



Why Do We Treat Obesity?

Epidemiology



AACE OBESITY RESOURCE CENTER

AACE ONLINE ENDOCRINE ACADEMY

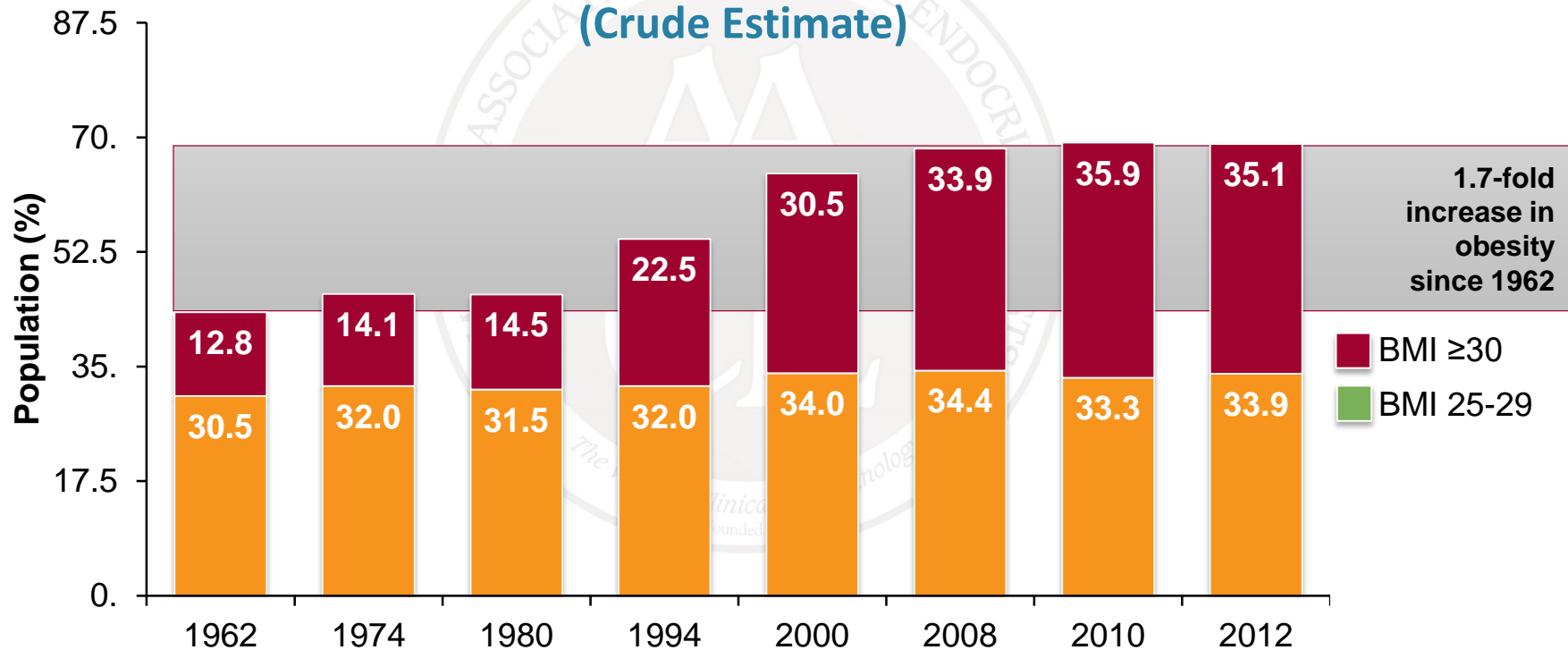


Epidemiology of Obesity

U.S. Epidemic

More than Two Thirds of US Adults Are Overweight or Obese

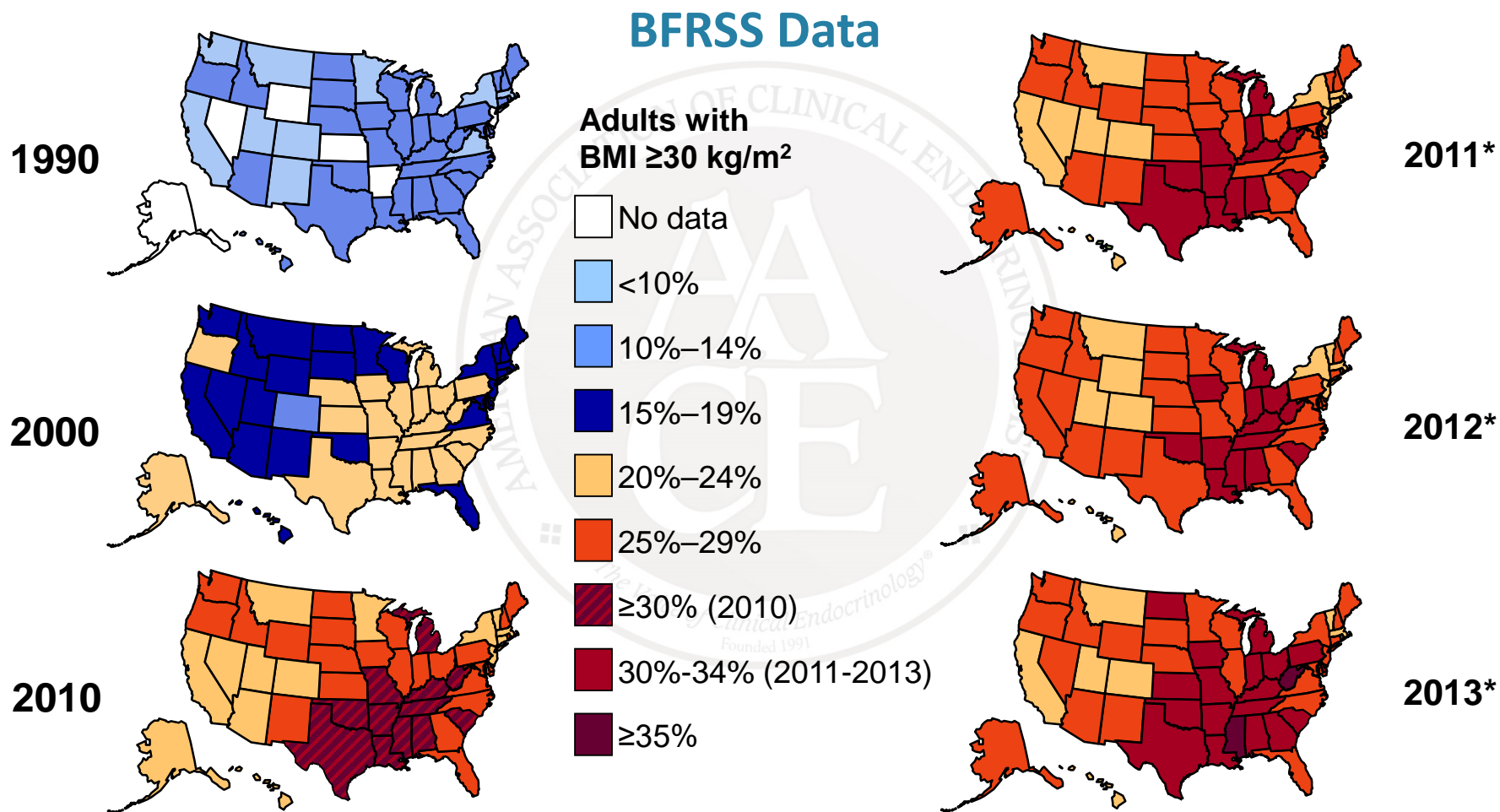
NHANES Data US Adults Age ≥20 Years (Crude Estimate)



BMI = body mass index (in kg/m²); NHANES = National Health and Nutrition Examination Survey (x-axis lists last year of each survey).

Flegal KM, et al. *Int J Obes Relat Metab Disord*. 1998;22:39-47; Flegal KM, et al. *JAMA*. 2002;288:1723-1727; Flegal KM, et al. *JAMA*. 2010;303:235-241; Flegal KM, et al. *JAMA*. 2012;307:491-497. Ogden CL, et al. *JAMA*. 2014;311:806-814.

Obesity Rates Are Increasing Across the United States



*BFRSS methodology changed in 2011 and data from 2010 and earlier cannot be compared to data from 2011 onward.

