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Obesity in Asian Populations

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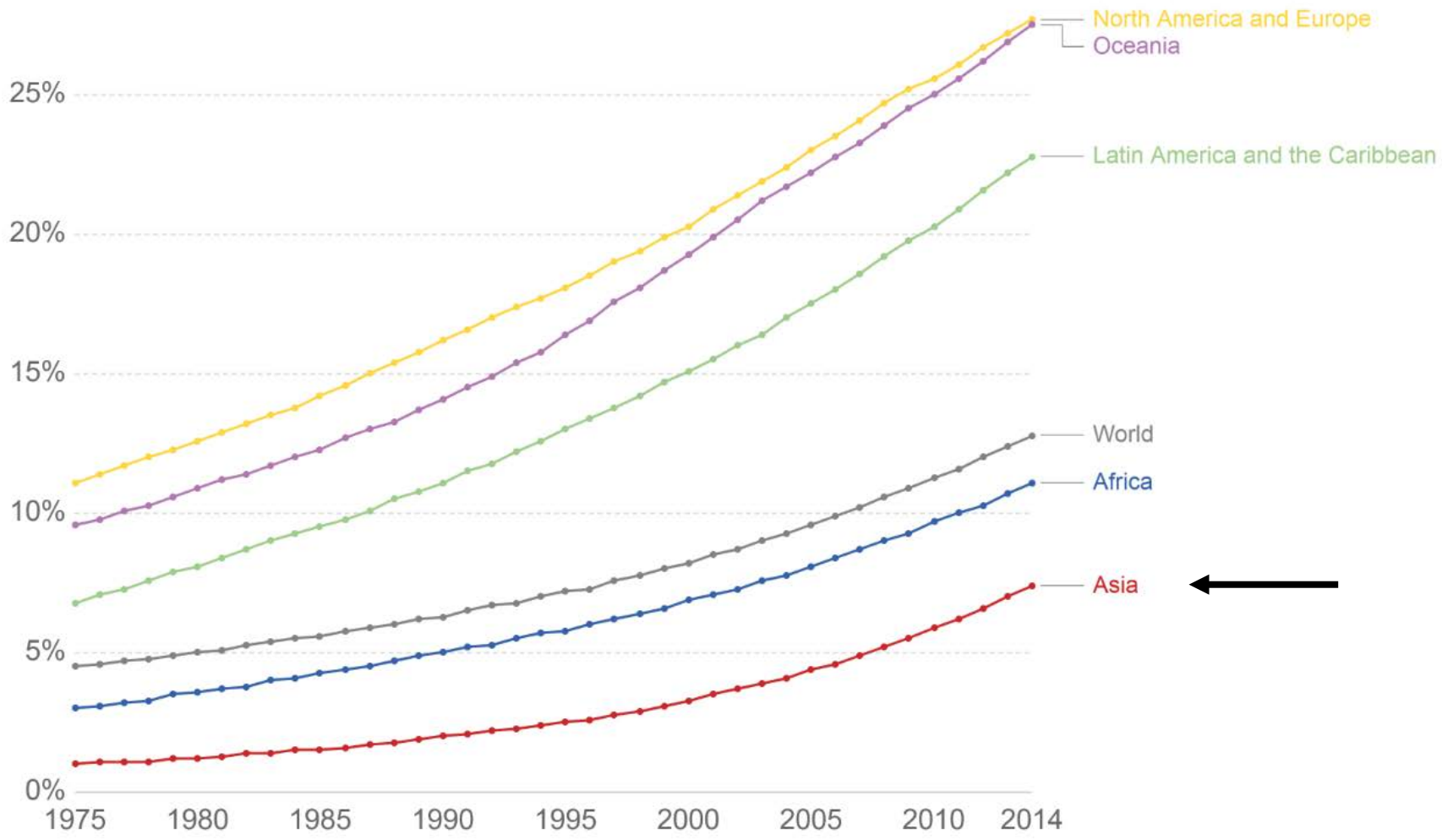
National Academy of Sciences, Washington DC
Tuesday October 9, 2018

Prevalence of obesity (BMI >30) in adults (18 years+) by region



UN Food and Agriculture Organization/WHO

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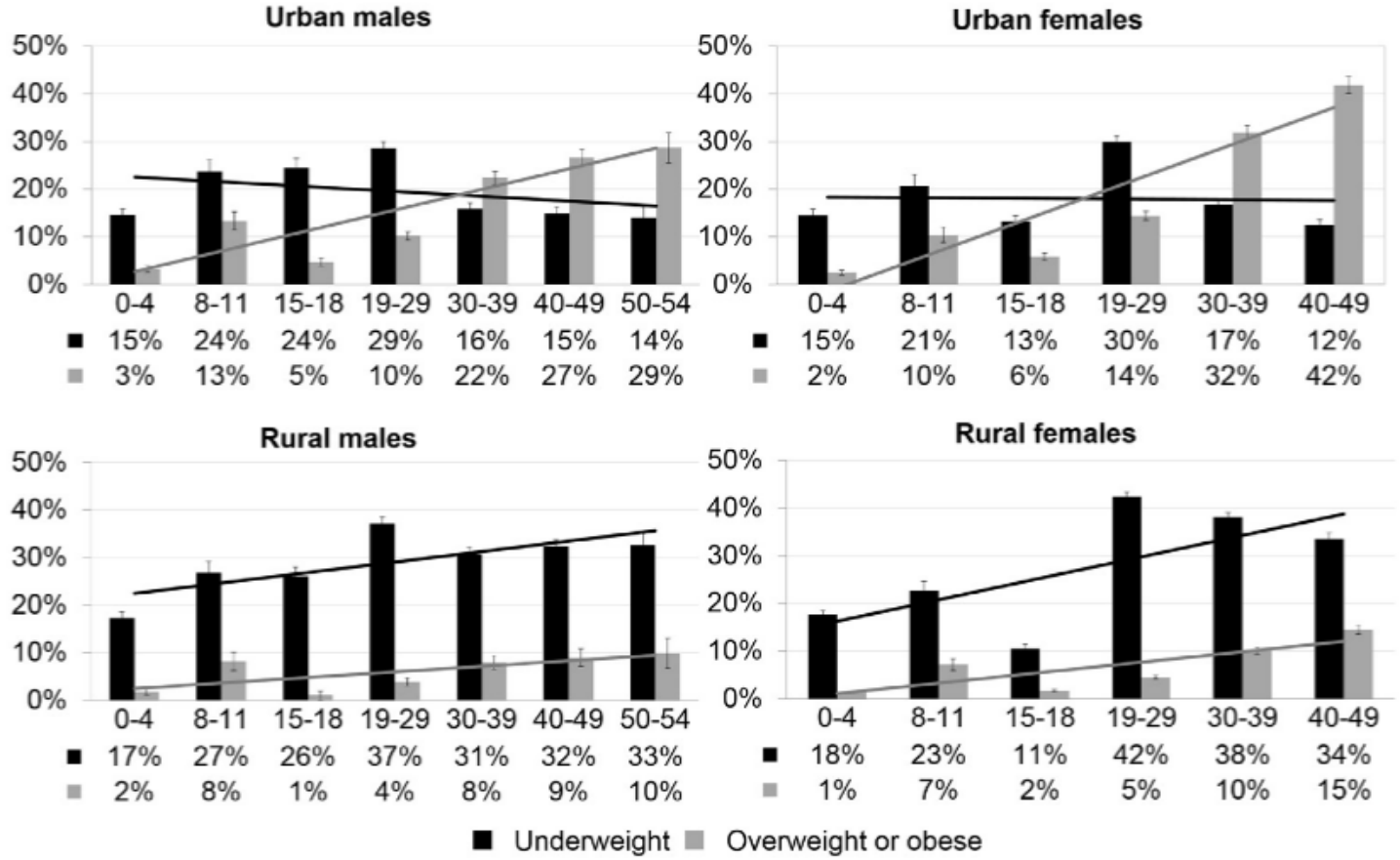
Prevalence of underweight and overweight or obesity by age and sex in urban and rural settings in India, 2004-2006 (n=236,039)



Vertical axis = prevalence
Horizontal axis = age group (years), point estimates

Annals of Epidemiology 25 (2015) 336-34

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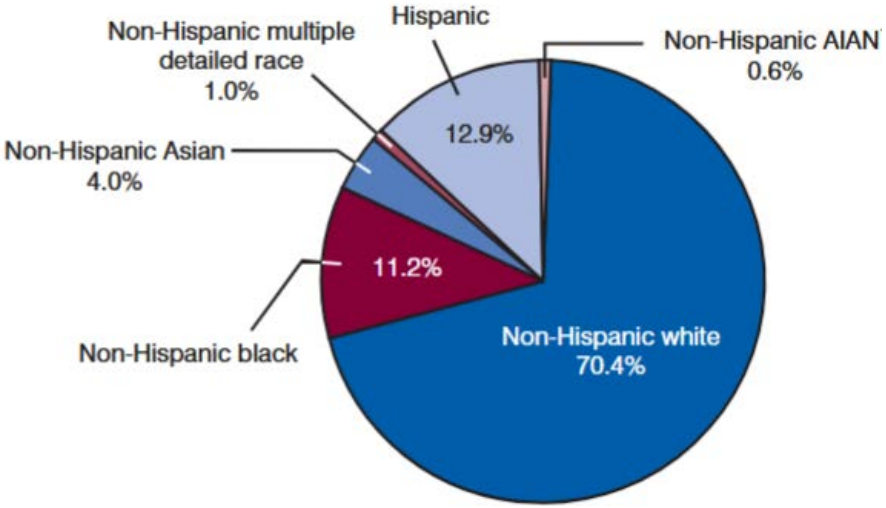
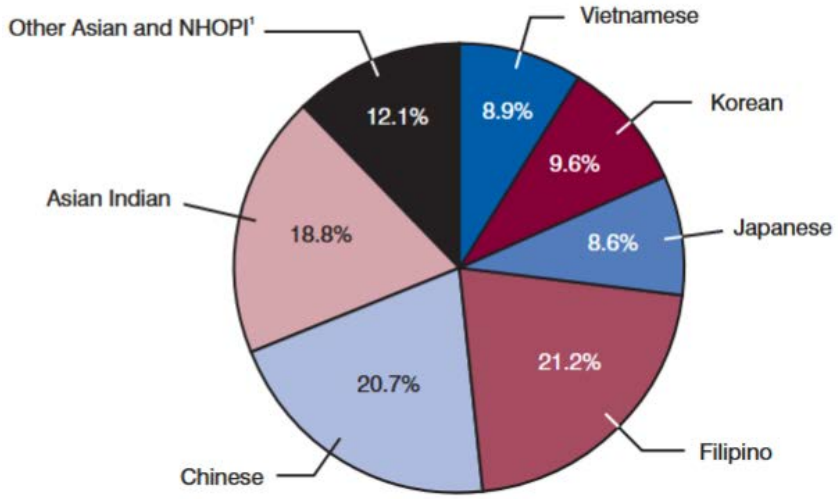
Age-adjusted prevalence of overweight but not obesity among Asian sub-groups, 18 years of age +, 2004–2006

Population	Overweight
All Whites	34.6
All Asians	27.5
Chinese	21.8
Filipino	33.0
Asian Indian	34.4
Japanese	25.9
Vietnamese	19.1
Korean	27.3
Other Asian & NHOPI	29.2

Percent distribution of race and ethnicity in US



Percent distribution of Asian subgroups in US



CDC, 2008. Health Characteristics of the Asian Adult Population: United States, 2004-2006.

