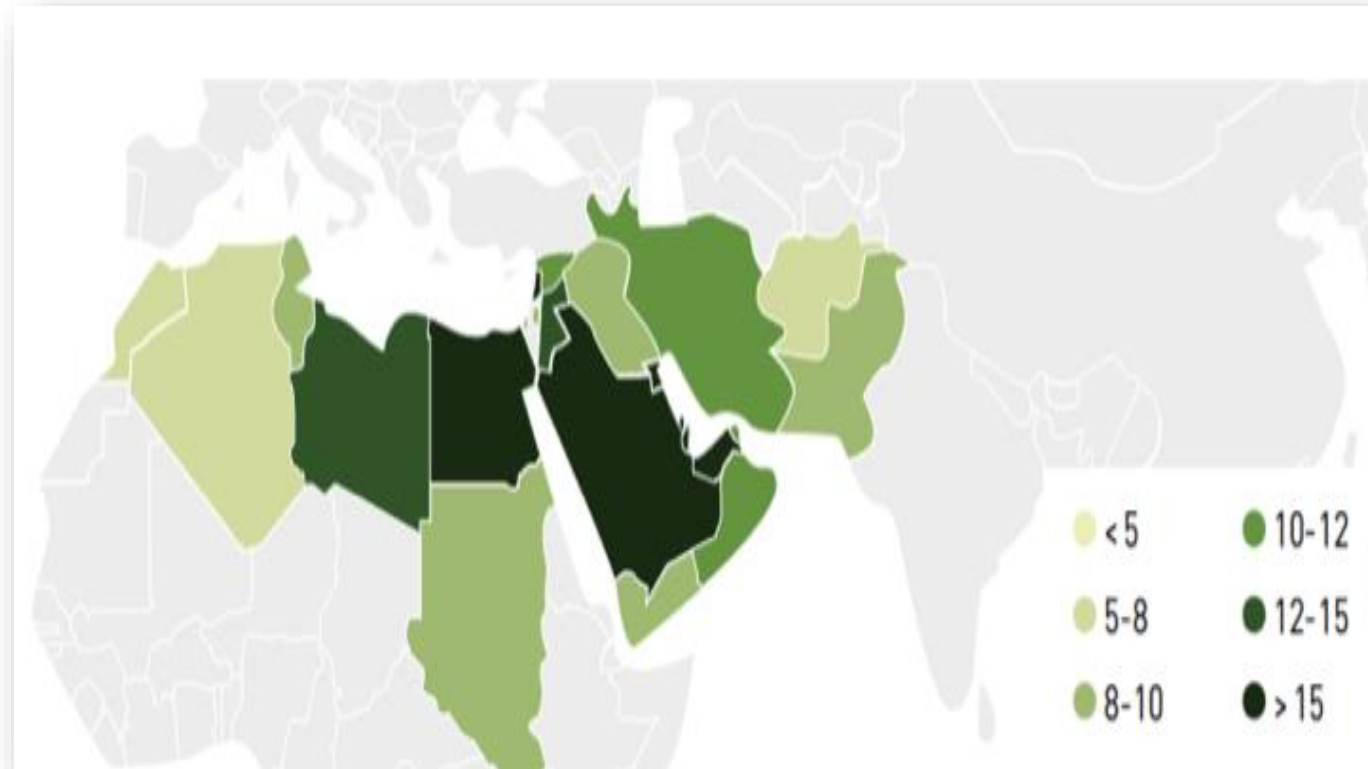
6 out of the top 10 countries for prevalence (%) of diabetes
are in the Middle East and North Africa Region –
Kuwait, Lebanon, Qatar, Saudi Arabia, Bahrain
and the United Arab Emirates.