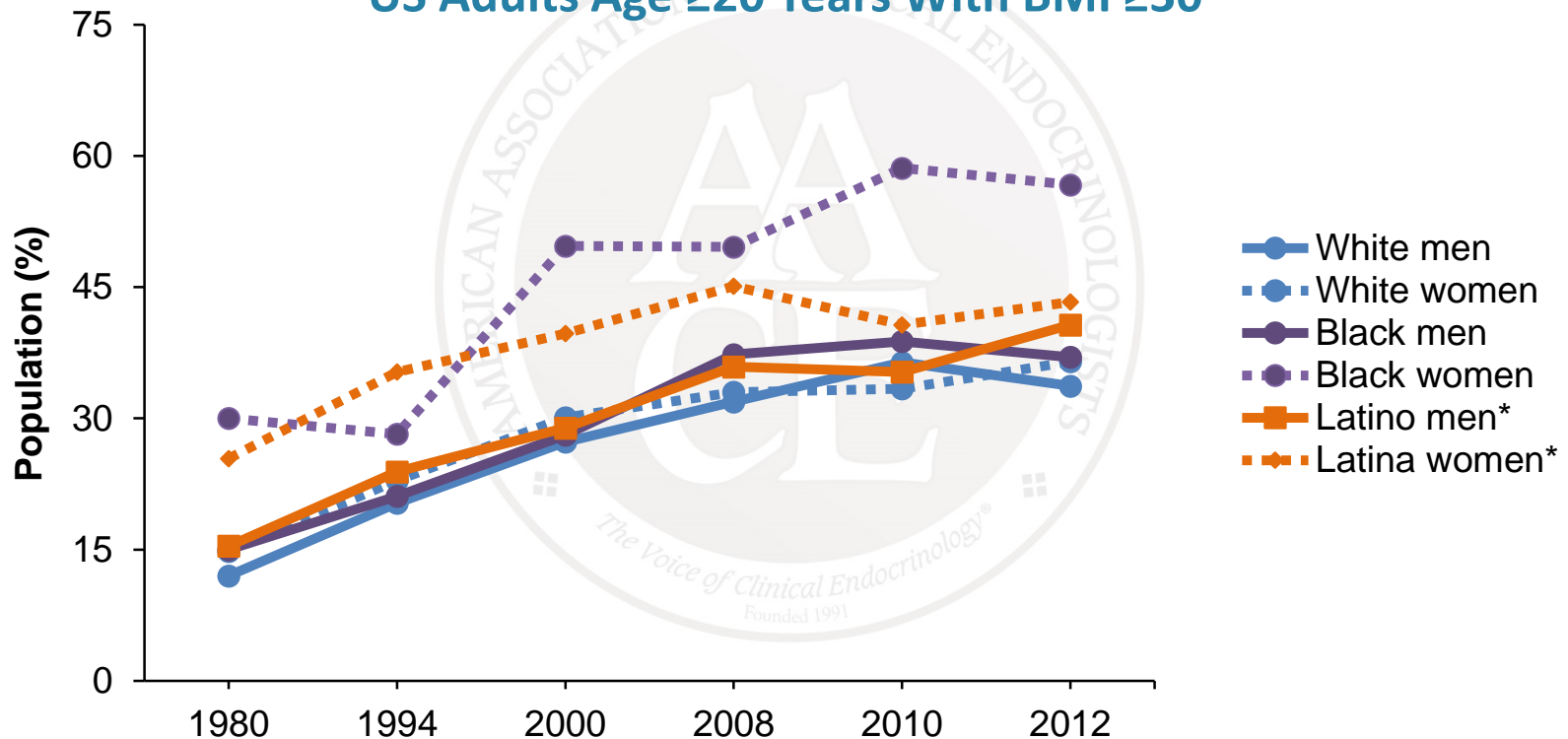
BRFSS = Behavioral Risk Factor Surveillance System; BMI = body mass index.

CDC. Adult obesity facts. Available at: <http://www.cdc.gov/obesity/data/trends.html>.

Prevalence of Obesity Varies With Race, Ethnicity, and Sex

NHANES Data

US Adults Age ≥ 20 Years With BMI ≥ 30



*Estimates based on Mexican Americans only for 1980-2008.

BMI = body mass index (in kg/m^2); NHANES = National Health and Nutrition Examination Survey (x-axis lists last year of each survey).

Flegal KM, et al. *Int J Obes Relat Metab Disord*. 1998;22:39-47; Flegal KM, et al. *JAMA*. 2002 ;288:1723-1727; Flegal KM, et al. *JAMA*. 2010;303:235-241; Flegal KM, et al. *JAMA*. 2012;307:491-497. Ogden CL, et al. *JAMA*. 2014;311:806-814.