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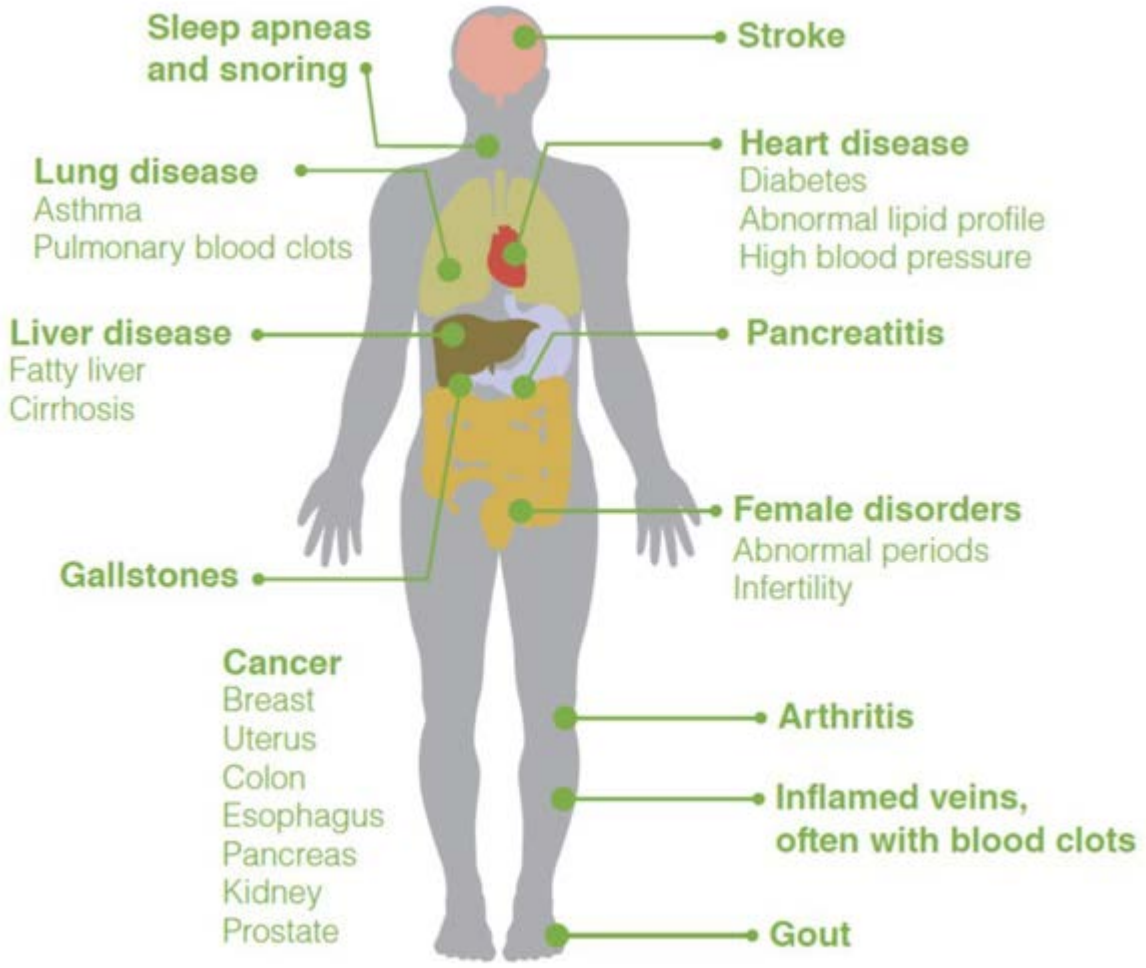
Medical Complications of Obesity



CDC: https://www.cdc.gov/healthreport/publications/compendium.pdf

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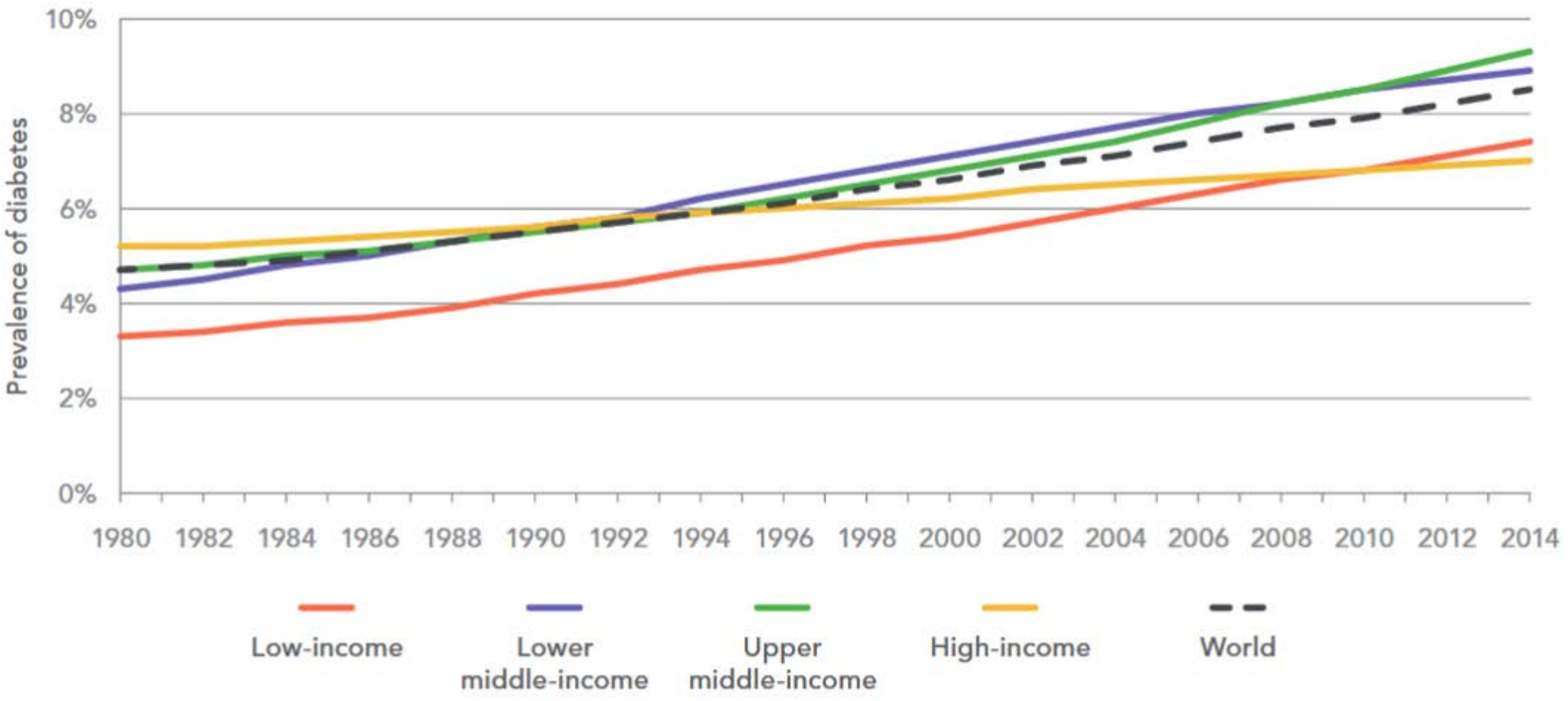
Global trends in type 2 diabetes prevalence



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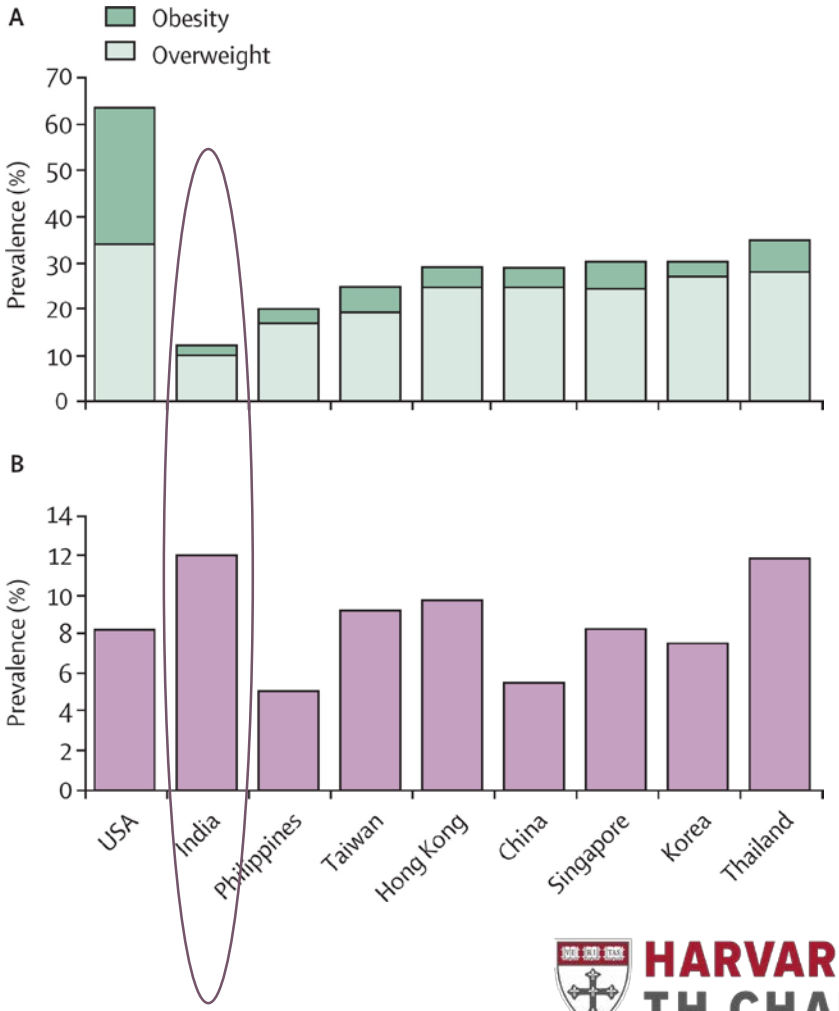
International comparison of prevalence of obesity and diabetes

Prevalence of obesity in India is lowest but prevalence of diabetes highest

Proportion of adults with overweight and obesity

Prevalence of diabetes



Lancet 2006; 368: 1681–88

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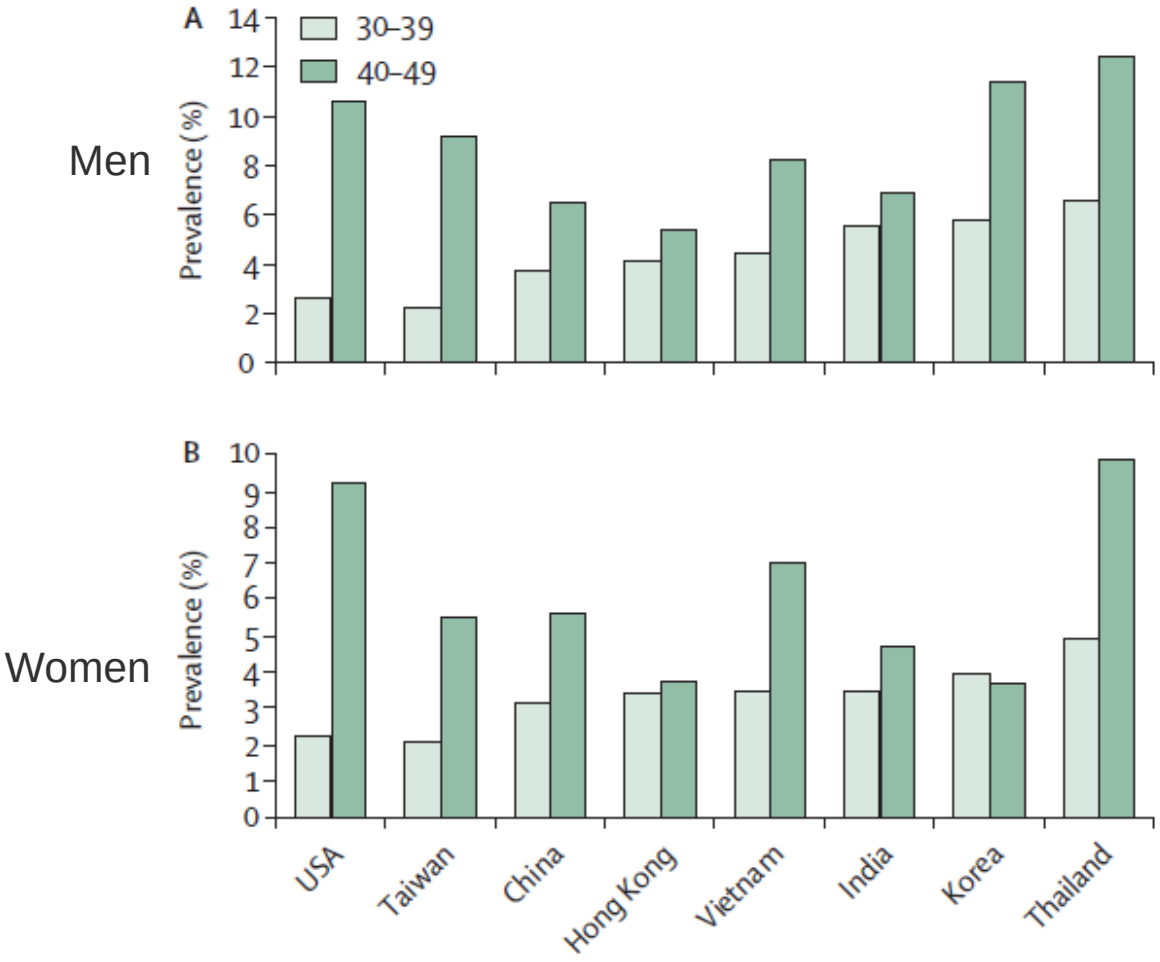
Comparison of diabetes prevalence between 30 and 40 year-olds