IDF Diabetes Atlas, 5th Edition

Cardiovascular Disease in the ME

The 10 things we know
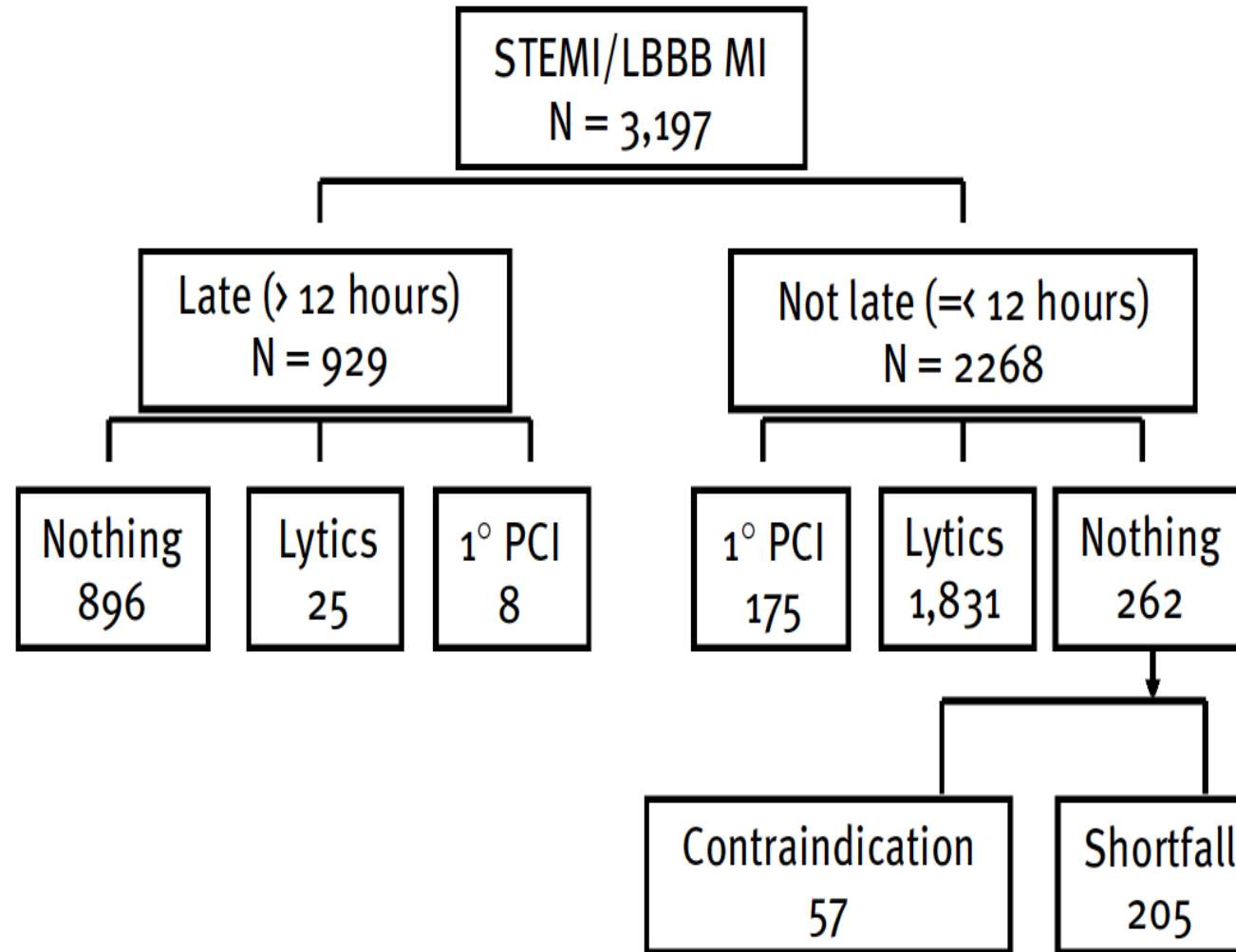
---

1. It is a BIG PROBLEM

2. They are YOUNGER

3. They are SICKER

4. It is here to STAY

5. We know about ACUTE CARE, but

what about BEFORE & AFTER

Patient Education – Many Present Late

Pre-Hospital Care

- **Gulf RACE** – 2007, ~ 8,000 ACS patients
  - Only 17% used EMS
  - Range 2% Yemen to 37% Oman (UAE 17%)
  - EMS users – less delay, shorter door-ECG and door-needle time for reperfusion
- **Gulf RACE II** – 2008/2009
  - EMS use 25% (UAE 17%)
  - EMS users ~ shorter door-needle time

Fares S, et. al. Journal of Emergency Medicine 2011; Alhabib K, et. al. Angiology 2014