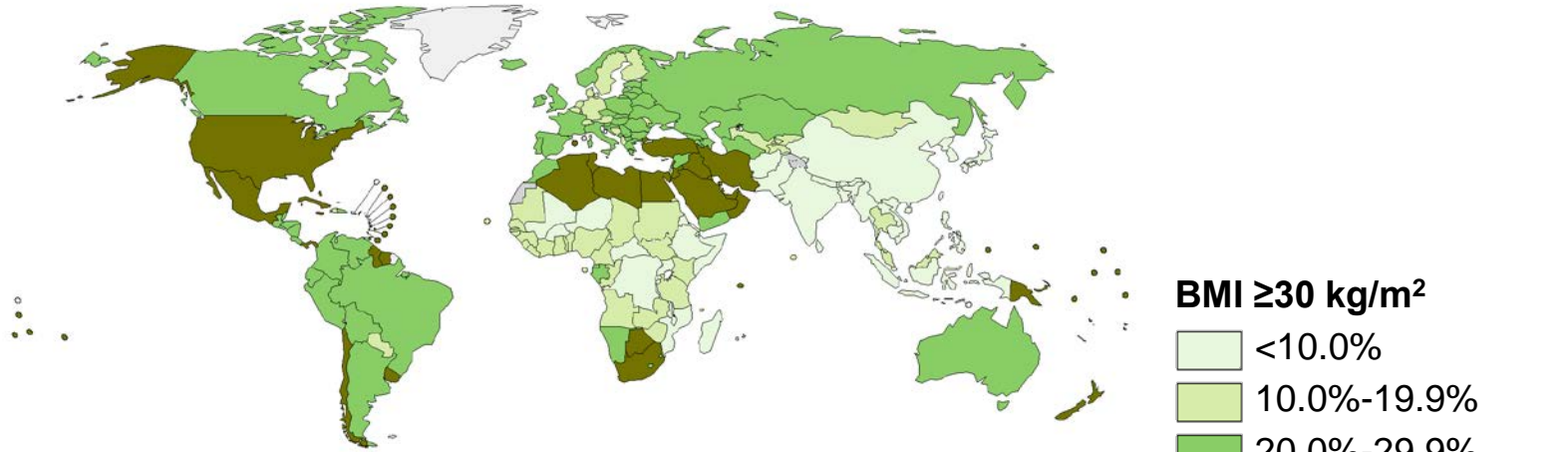


Epidemiology of Obesity

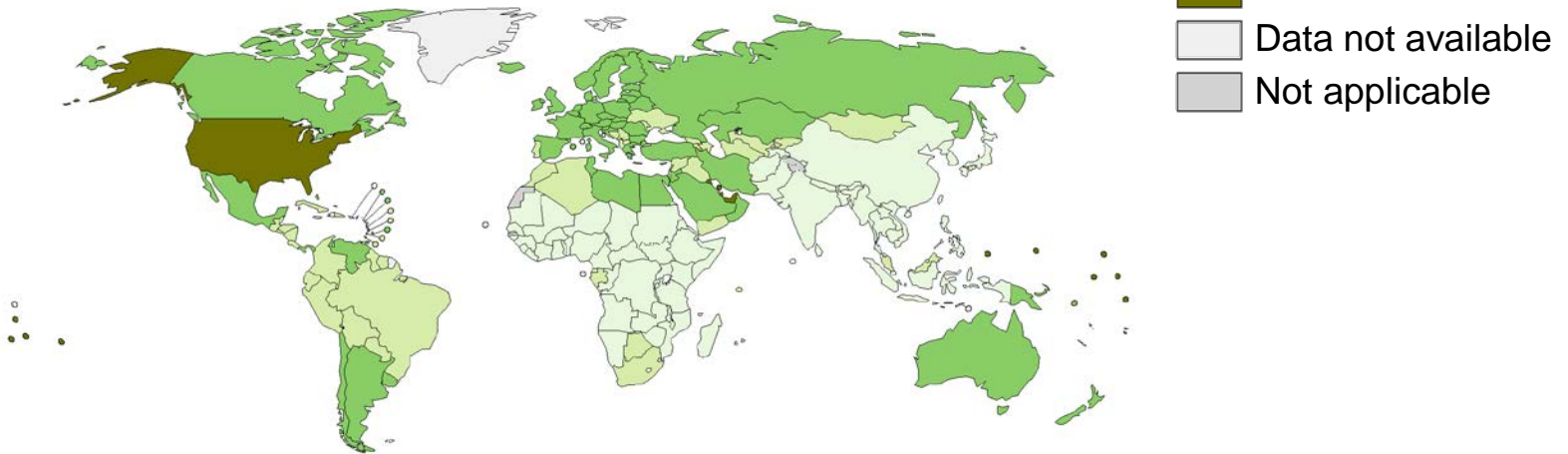
Worldwide Trends

Worldwide Prevalence of Obesity 2015

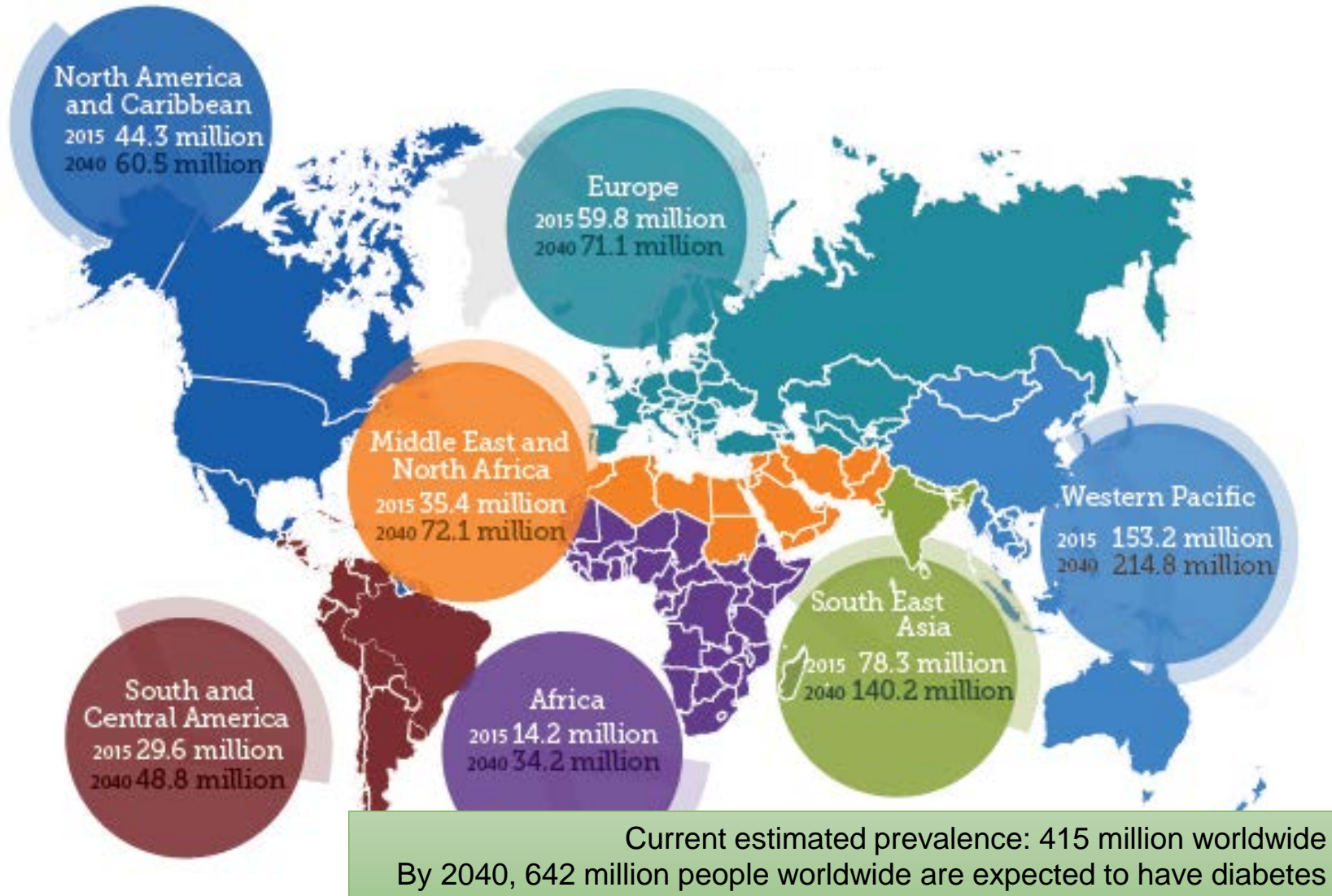
Women, Age ≥18 Years



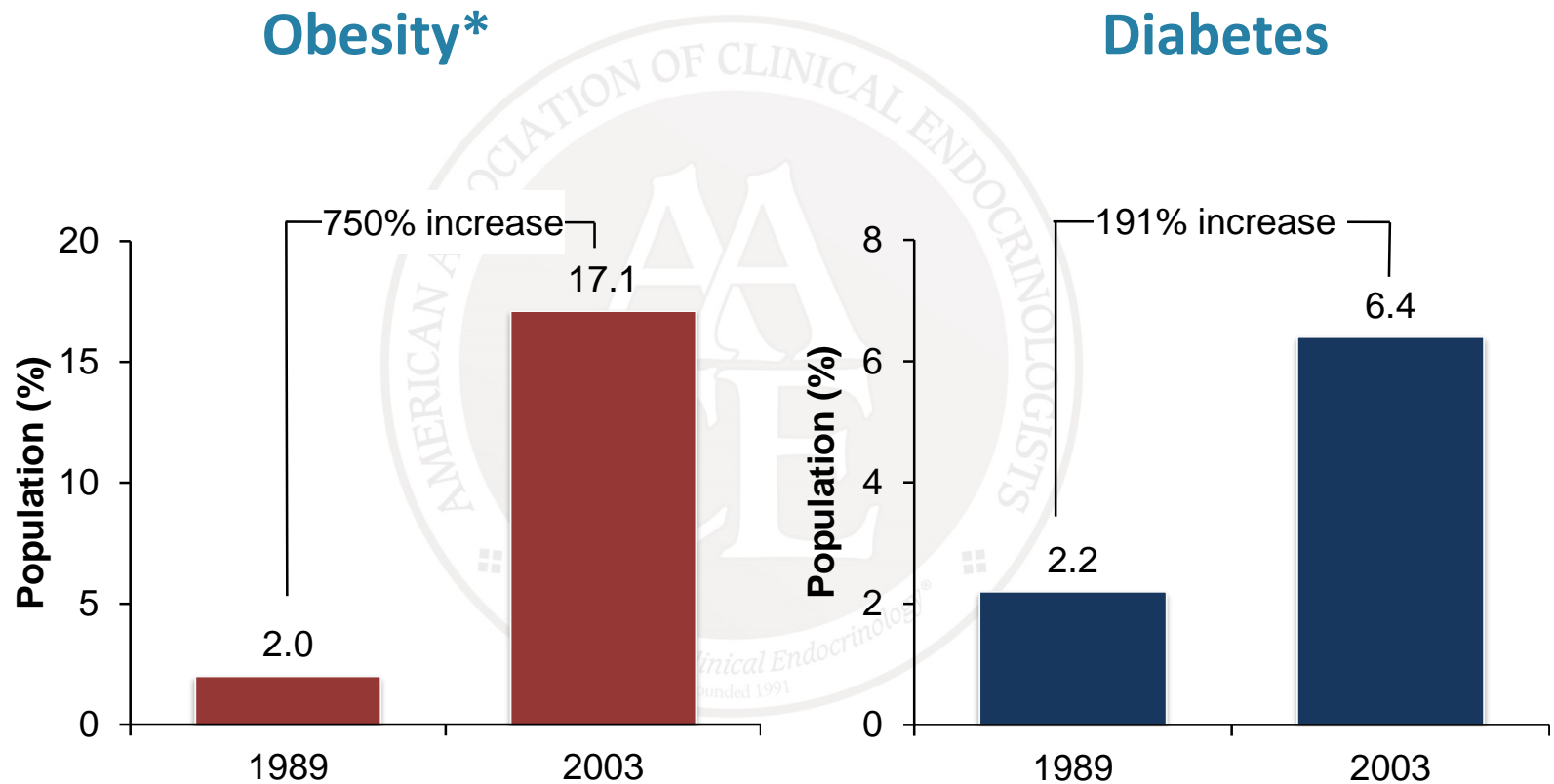
Men, Age ≥18 Years



Obesity Increase Is Associated with Rising Rates of Diabetes Worldwide



Strong Association Between Weight Gain and Diabetes: Rural India



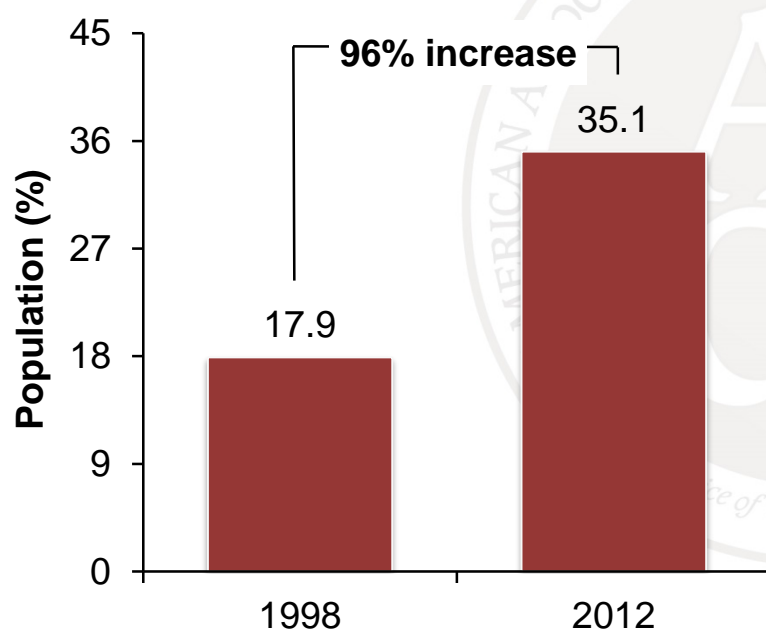
*BMI ≥ 25 kg/m².

BMI = body mass index.