Prevalence of diabetes in Asian populations is higher among 30-year-olds in comparison to US population



Lancet 2006; 368: 1681–88

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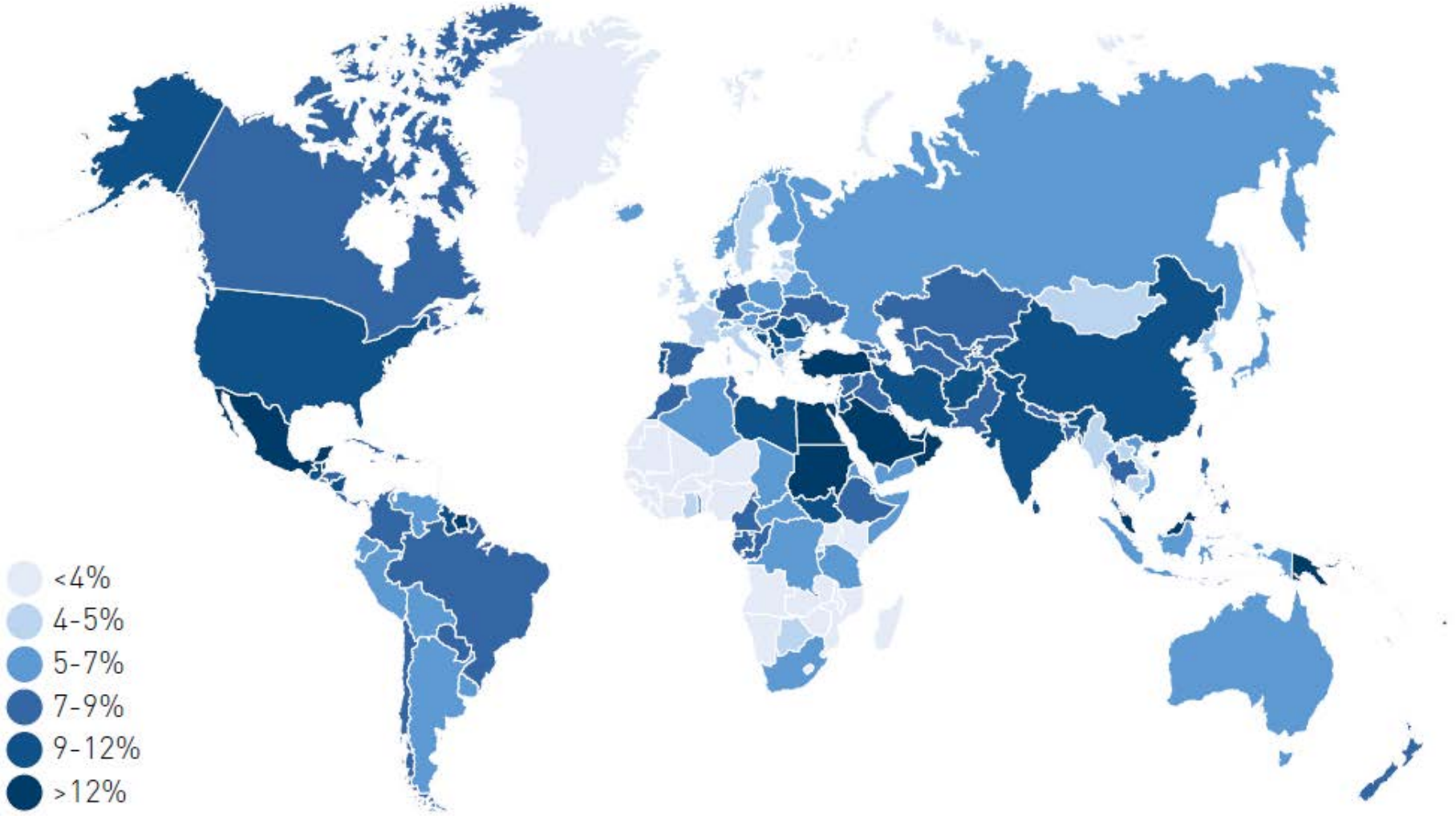
Estimated age-adjusted prevalence of diabetes in adults (20-79 years), 2017



International Diabetes Federation

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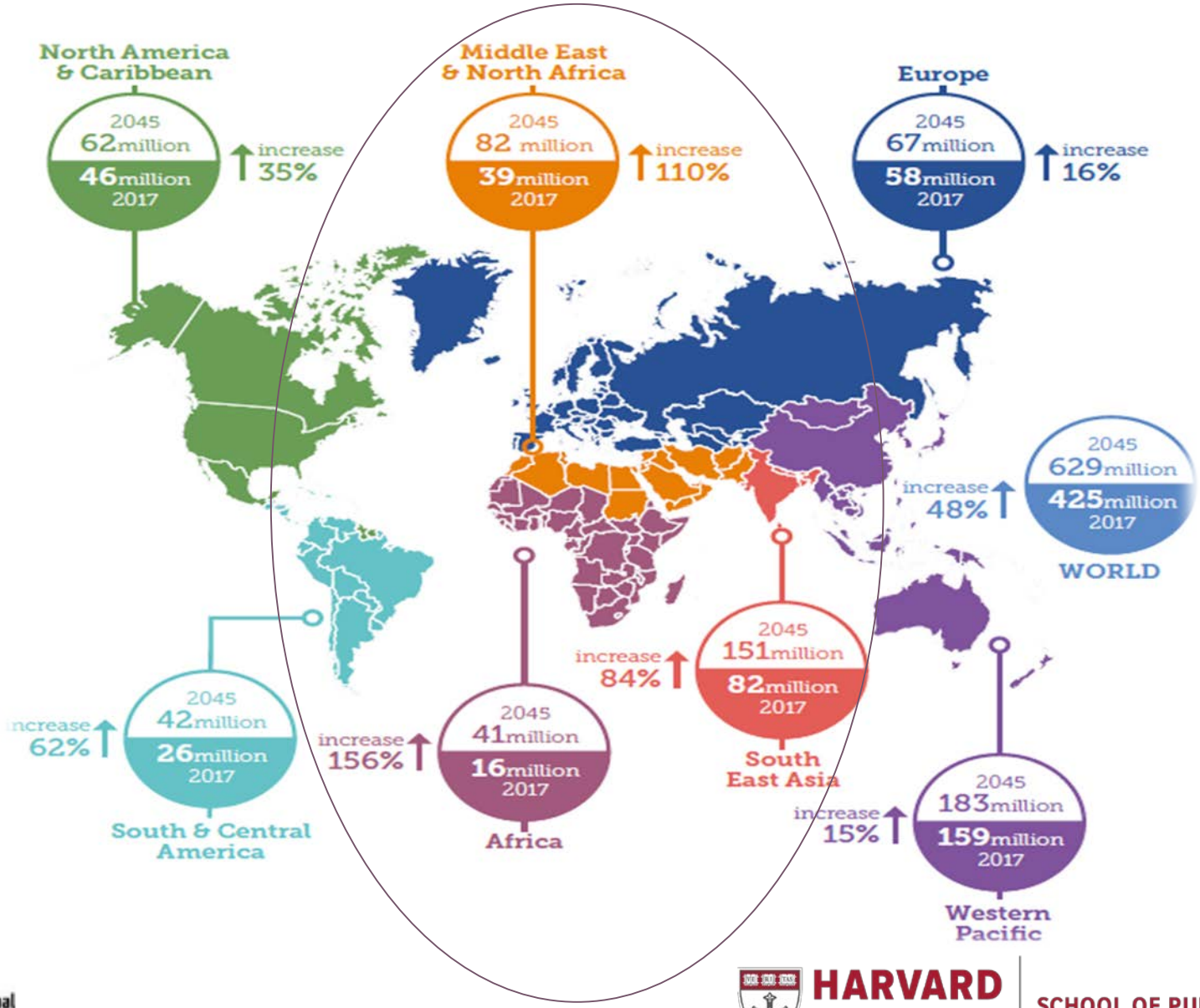
Number of Adults with Diabetes Worldwide in 2017 and 2045



International Diabetes Federation

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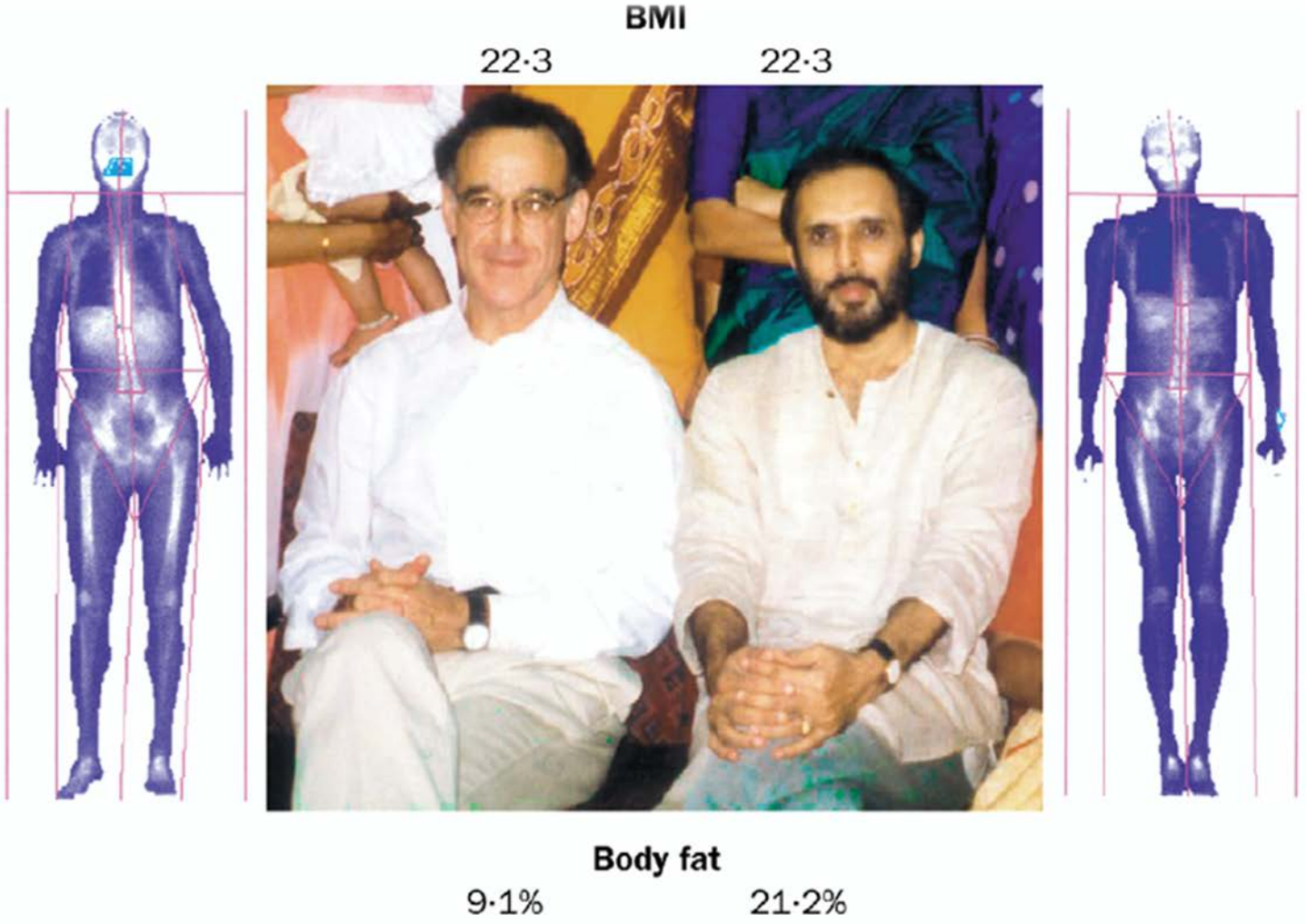
Asian populations and diabetes/cardiometabolic risk