Cardiovascular Disease in the ME

The 10 things we know

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5. We know about ACUTE CARE
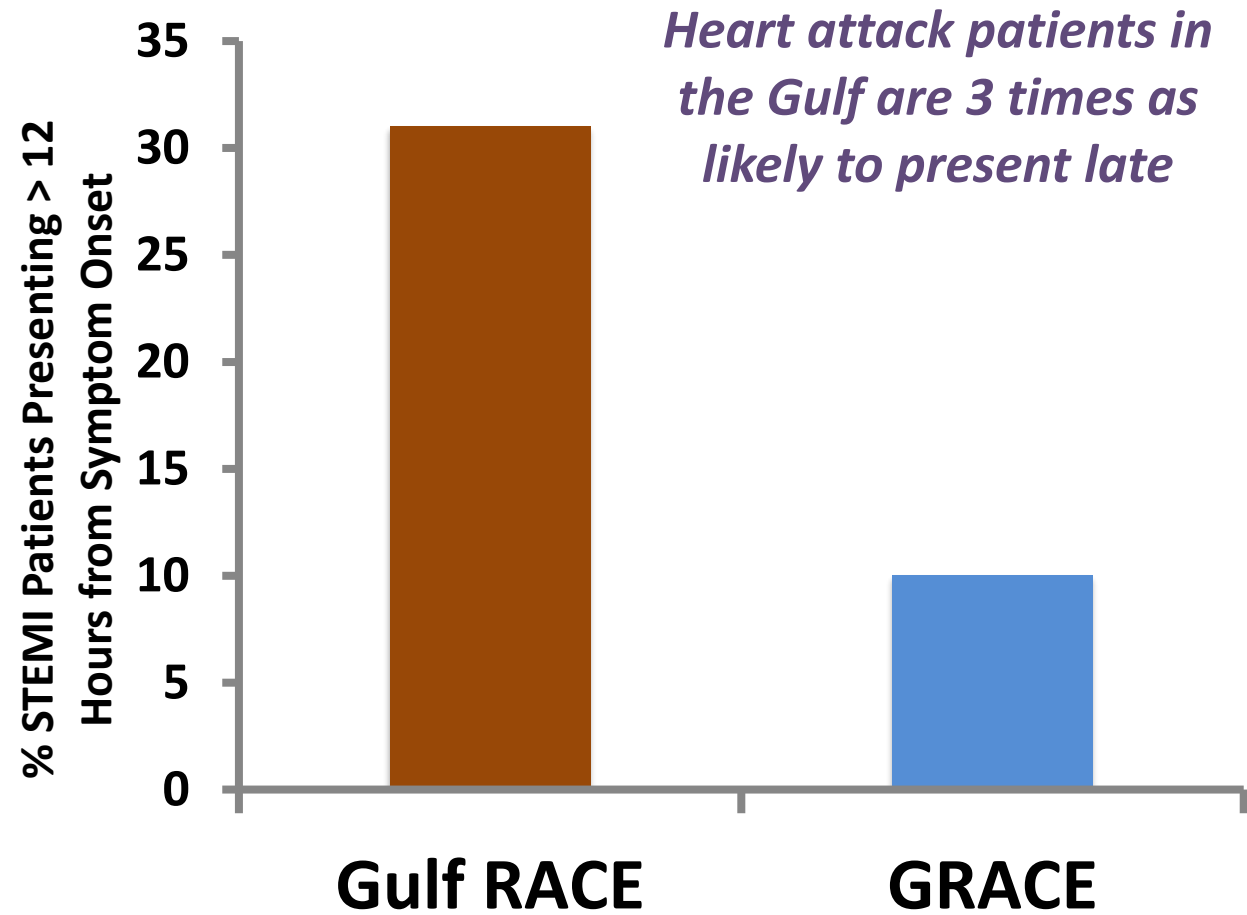
6. They present late

STEMI

- 48.2% presented less than 12 hours of symptom onset.
- Median time from symptom onset to hospital arrival was 300 minutes.
- 54.9% were treated with TT.
- Median DTN was 45 minutes (IQR: 30-83 minutes).
- 19.8% received TT within 30 min. of hospital arrival.
- Streptokinase (45.3%), followed by r-PA (31%).
- Only 12.3% had primary PCI.

Hospitals that identified themselves as routinely performing primary PCI, were doing it only 35% of the time.

	Cath lab on site	Routinely do PPCI
No. of hospitals	18 (28%)	7 (11%)
Reperfused STEMI/LBBB MI	678	329
Thrombolytic therapy	524 (76%)	213 (65%)
Primary PCI	163 (24%)	116 (35%)

Patients Present Late

% STEMI Patients Presenting > 12 Hours from Symptom Onset (y-axis: 0, 5, 10, 15, 20, 25, 30, 35)