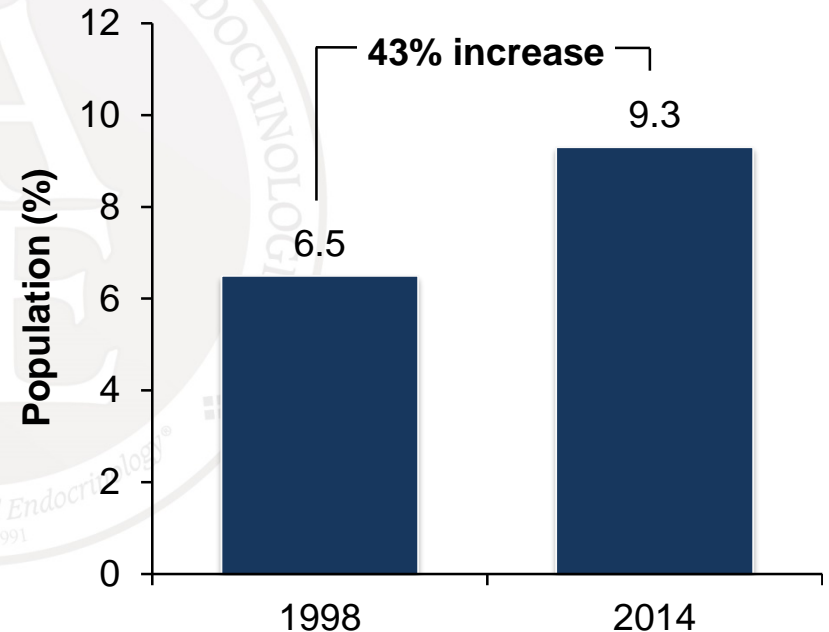
Ramachandran A, et al. *Diabetologia*. 2004;47:860-865.

The Increase in Diabetes Parallels the Increase in Obesity in the United States

Obesity*



Diabetes



*BMI ≥ 30 kg/m².

BMI = body mass index.

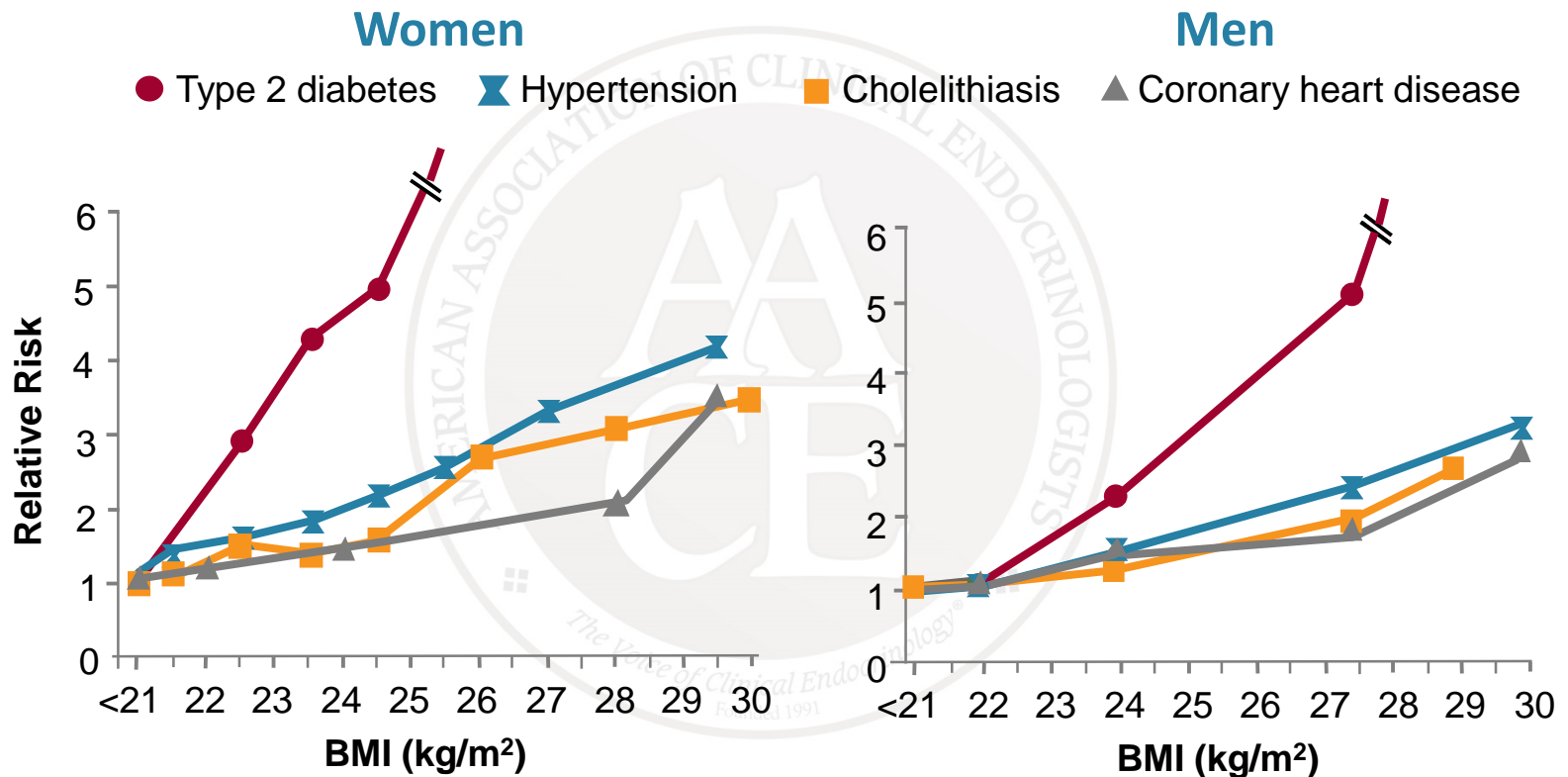
CDC. National diabetes statistics report, 2014. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2014. Mokdad AH, et al. *JAMA*. 1999;282:1519-1522; Mokdad AH, et al. *Diabetes Care*. 2000;23:1278-1283; Ogden CL, et al. *JAMA*. 2014;311:806-814.