- High prevalence of diabetes and cardiovascular risk factors in parts of Asia where average BMI is below 25 kg/m2
    - In some Asian populations a specific BMI reflects a higher percentage of body fat compared to white/European populations
    - Some Asian populations (especially South Asians) tend to have less muscle and more abdominal fat compared to white/European populations

Lancet 2004; 363: 157–63

The two authors share a near identical BMI, but differ in percent body fat

Reminder of the limitations of BMI as a measure of adiposity across populations



Lancet 2004; 363: 157–63

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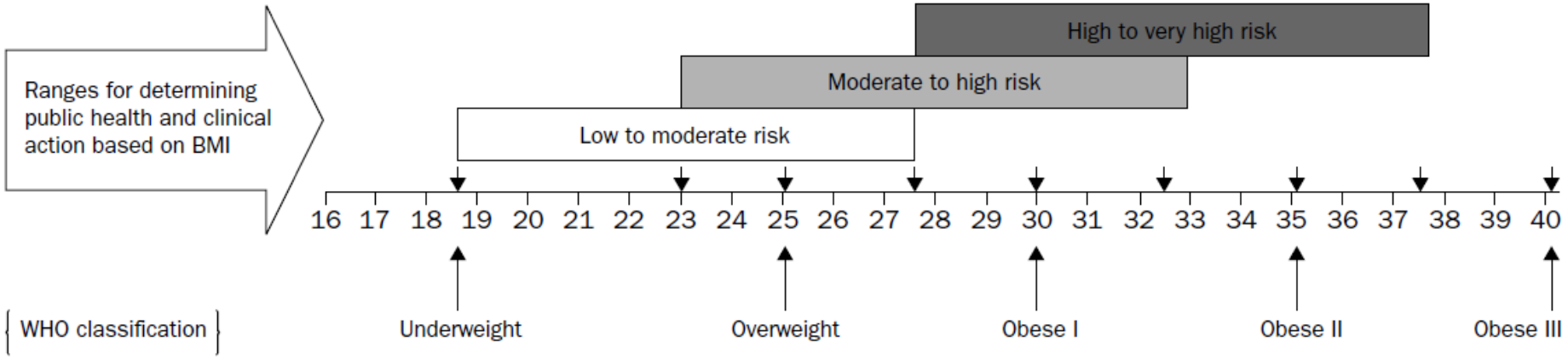
BMI cut-off points for public health and clinical action



Asian-specific BMI cut-off points	Traditional WHO cut-off points
Underweight: <18.5 kg/m2	Underweight: <18.5 kg/m2
Healthy weight: 18.5 - 22.9 kg/m2	Healthy weight: 18.5 - 24.9 kg/m2
Overweight: 23 - 27.4 kg/m2	Overweight: 25 - 29.9 kg/m2
Obesity: ≥ 27.5 kg/m2	Obesity: ≥ 30 kg/m2

Lancet 2004; 363: 157–63

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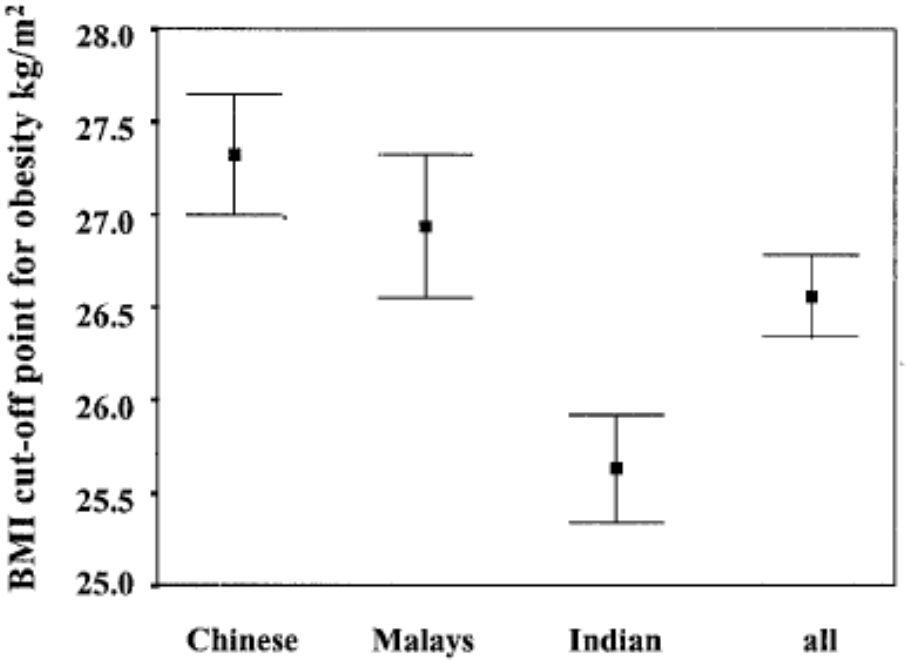
The paradox of low BMI and high body fat percentage among Chinese, Malays and Indians in Singapore (n=291)



Indians had the highest body fat % and Chinese the lowest for the same BMI

For the same amount of body fat as Caucasians with a BMI of 30, the BMI cut-off points for obesity would be ~ 27 for Chinese and Malays and 26 for Indians

International Journal of Obesity (2000) 24, 1011-1017

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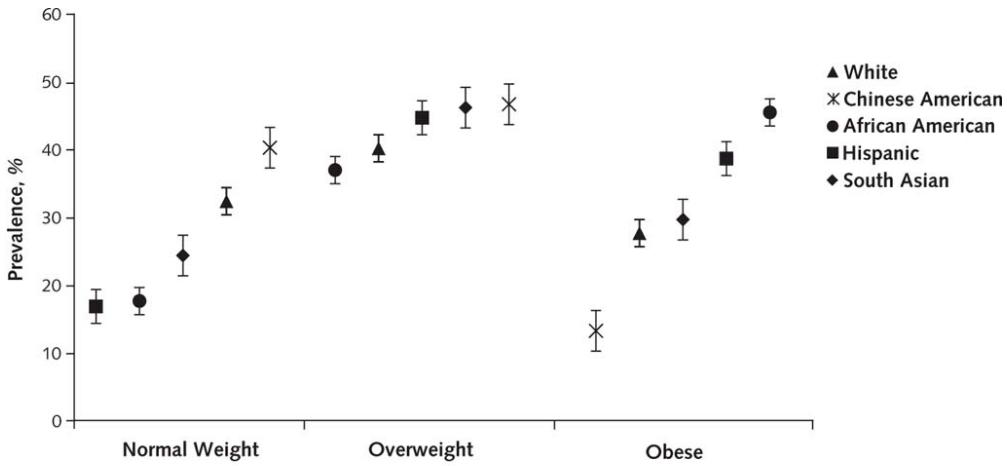
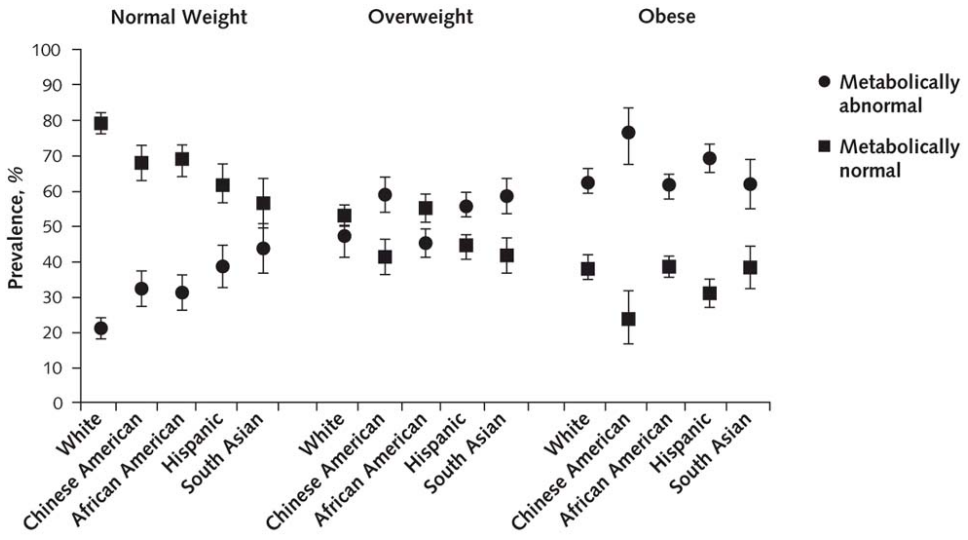
Cardiometabolic Abnormalities Among Normal-Weight Persons From Five Racial/Ethnic Groups in the United States





MESA: 2622 white
803 Chinese American
1893 African American
1496 Hispanic
MASALA : 803 South Asian

Prevalence of MAN (metabolic abnormality but normal weight) was higher among South Asians and Hispanics, followed African and Chinese Americans compared with whites

Ann Intern Med. 2017 May 2;166(9):628-636.

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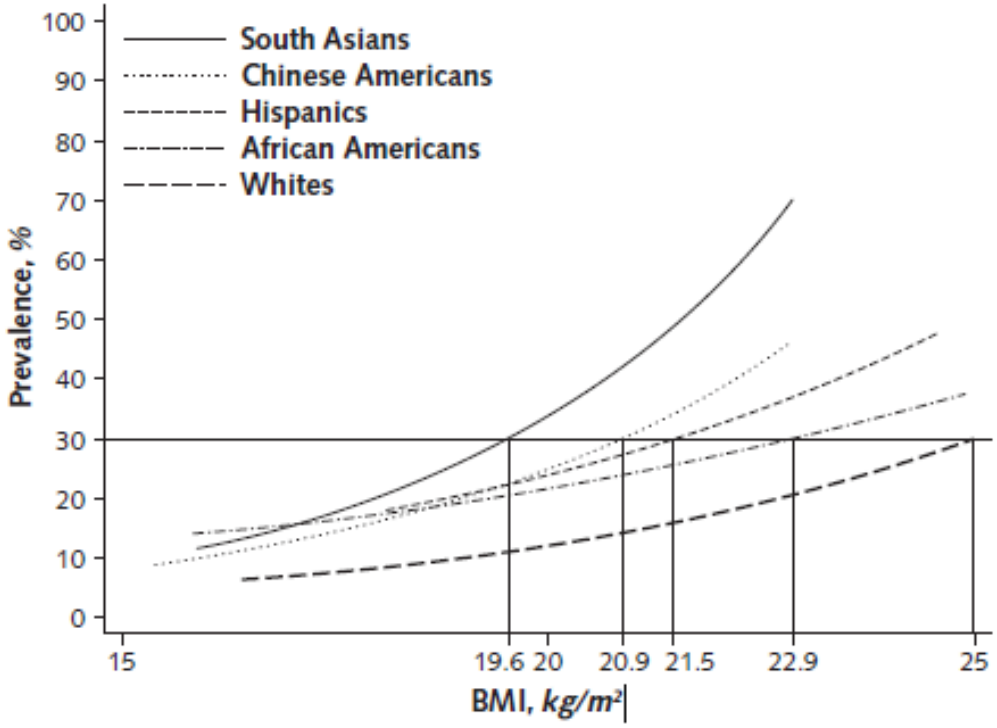
Race/ethnicity-specific BMI values associated with MAN (metabolic abnormality but normal weight) compared with whites with a BMI of 25



- For a MAN prevalence equivalent to that in whites with a BMI of 25, the corresponding BMI values were lower in all racial/ethnic minority groups,
- BMI alone is a poor indicator of cardiometabolic risk in most of these populations.