Heart attack patients in the Gulf are 3 times as likely to present late

Gulf RACE — GRACE

Awad H, Zubaid M, Alsheikh-Ali AA, et. al., American Journal of Cardiology 2011

Cardiovascular Disease in the ME
The 10 things we know

1. It is a BIG PROBLEM

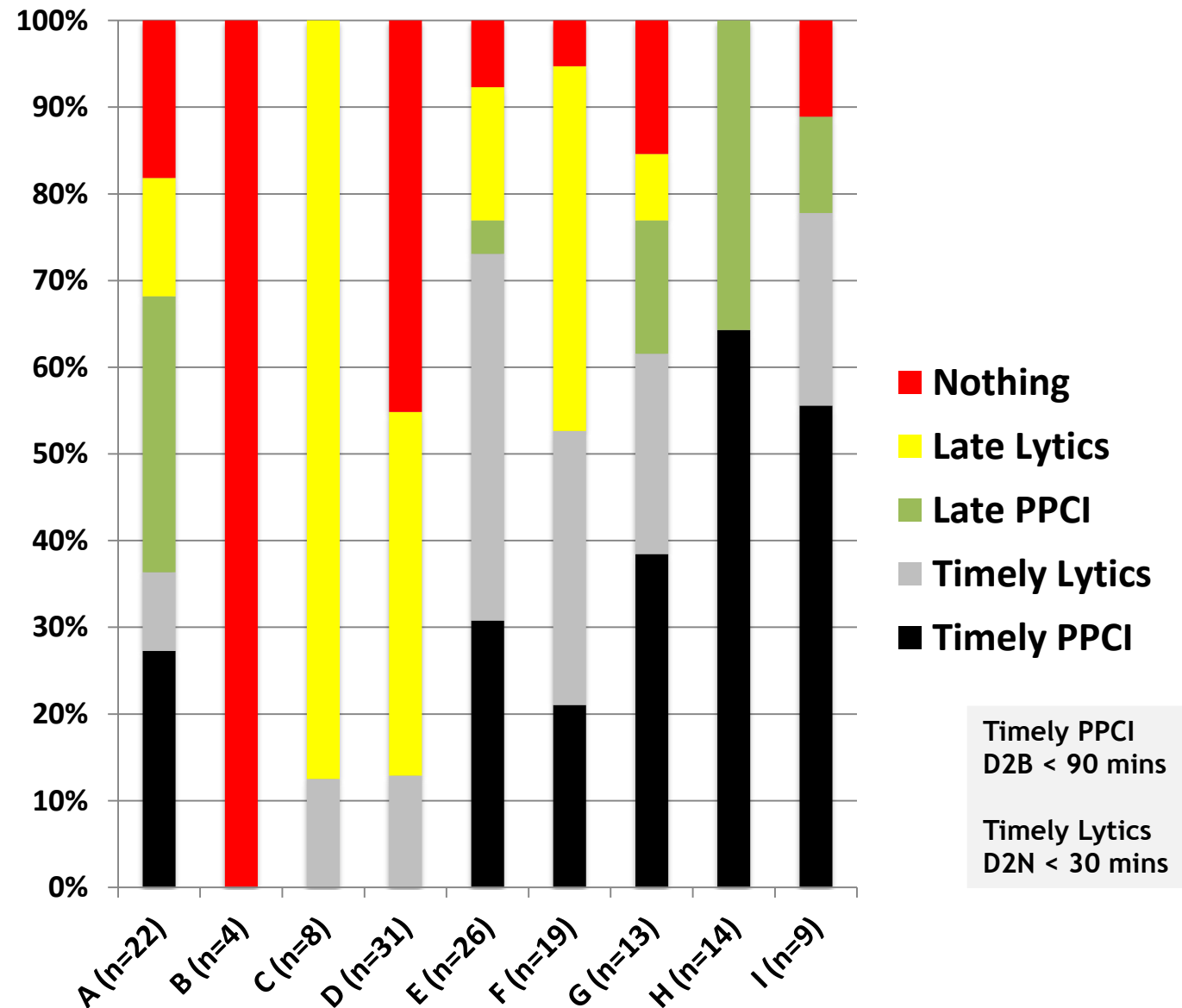2. They are YOUNGER

3. They are SICKER

4. It is here to STAY

5. We know about ACUTE CARE

6. They present LATE

7.HETEROGENEITY:

of risk, care, outcomes

Heterogeneity of Therapy:
Reperfusion in STEMI (Gulf COAST UAE Cohort)

Legend:
- Nothing
- Late Lytics
- Late PPCI
- Timely Lytics
- Timely PPCI

Timely PPCI
D2B < 90 mins

Timely Lytics
D2N < 30 mins

X-axis categories: A (n=22), B (n=4), C (n=8), D (n=31), E (n=26), F (n=19), G (n=13), H (n=14), I (n=9)

Cardiovascular Disease in the ME
The 10 things we know

1. It is a BIG PROBLEM

2. They are YOUNGER

3. They are SICKER

4. It is here to STAY

5. We know about ACUTE CARE

6. They present LATE

7. HETEROGENEITY

8. What about CHILDREN and other heart disease

None coronary cardiac disease

- Valvular Heart Disease: rheumatic heart disease is still prevalent in the region

- Heart Failure: lack of adherence to proper management leads to repeated admissions and saturation of cardiac services

Congenital Heart Disease

- Incidence in KSA is 10-12 /1000 births compared to 5-7/1000 live births in developed countries

- Incidence in KSA is likely higher due to consanguinity and DM

- live births in MOH hospitals for 2009were 246,615 meaning 5000 NEW CHD born every year