Epidemiology of Obesity

Impact on Clinical Outcomes

The Risk of Chronic Conditions Increases With BMI



Increased abdominal adiposity is highly correlated with insulin resistance and type 2 diabetes

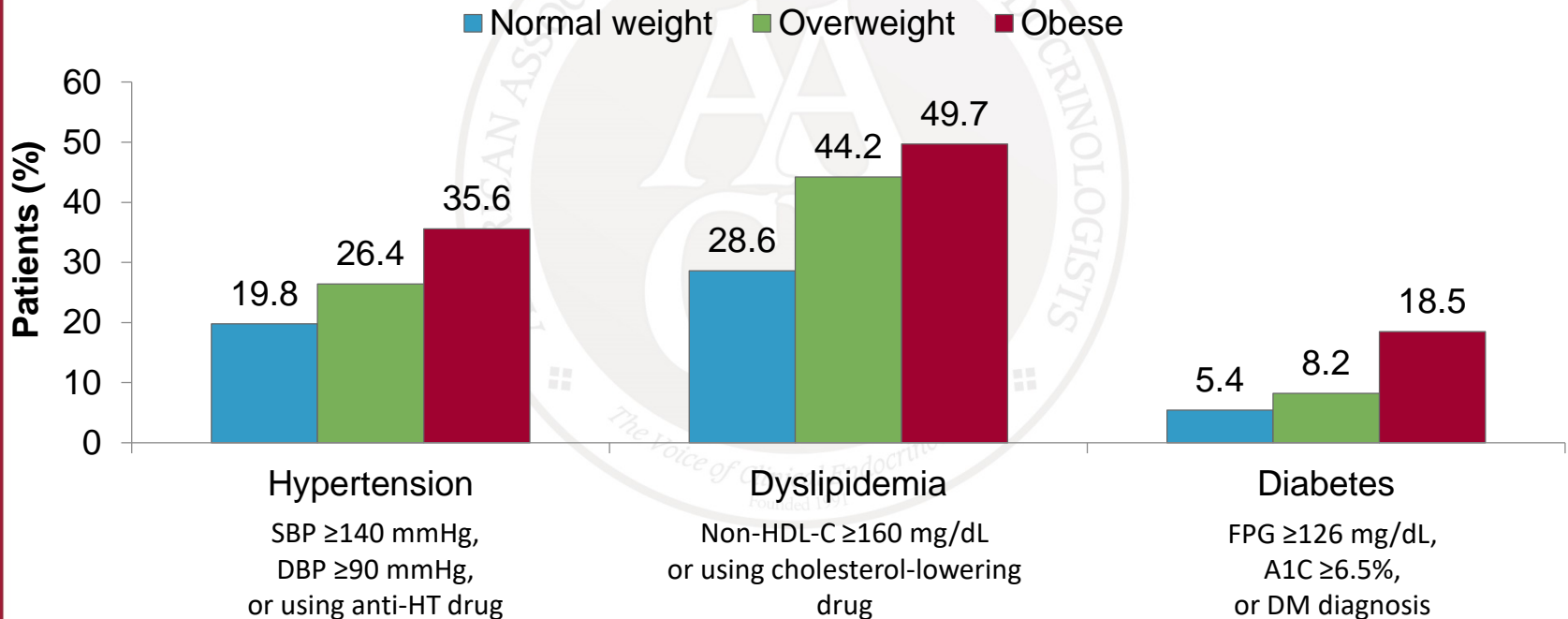
BMI = body mass index.

Willett WC, et al. *N Engl J Med.* 1999;341:427-434. Carey VJ, et al. *Am J Epidemiol.* 1997;145:614-619.

Prevalence of Weight-Related Comorbidities in the US

NHANES 2007-2010

US Adults Age ≥18 Years (N=12,175)



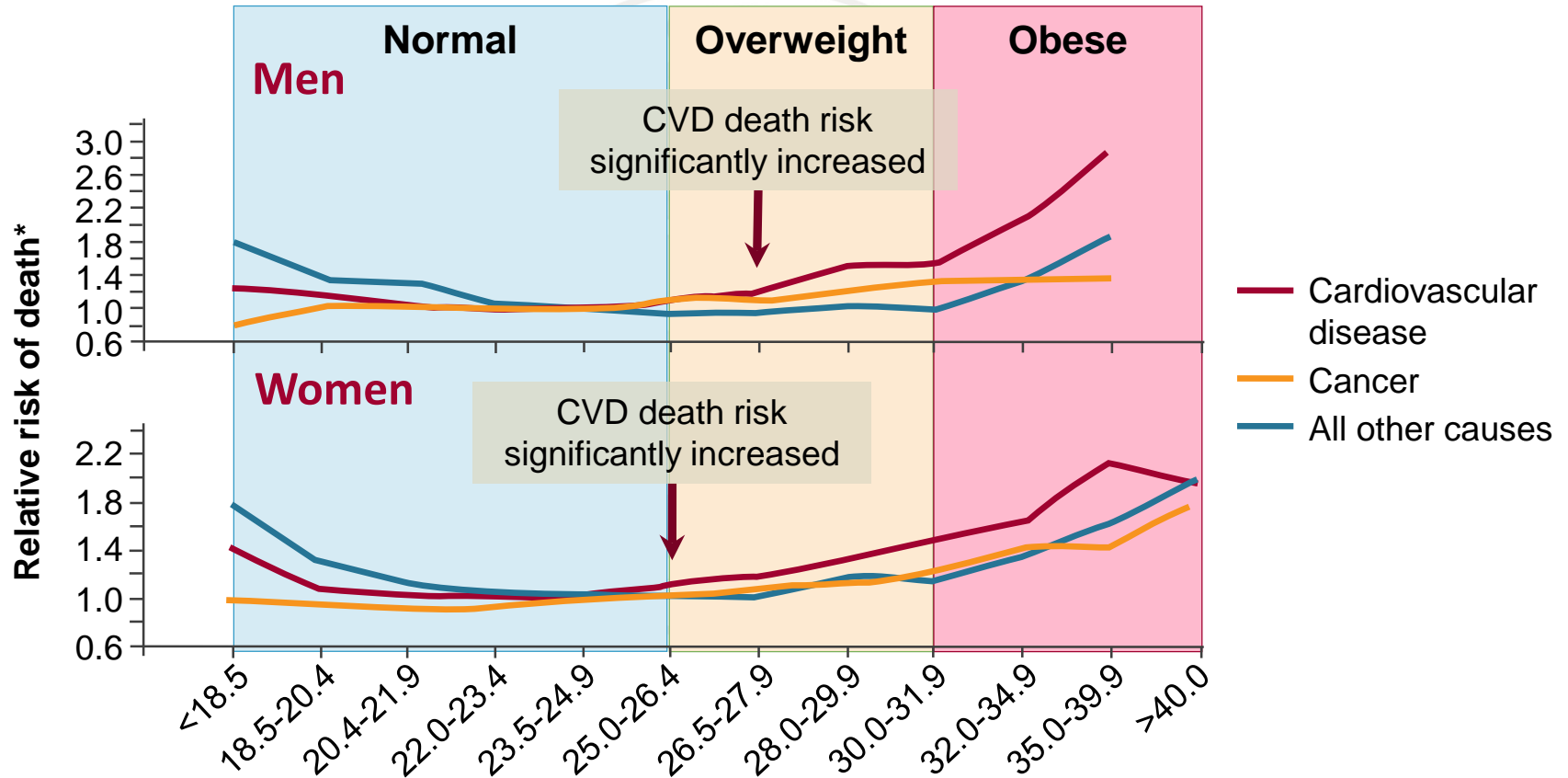
Normal weight = BMI 18 to <25 kg/m²; overweight = BMI 25 to <30 kg/m²; obese = BMI ≥30 kg/m²

BMI = body mass index; DM = diabetes mellitus; DBP = diastolic blood pressure; HDL-C = high density lipoprotein cholesterol; HT = hypertension; SBP = systolic blood pressure.

Saydah S, et al. *Obesity (Silver Spring)*. 2014;22:1888-1895.