Ann Intern Med. 2017 May 2;166(9):628-636.

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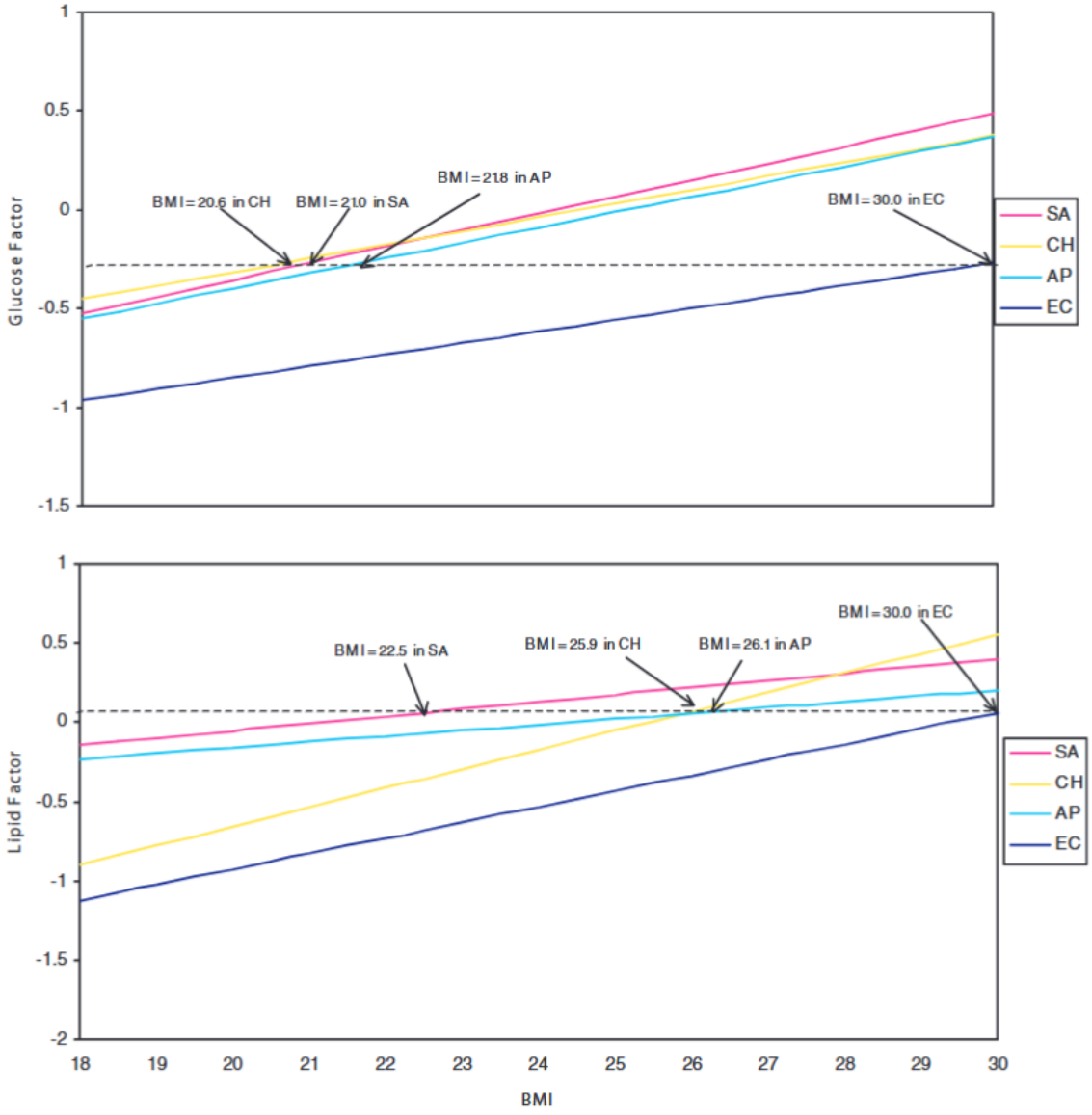
Obesity Cut Points in a Multiethnic Population (n=1078 Canadians)



For a given BMI, elevated glucose- and lipid- factors were more likely to be present in South Asian, Chinese, and Aboriginal populations compared with Europeans

The cut point to define obesity, is lower by ~6 kg/m2 among non-European groups compared with Europeans

Circulation. 2007;115:2111-2118

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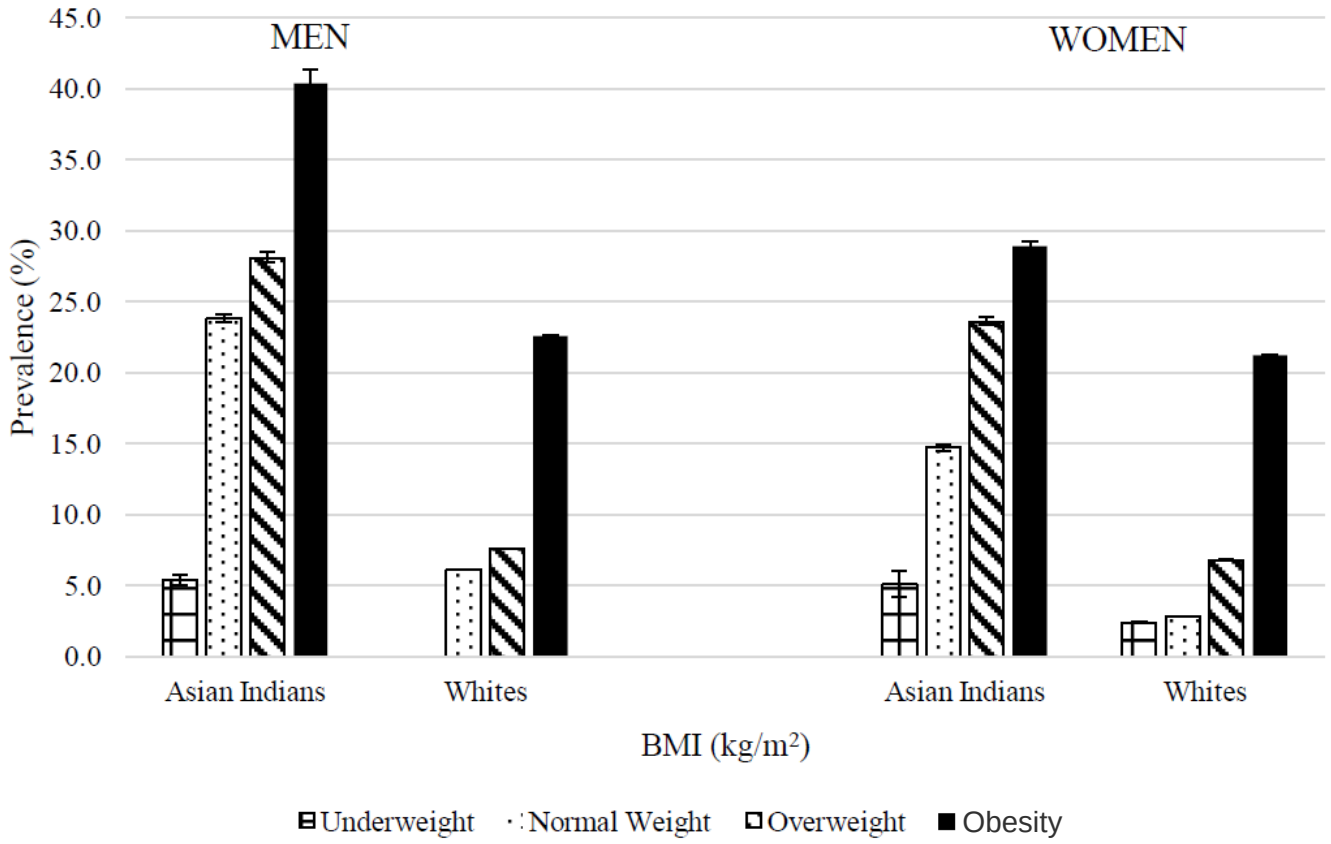
Prevalence of Type 2 Diabetes by BMI and Ethnicity in CARRS-Chennai Study (4,930 Asian Indians) and NHANES (2,868 Whites)



Significant ethnic differences in type 2 diabetes prevalence without excess weight

Diabetes Research and Clinical Practice (2018)
https://doi.org/10.1016/j.diabres. 2018.09.011

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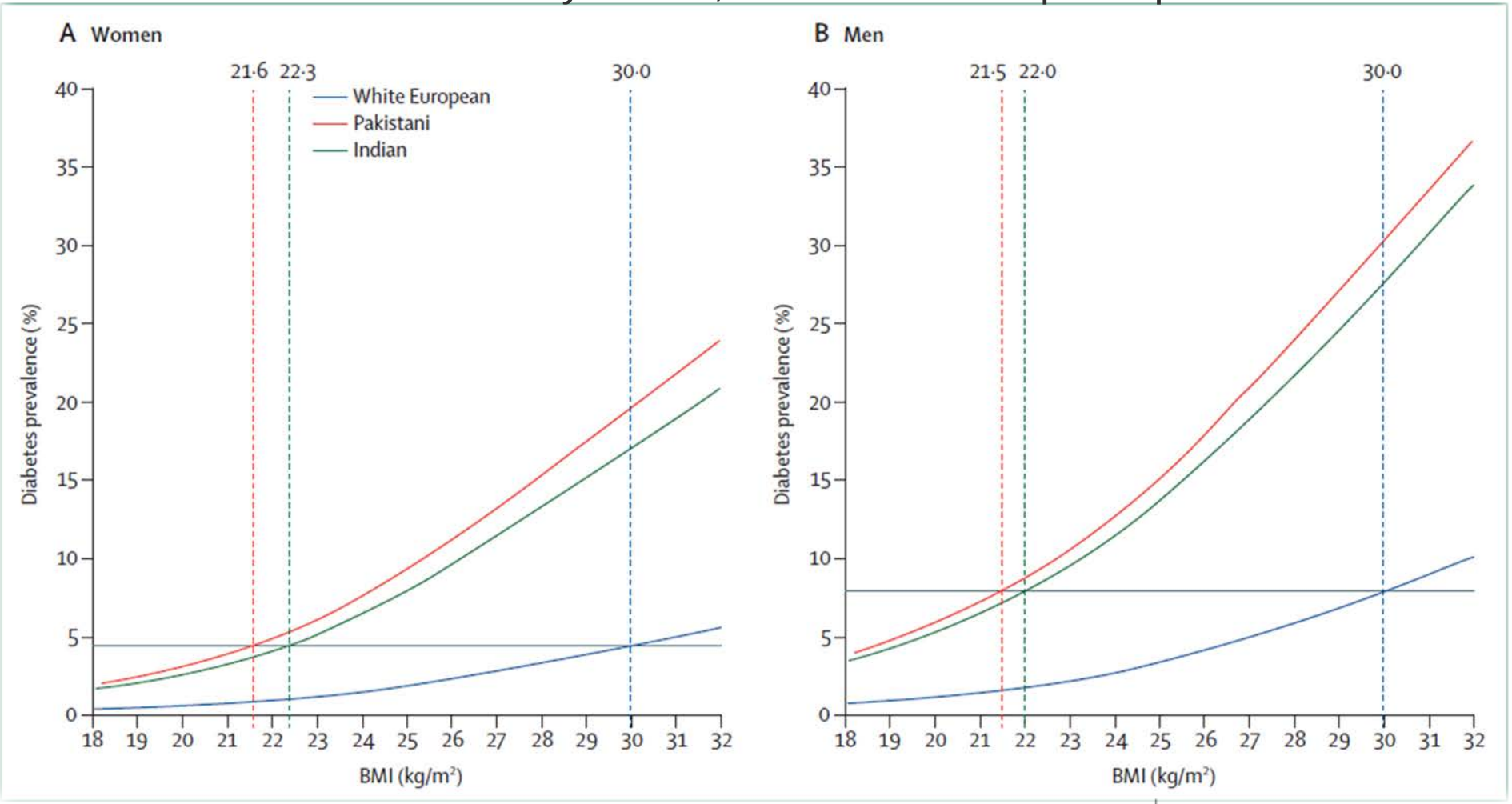
Increased risk for diabetes observed at lower levels of BMI in migrant south Asian groups than white individuals or Europeans