Saudi Arabia has an unusually high rate of congenital disorders

In Saudi Arabia consanguinity is very high compared to international levels, occurring in 52% of all marriages, Common genetic disorders include congenital heart and pulmonary defects
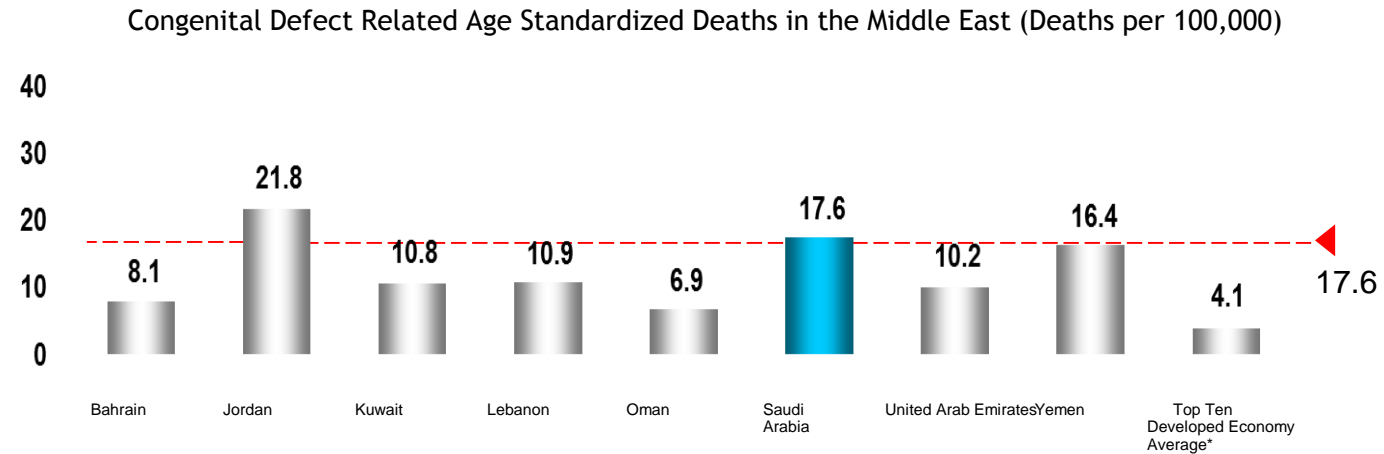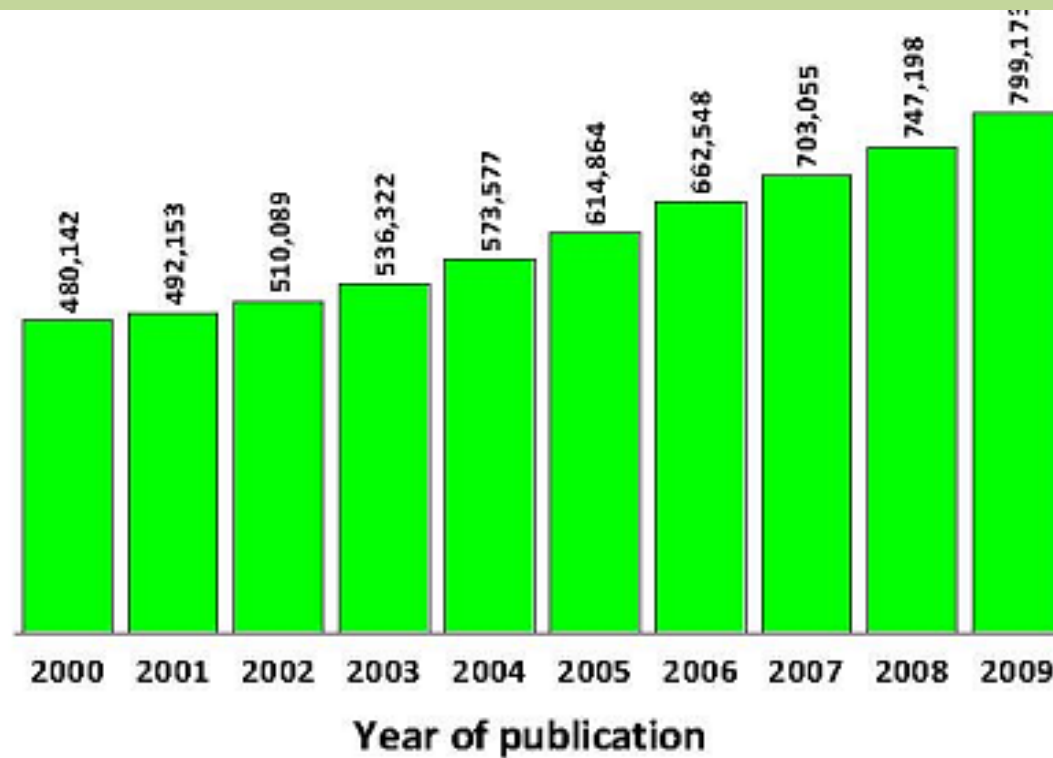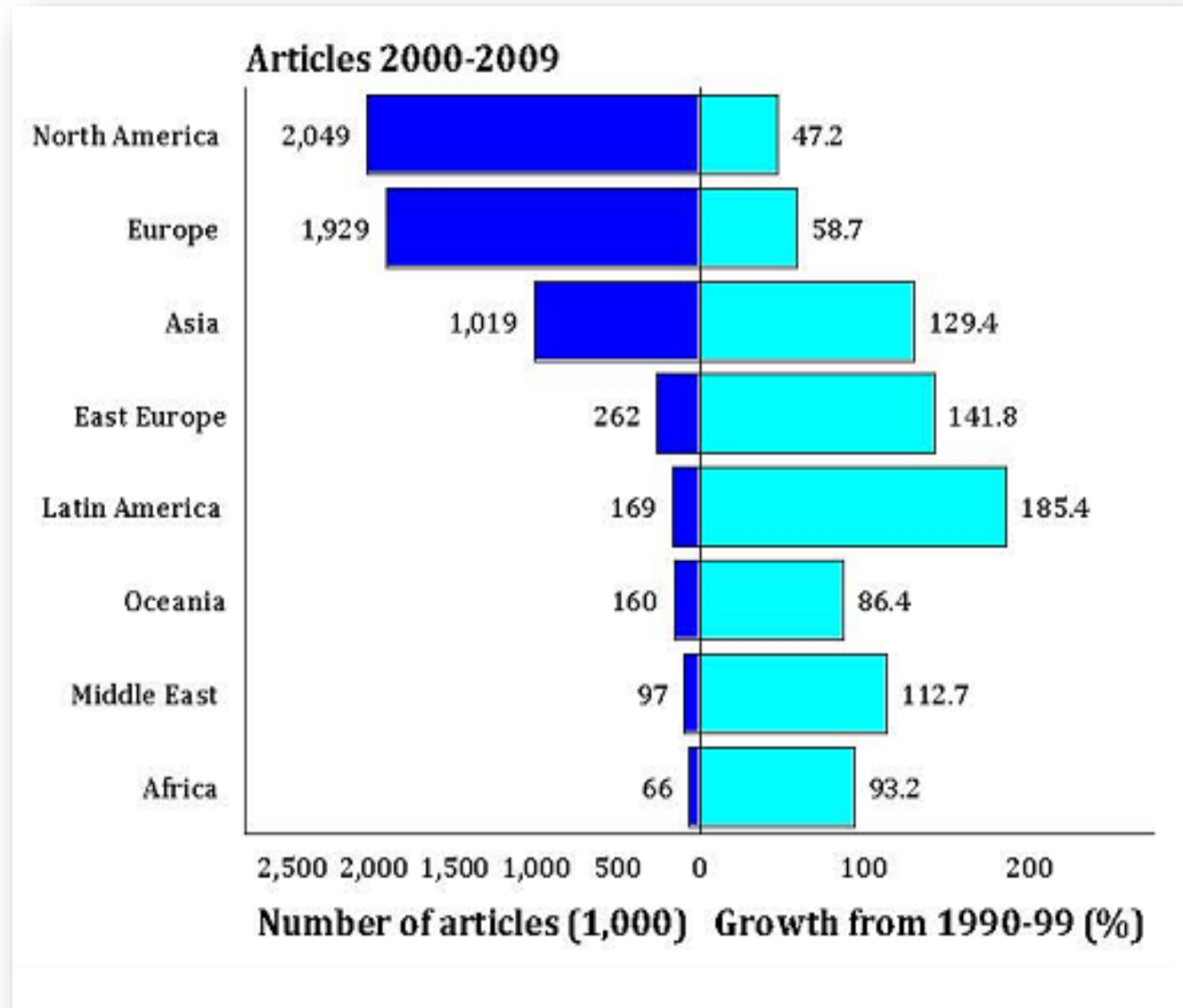
Congenital Defect Related Age Standardized Deaths in the Middle East (Deaths per 100,000)