Mortality Increases with BMI

Cancer Prevention Study II (N=1,046,154)

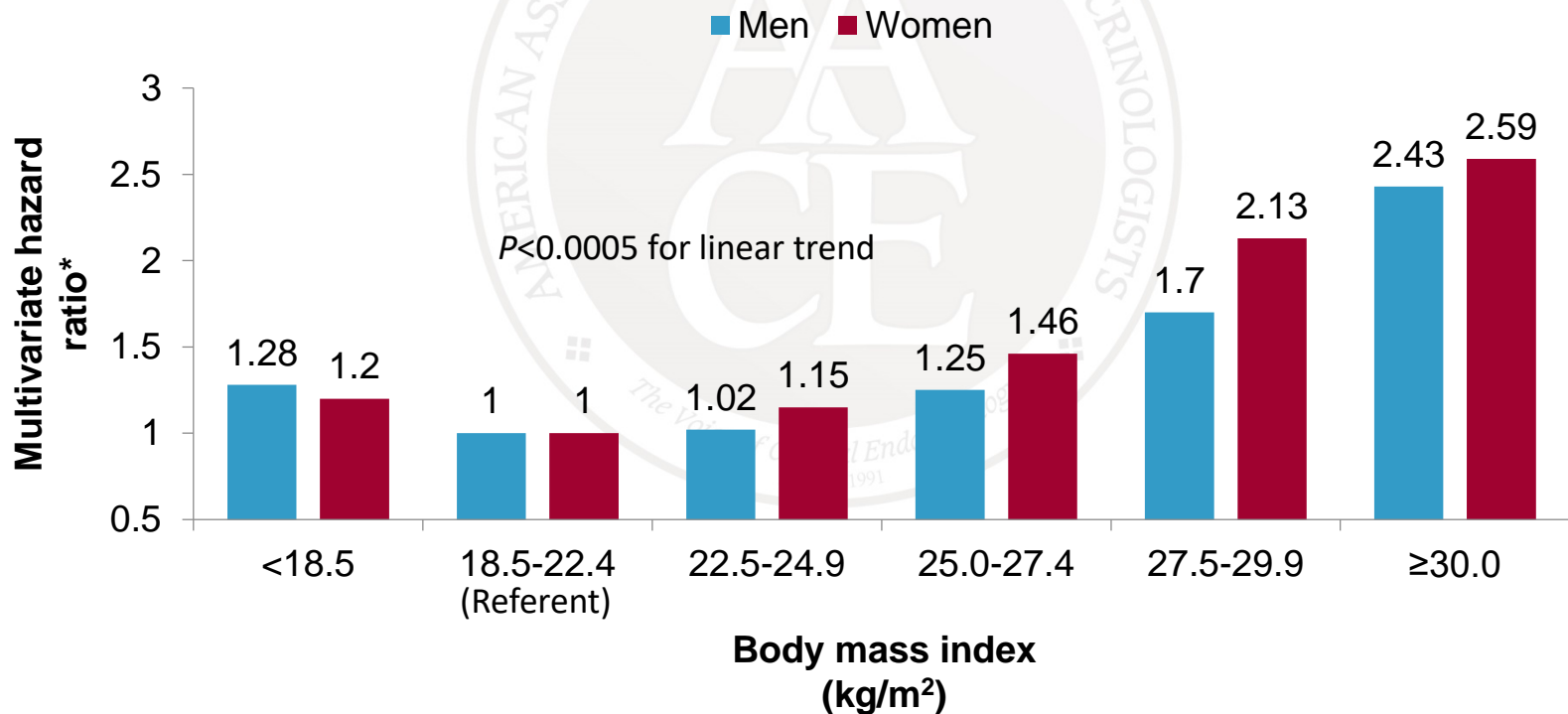


*Cox proportional hazards model adjusted for age at enrollment, education, physical activity, alcohol use, marital status, aspirin use, fat consumption, vegetable consumption, and use estrogen replacement therapy in women.

Calle EE, et al. *New Engl J Med.* 1999;341:1097-1105.

All-Cause Mortality Increases with BMI

National Institutes of Health AARP Cohort Study,
1996-2009
(N=109,947 Never-Smokers)

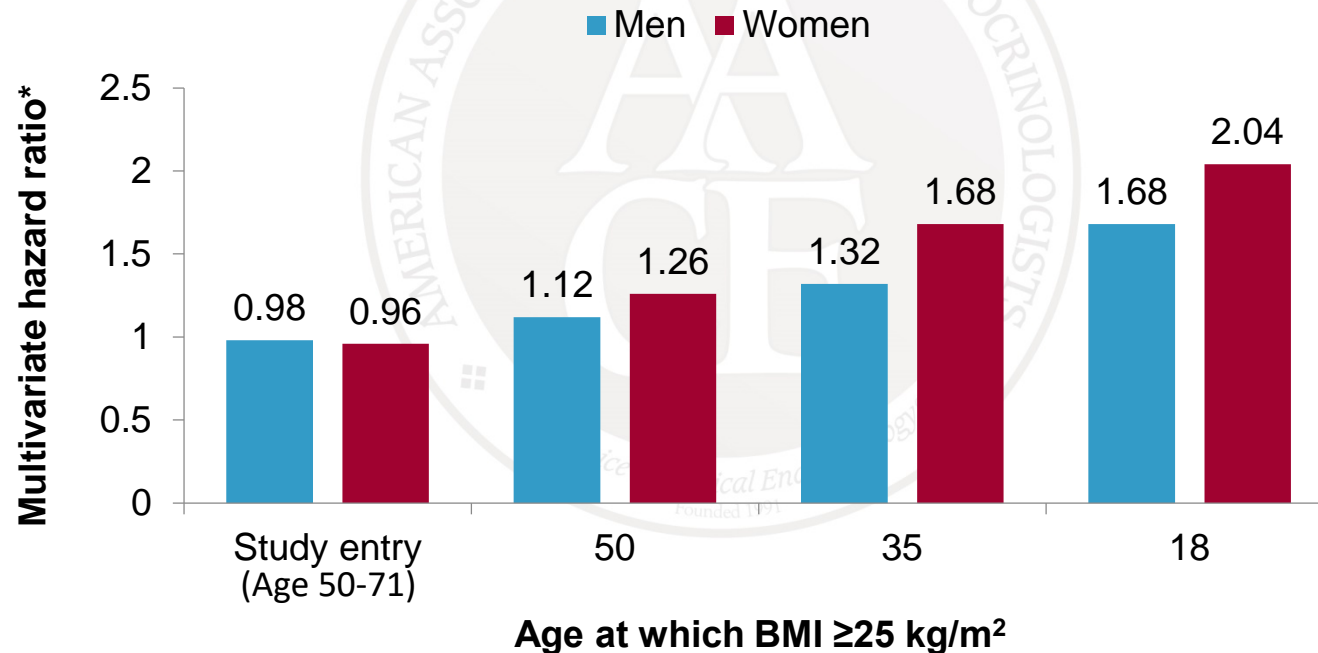


*Regression analyses adjusted for age, race/ethnicity, education, leisure-time physical activity, and alcohol consumption.

Adams KF, et al. *Am J Epidemiol.* 2014;179:135-144.

Earlier Weight Gain Increases Total Mortality Risk

National Institutes of Health AARP Cohort Study,
1996-2009
(N=109,947 Never-Smokers)



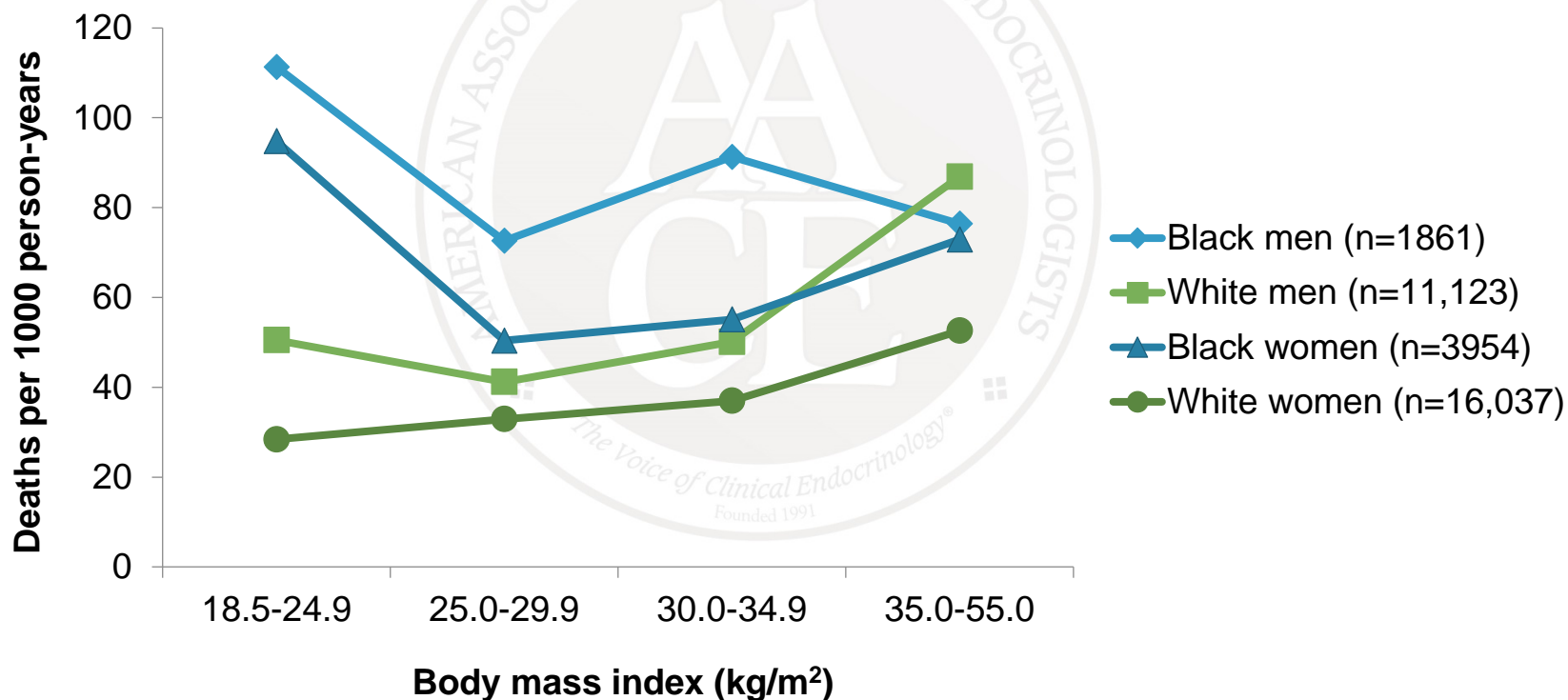
*Regression analyses adjusted for age, race/ethnicity, education, leisure-time physical activity, and alcohol consumption.