Cross-sectional study of 490,288 UK biobank participants



Lancet Diabetes Endocrinol 2015;3: 1004–16

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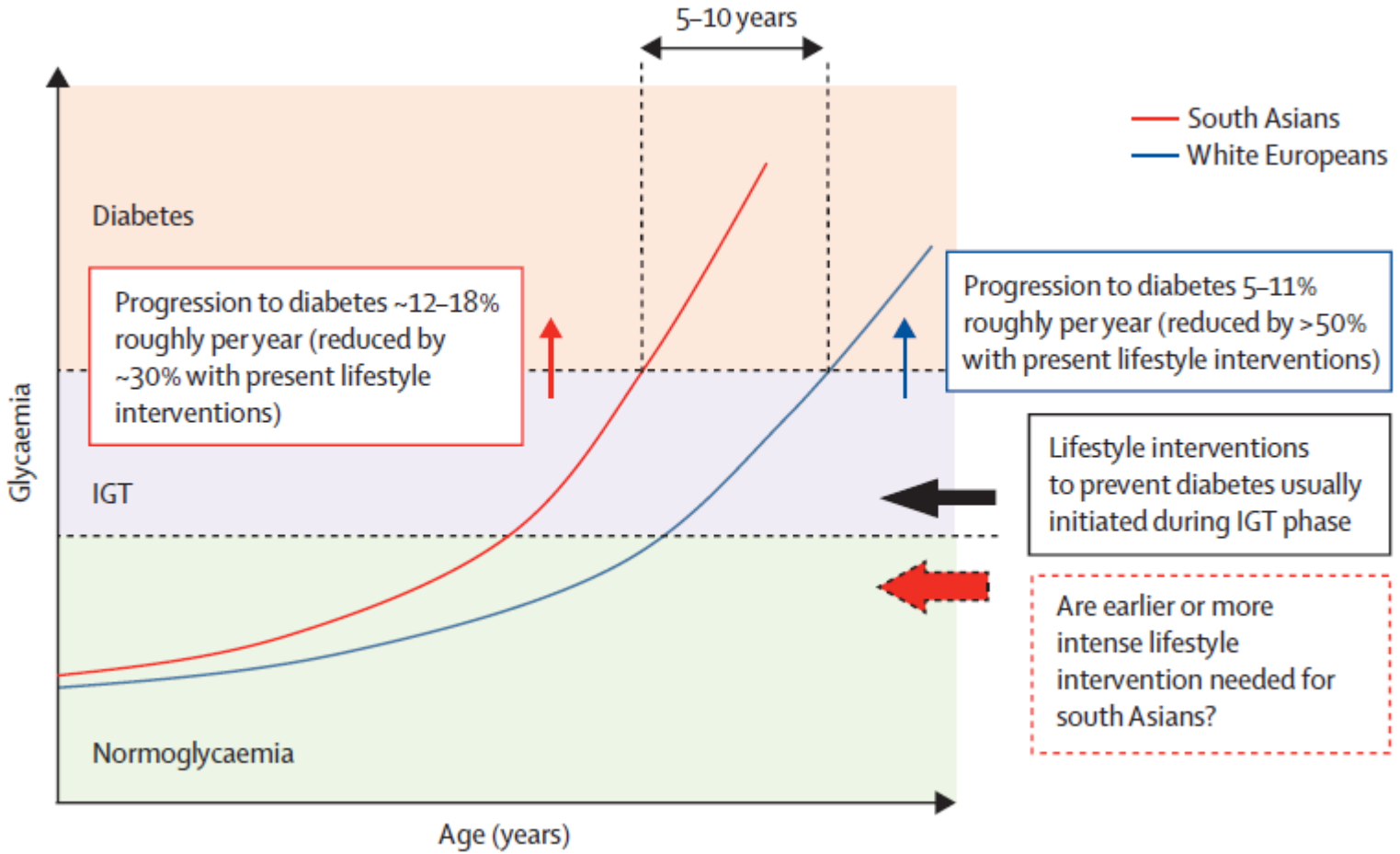
South Asians develop diabetes ~ 5–10 years earlier than Europeans and have more rapid progression from impaired glucose tolerance (IGT) to diabetes



Lancet Diabetes Endocrinol 2015;3: 1004–16

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Ethnic-specific cut-offs for waist circumference

World Health Organization cut-off points and risk of metabolic complications

Indicator	Cut-off points	Risk of metabolic complications
Waist circumference	>94 cm (M); >80 cm (W)	Increased
Waist circumference	>102 cm (M); >88 cm (W)	Substantially increased
Waist–hip ratio	≥0.90 cm (M); ≥0.85 cm (W)	Substantially increased

M, men; W, women

International Diabetes Federation cut-off points for different ethnic groups

	Men	Women
Europids	>94 cm	>80 cm
South Asians, Chinese and Japanese	>90 cm	>80 cm

Waist circumference and waist–hip ratio: report of a WHO expert consultation, Geneva, 8–11 December 2008

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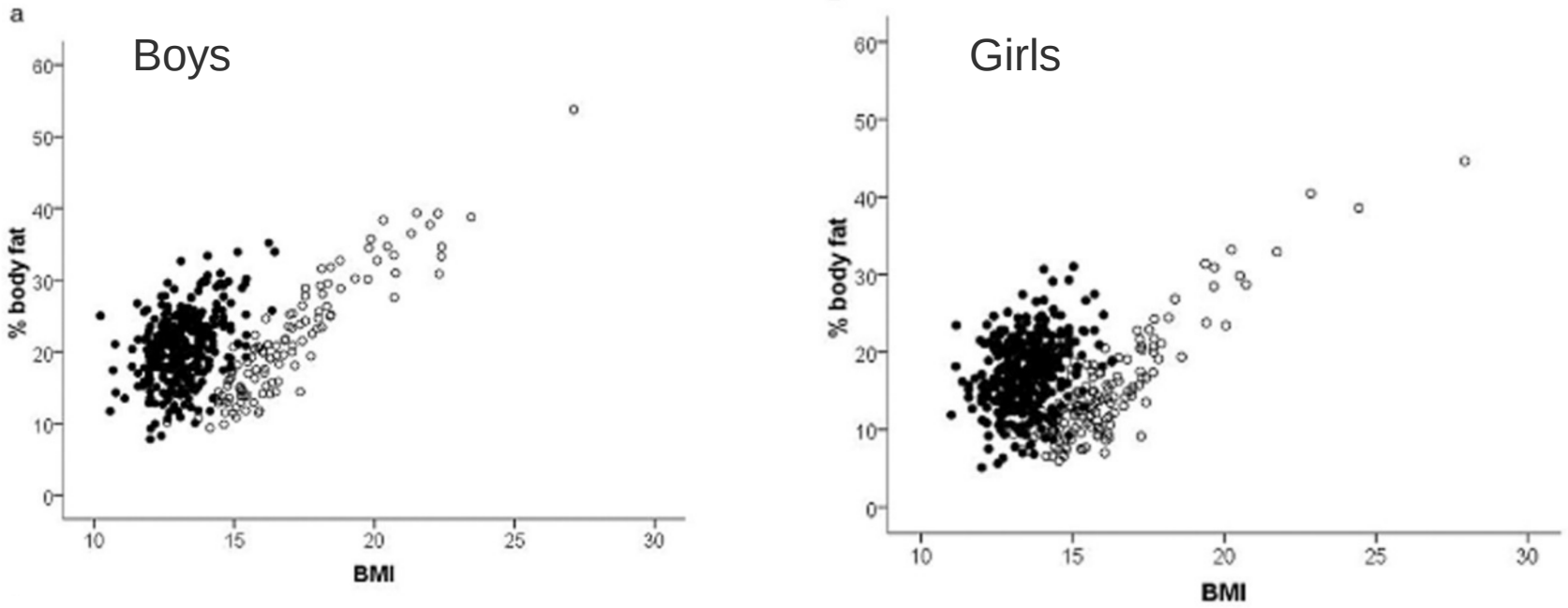
Differences in body composition and metabolic status between white UK and Asian Indian children

(EarlyBird 24 (n=262), and the Pune Maternal Nutrition Study (n=626))



Indian children have greater adiposity than white UK children despite lower BMIs

Indian children are also more insulin resistant, even after adjustment for adiposity

White UK (open circle)
Asian Indian (closed circle)

Pediatric Obesity (2012) 7, 347–354

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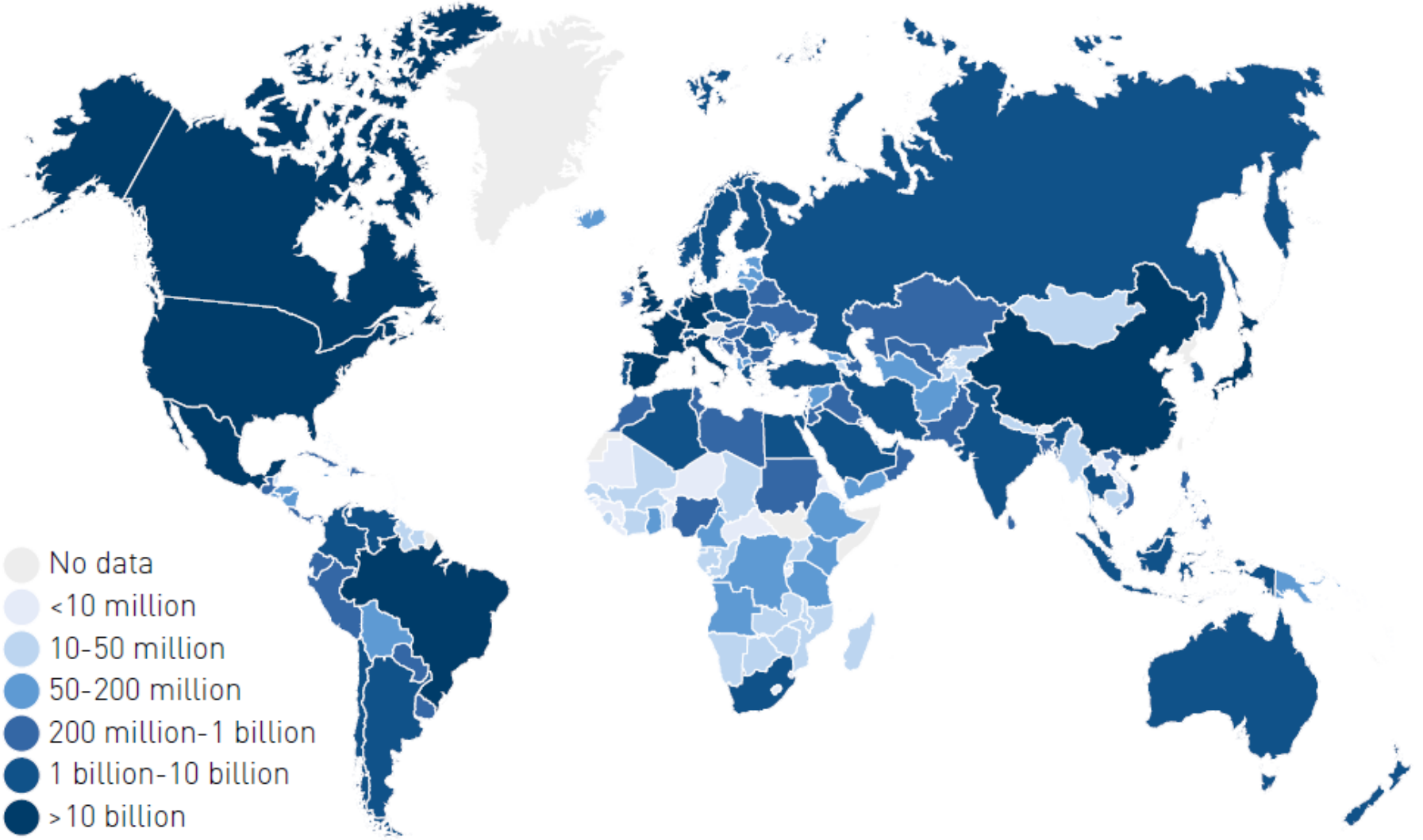
Total healthcare expenditure on diabetes (20-79 years) (ID)