Cardiovascular Disease in the ME
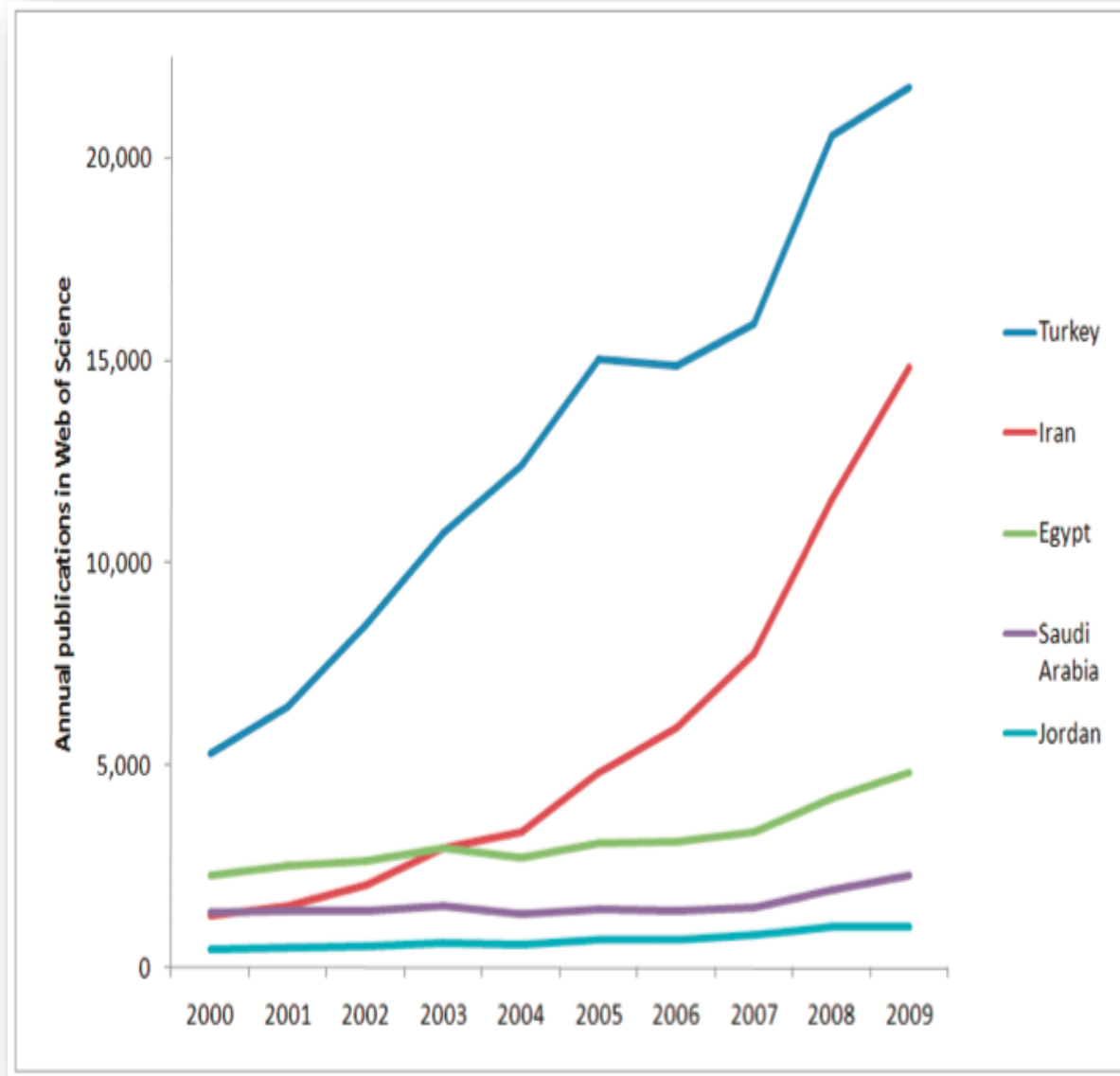## *The 10 things we know*