Adams KF, et al. *Am J Epidemiol.* 2014;179:135-144.

Racial Differences in BMI-Mortality Association

National Health Interview Survey, 1997-2006

All-Cause Mortality Rates Among Individuals Who Have Never Smoked



Age-standardized all-cause mortality rates for persons aged 35-75 years without a history of heart disease or cancer at baseline.

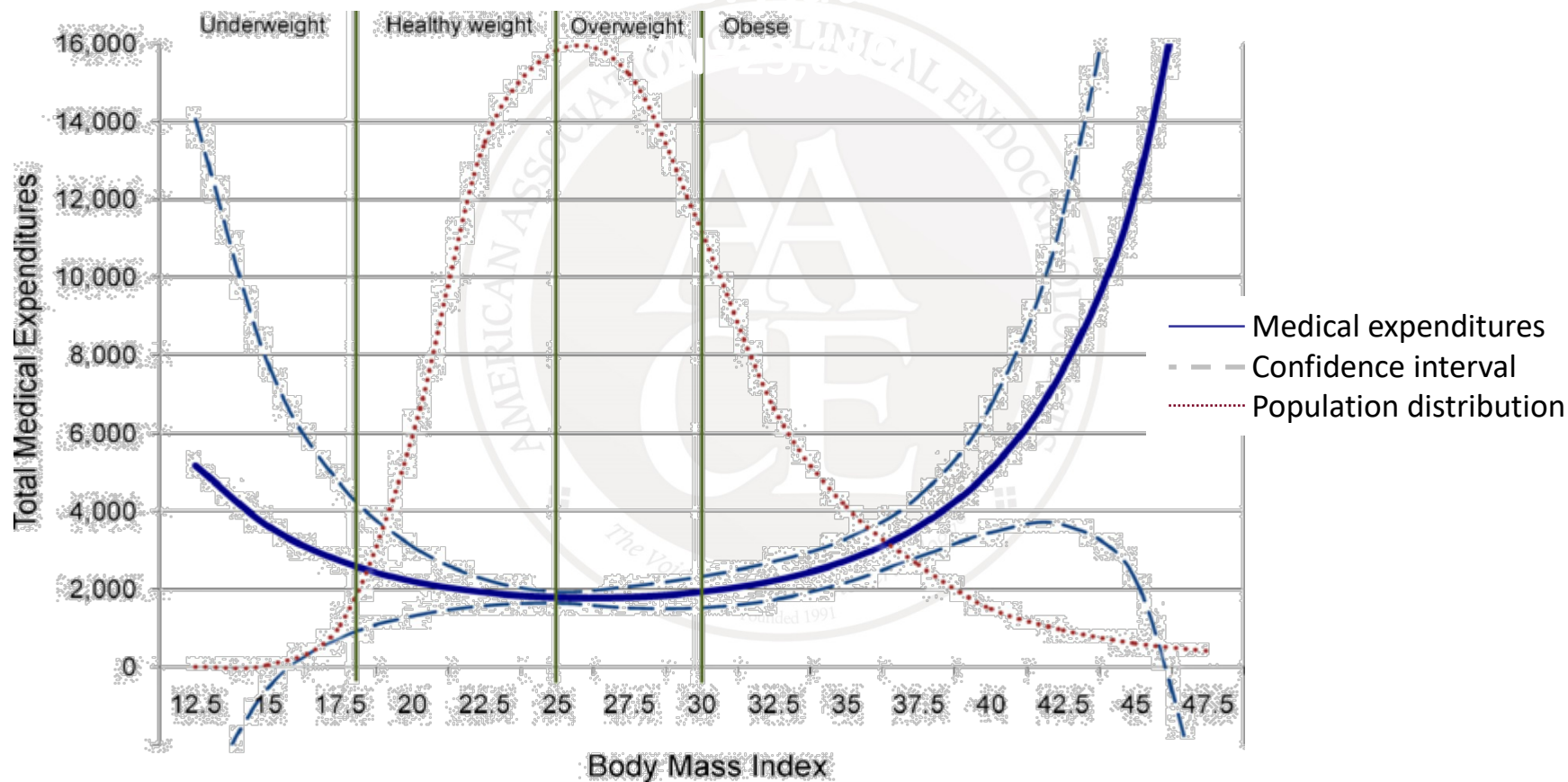
Jackson CL, et al. *Obesity (Silver Spring)*. 2014;22:842-851.



Epidemiology of Obesity

Economic Impact

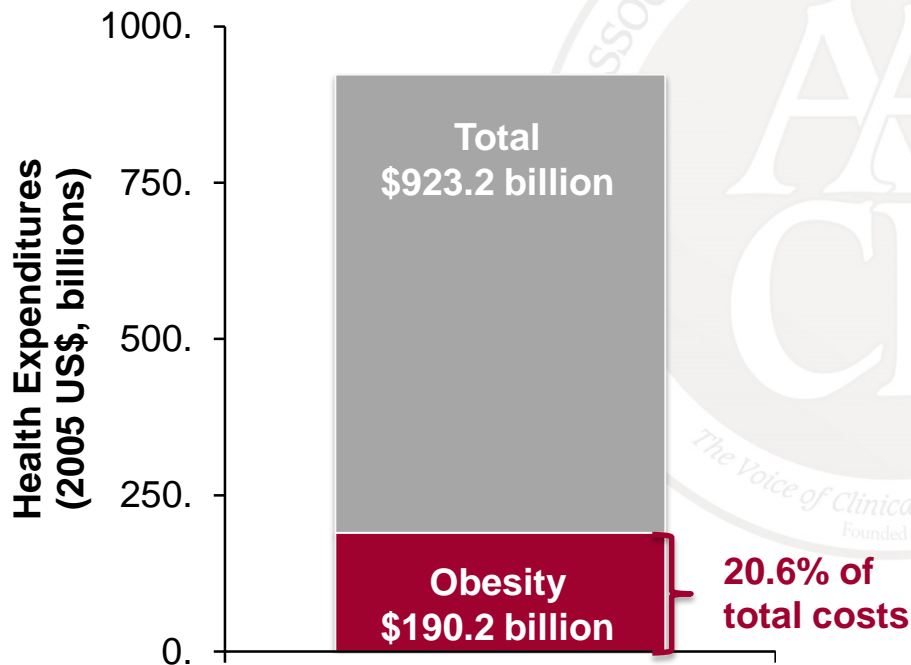
The Effect of Weight on Healthcare Costs