IDF Diabetes Atlas - 8th Edition

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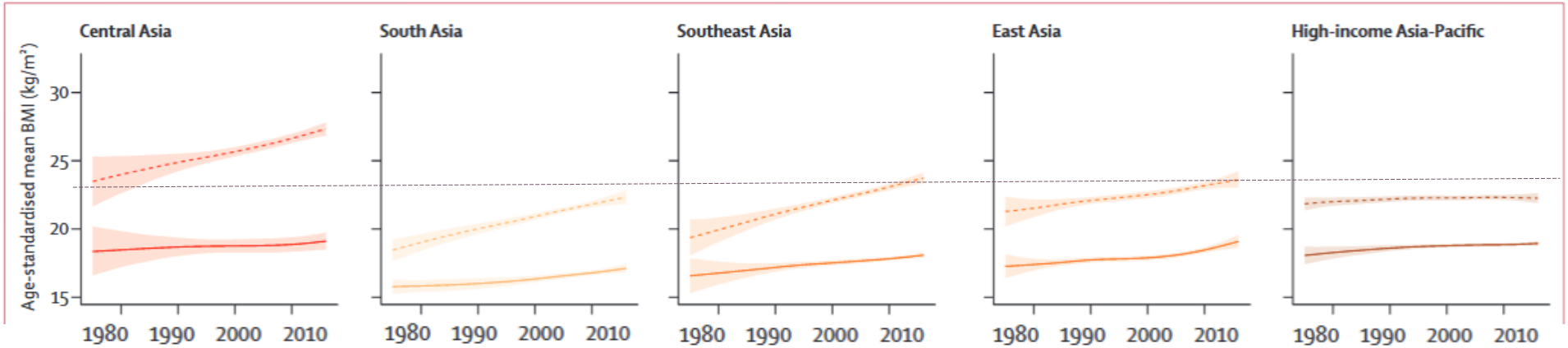
Summary

- Obesity has increased in Asia over recent decades but rates are among the lowest globally
    - Regional differences- higher in Central Asia and high income Asia-Pacific, higher in urban vs. rural
    - Similar trends in migrant Asian populations
    - Underweight a co-existing problem in some regions
- Asians develop diabetes at a younger age, more rapidly and at a lower BMI compared to Western populations
    - Asian specific lower cut-points for BMI and WC
    - Evidence suggests that similar trends may be apparent among children but further studies are needed
- Incorporating Asian BMI and WC cut-points into screening programs could help reduce diabetes burden in Asian populations in Asia and globally

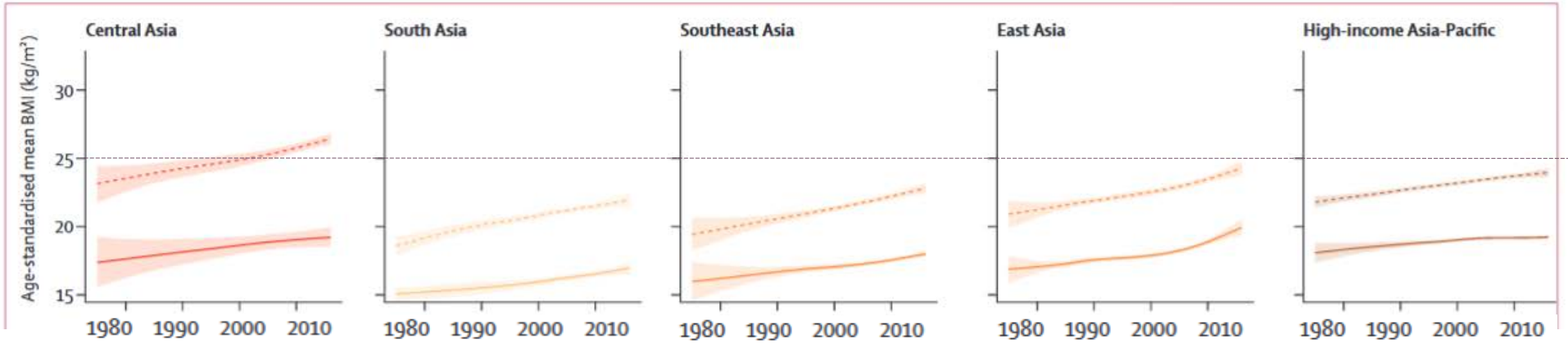
EXTRA SLIDES

Trends in age-standardized mean BMI by sex and region

Women



Men



Dashed line: children and adolescents, 5–19 years
Solid line: adults, 20 years and older

Lancet. 2017 Dec 16;390(10113):2627-2642

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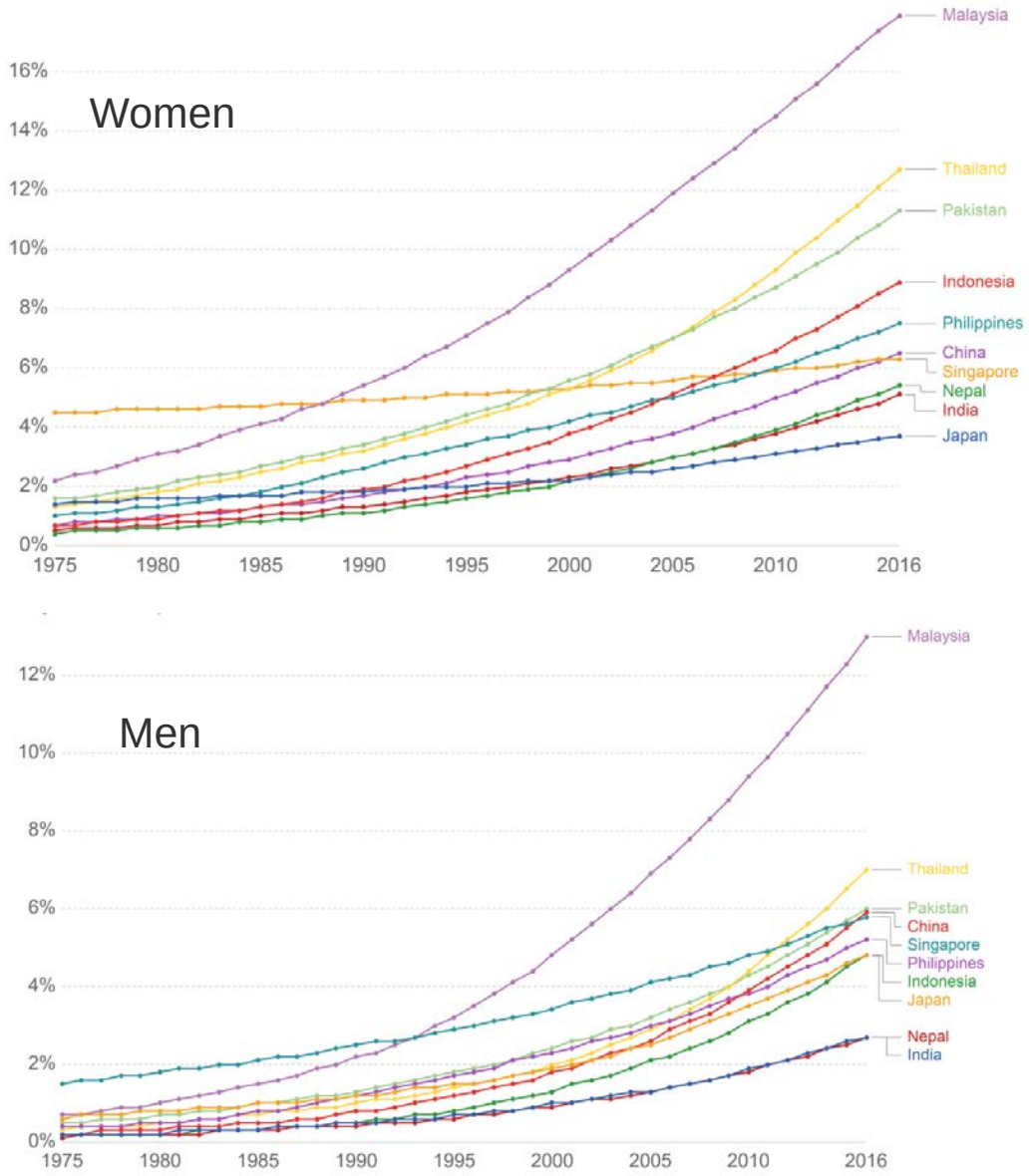
Prevalence of obesity (BMI >30) in adults (18 years+) by country



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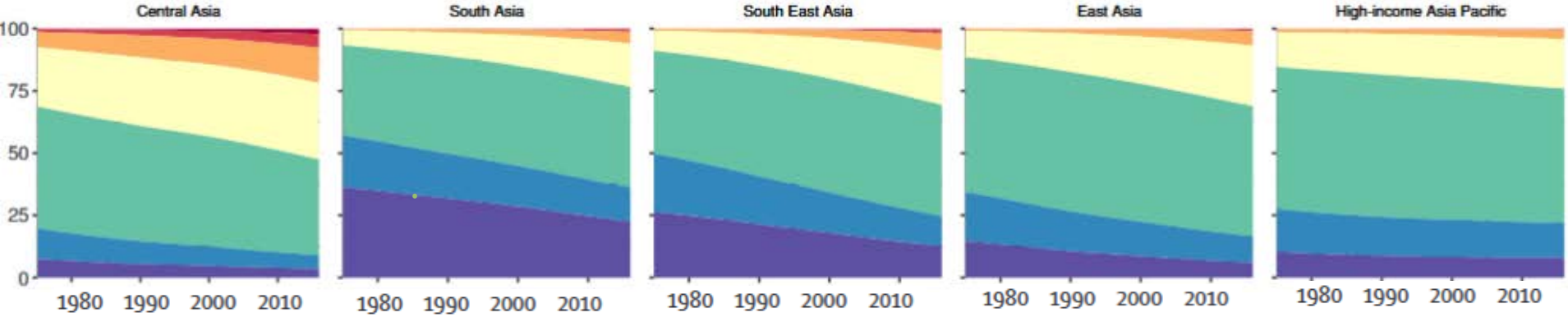
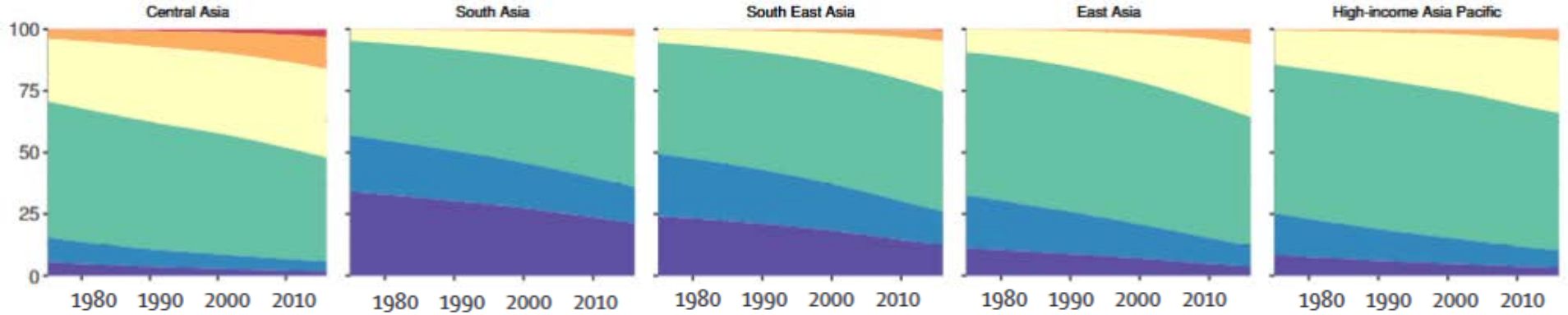
Trends in age-standardized prevalence of BMI categories for adults (aged 20 years and older) by region: **Double burden**