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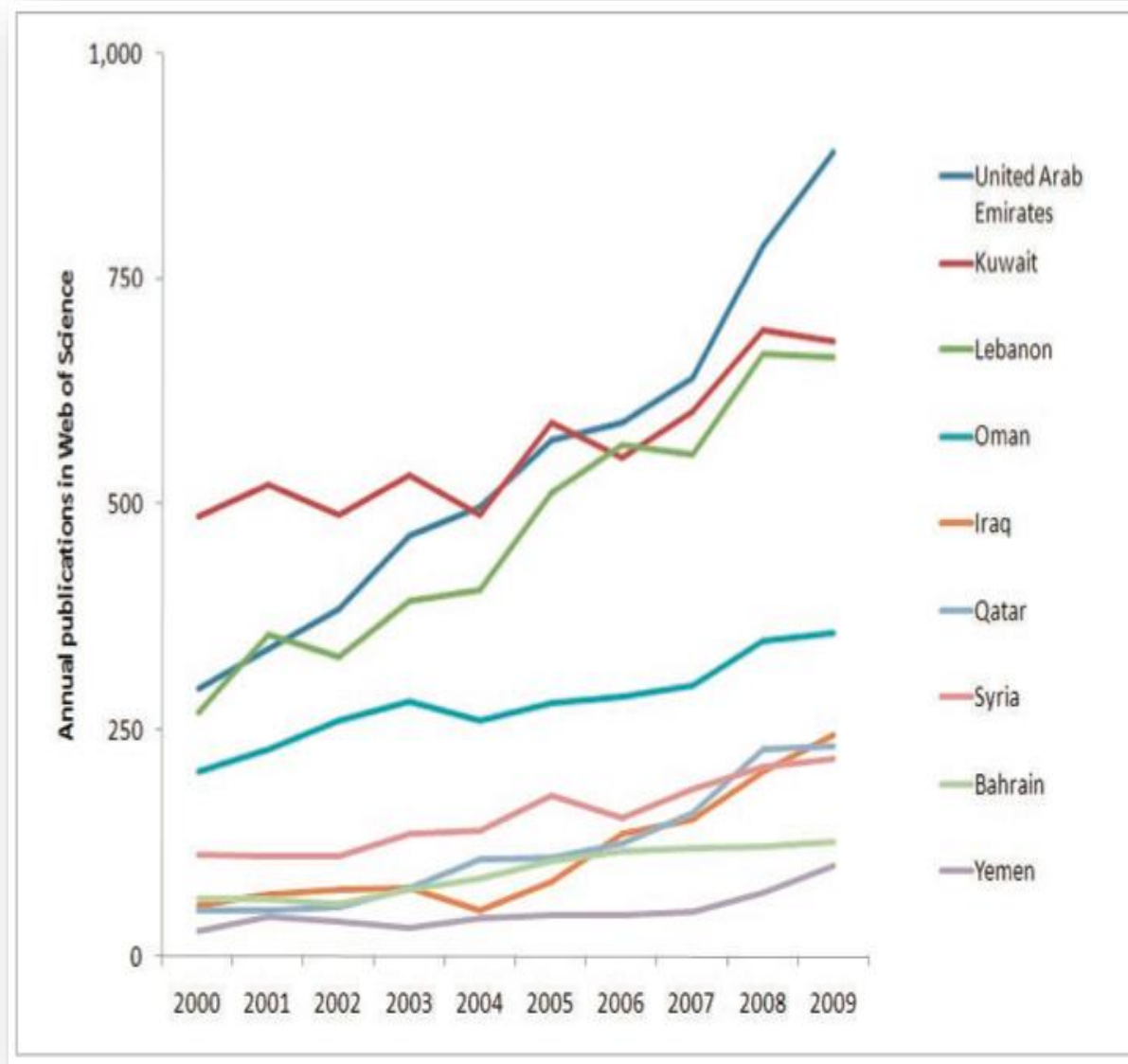Worldwide 67% Growth in published biomedical research articles between 2000 and 2009

Articles 2000-2009

	Number of articles (1,000)	Growth from 1990-99 (%)
North America	2,049	47.2
Europe	1,929	58.7
Asia	1,019	129.4
East Europe	262	141.8
Latin America	169	185.4
Oceania	160	86.4
Middle East	97	112.7
Africa	66	93.2

Annual Research Output (most prolific)

Annual Research Output (less prolific)

* Global Research Report: Middle East. Thomson Reuters 2011

- *Uncontrolled Risk Factors*
- *Limited Preventive Polices*
- *Rapid Urbanization*
- *Baby boom*

- Diabetes
- Obesity
- Aging

Crisis Today

Future Crisis
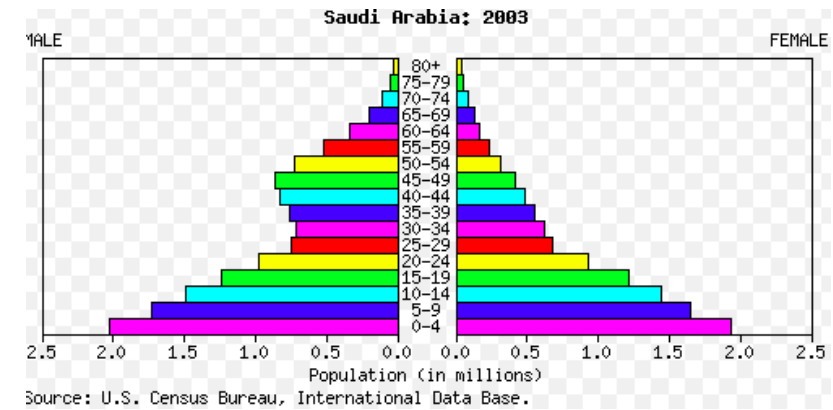
Cardiovascular Disease in the ME
The OTHER things we know it matters

- Big Problem
- They are YOUNG
- They are sicker
- Burden of Risk
- Before/After Hospital Care
- They present LATE
- Heterogeneity
- Children
- Cardiovascular research

Other Things to Know:
- Economic impact
- CVD and migration
- CVD & urbanization
- Genetics of CVD
- Novel risk factors

Cardiovascular Disease in the ME

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10. We have come a long way !

But . . . We've come a long way

- **Advanced Acute cardiac care**
  - Development of Centers of excellence
  - Participation in International registries (NCDR)
- **Established Record**
  - Self-confidence
  - Confidence of others
- **More Funding**
  - Government
  - Industry
- **Established Network**
  - Centers
  - Collaborators