Women



Men



BMI <18.5 | BMI 18.5-20 | BMI 20-25 | BMI 25-30 | BMI 30-35 | BMI 35-40 | BMI≥ 40

Lancet. 2017 Dec 16;390(10113):2627-2642

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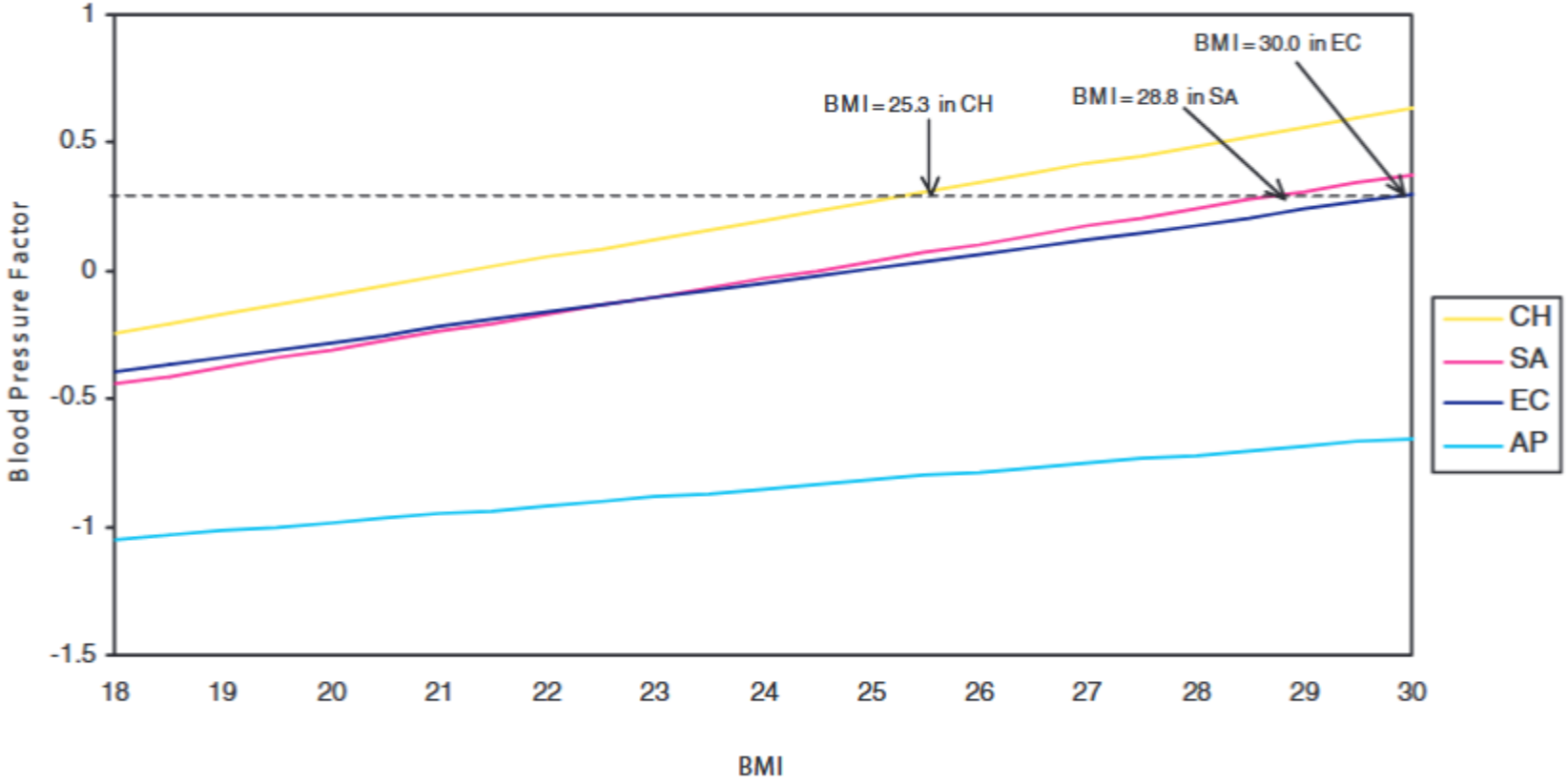
Age-adjusted percent distributions of selected health behaviors for adults 18 years of age and over, 2004–2006, obese

Population	Obese	Ratio Obese/ All Asian Population	Ratio Obese / Whites
All Whites	23.6	--	--
All Asians	8.1	--	0.3
Chinese	4.2	0.5	0.2
Filipino	14.1	1.7	0.6
Asian Indian	6.0	0.7	0.3
Japanese	8.7	1.1	0.4
Vietnamese	5.3	0.7	0.3
Korean	2.8	0.3	0.1
Other Asian & NHOPI	12.5	1.5	0.5

Source: CDC, 2008. Health Characteristics of the Asian Adult Population: United States, 2004-2006. Table 2. http://www.cdc.gov/nchs/data/ad/ad394.pdf [PDF | 476KB]


BMI = 30.0 in EC
BMI = 25.3 in CH
BMI = 28.8 in SA
Blood Pressure Factor
1
0.5
0
-0.5
-1
-1.5
18
19
20
21
22
23
24
25
26
27
28
29
30
BMI
CH
SA
EC
AP

Ethnic group	Waist circumference (as measure of central obesity)
Europids*	
Men	≥94 cm
Women	≥80 cm
South Asians	
Men	≥90 cm
Women	≥80 cm
Chinese	
Men	≥90 cm
Women	≥80 cm
Japanese	
Men	≥85 cm
Women	≥90 cm
Ethnic south and central Americans	Use south Asian recommendations until more specific data are available
Sub-Saharan Africans	Use European data until more specific data are available
Eastern Mediterranean and middle east (Arab) populations	Use European data until more specific data are available

Data are pragmatic cutoffs and better data are required to link them to risk. Ethnicity should be basis for classification, not country of residence. *In USA, Adult Treatment Panel III values[7] (102 cm male, 88 cm female) are likely to continue to be used for clinical purposes. In future epidemiological studies of populations of Europid origin (white people of European origin, regardless of where they live in the world), prevalence should be given, with both European and North American cutoffs to allow better comparisons.

Table: **Ethnic-specific values for waist circumference**

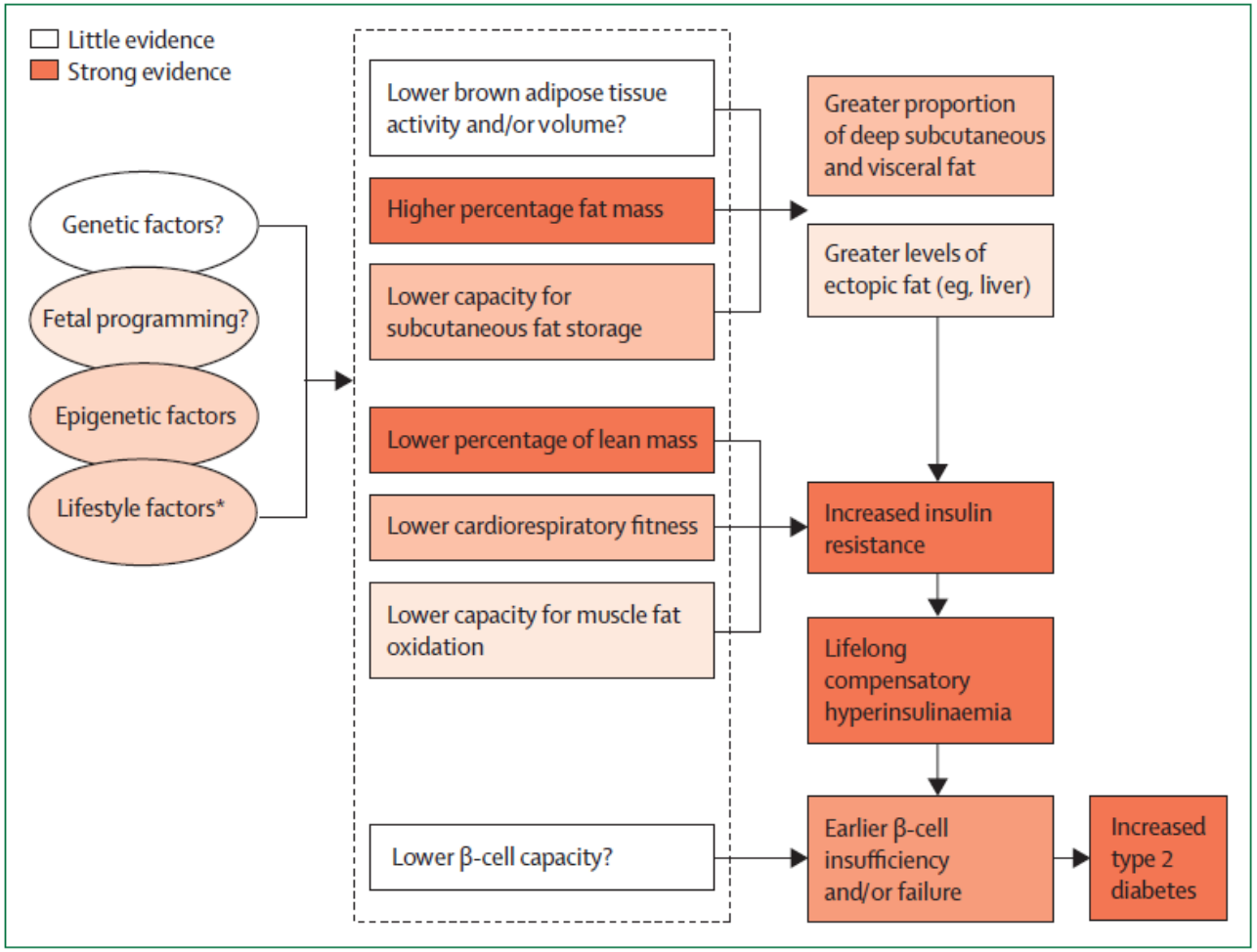


***Figure 3*: Hypothesised mechanisms for increased type 2 diabetes risk in south Asian people**
A combination of innate and environmental factors interact to accelerate diabetes risk in south Asian people compared with individuals of white European descent, through the potential mechanisms outlined. Intensity of colour in the boxes suggests the amount of supporting evidence for each factor. *Such as urbanisation, diet, physical activity.

Lancet Diabetes Endocrinol 2015;3: 1004–16

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Rank	Countries	Total healthcare expenditure*
1	United States of America	348
2	China	110
3	Germany	42
4	India	31
5	Japan	28
6	Brazil	24
7	Russian Federation	20
8	Mexico	19
9	France	18
10	Canada	15

*Billion ID