Obesity-Related Illness Accounts for One-Fifth of U.S. Healthcare Costs

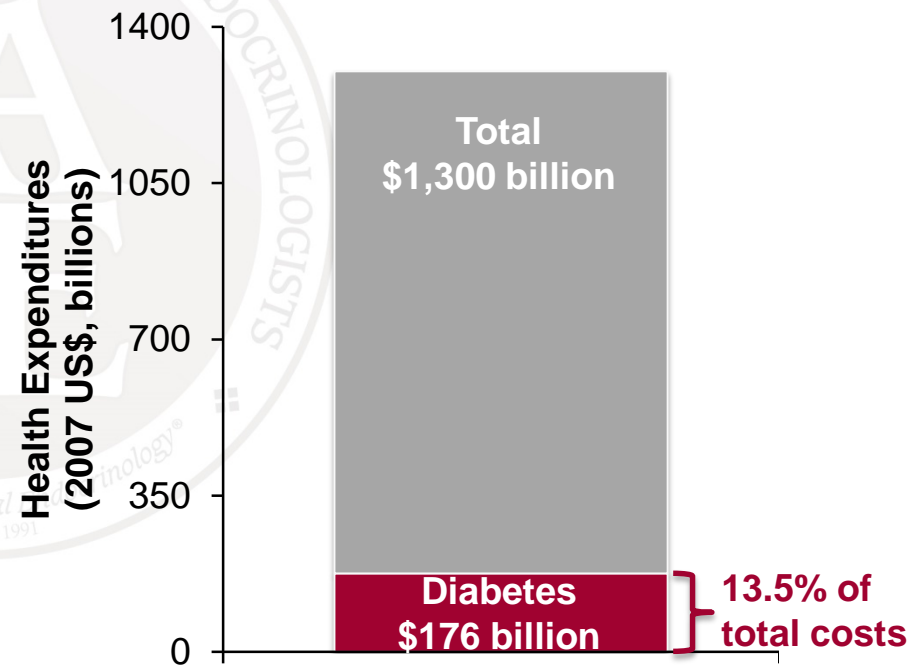
Obesity Costs¹

U.S. Adults Age ≥18 Years



Diabetes Costs²

U.S. Residents, All Ages

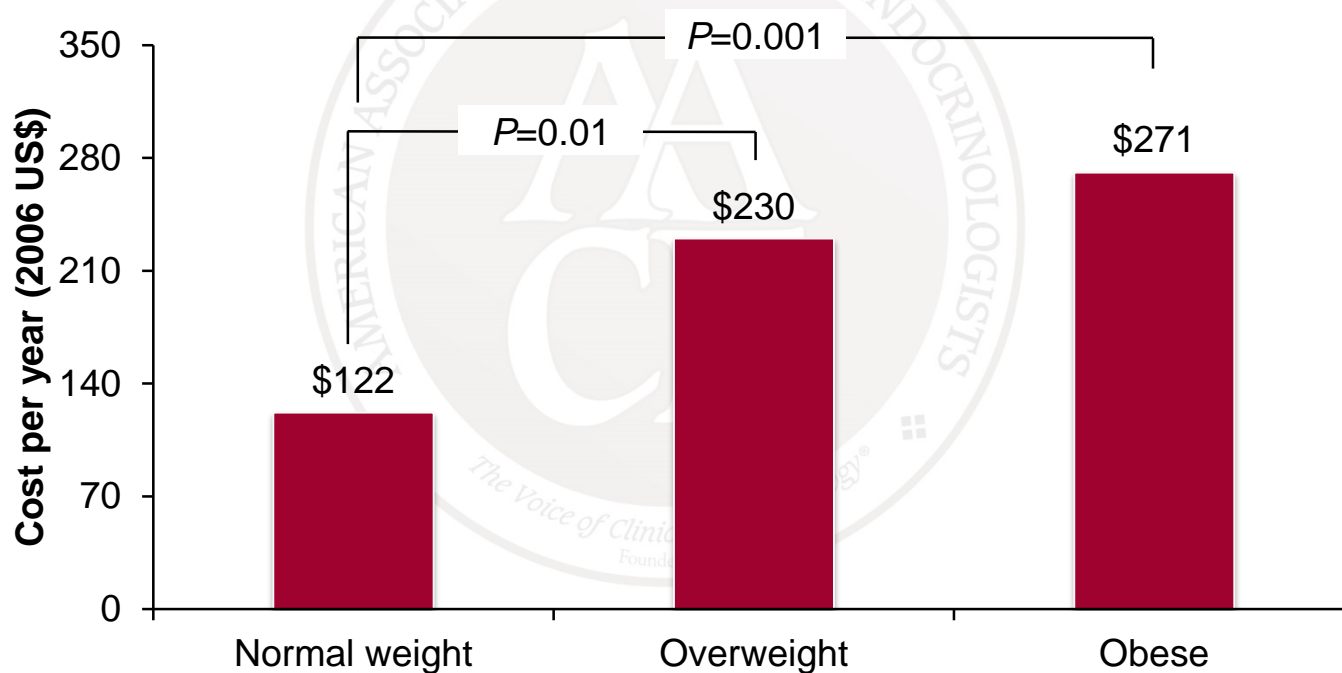


1. Cawley J, Meyerhoefer C. *J Health Econ.* 2012;31:219-230.

2. ADA. *Diabetes Care.* 2013;36:1033-1046.

Medicare Spending Is Rising Significantly Faster in the Overweight Population

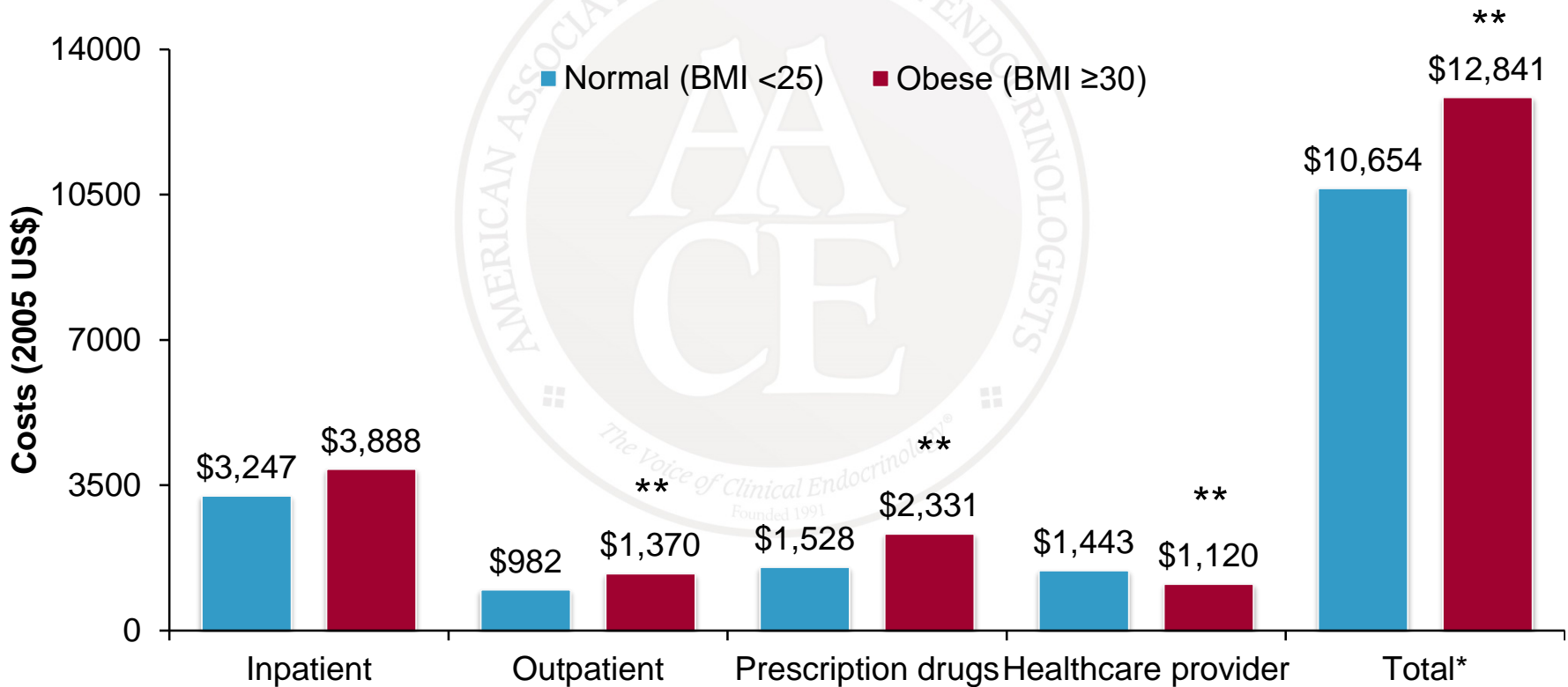
Annual Increase in Medicare Expenditures 1997-2006



After adjustment for obesity-related chronic conditions, interactions were no longer significant

Obesity Significantly Increases Medicare Expenditures

Mean Expenditures in 2003 Individuals >65 Years of Age



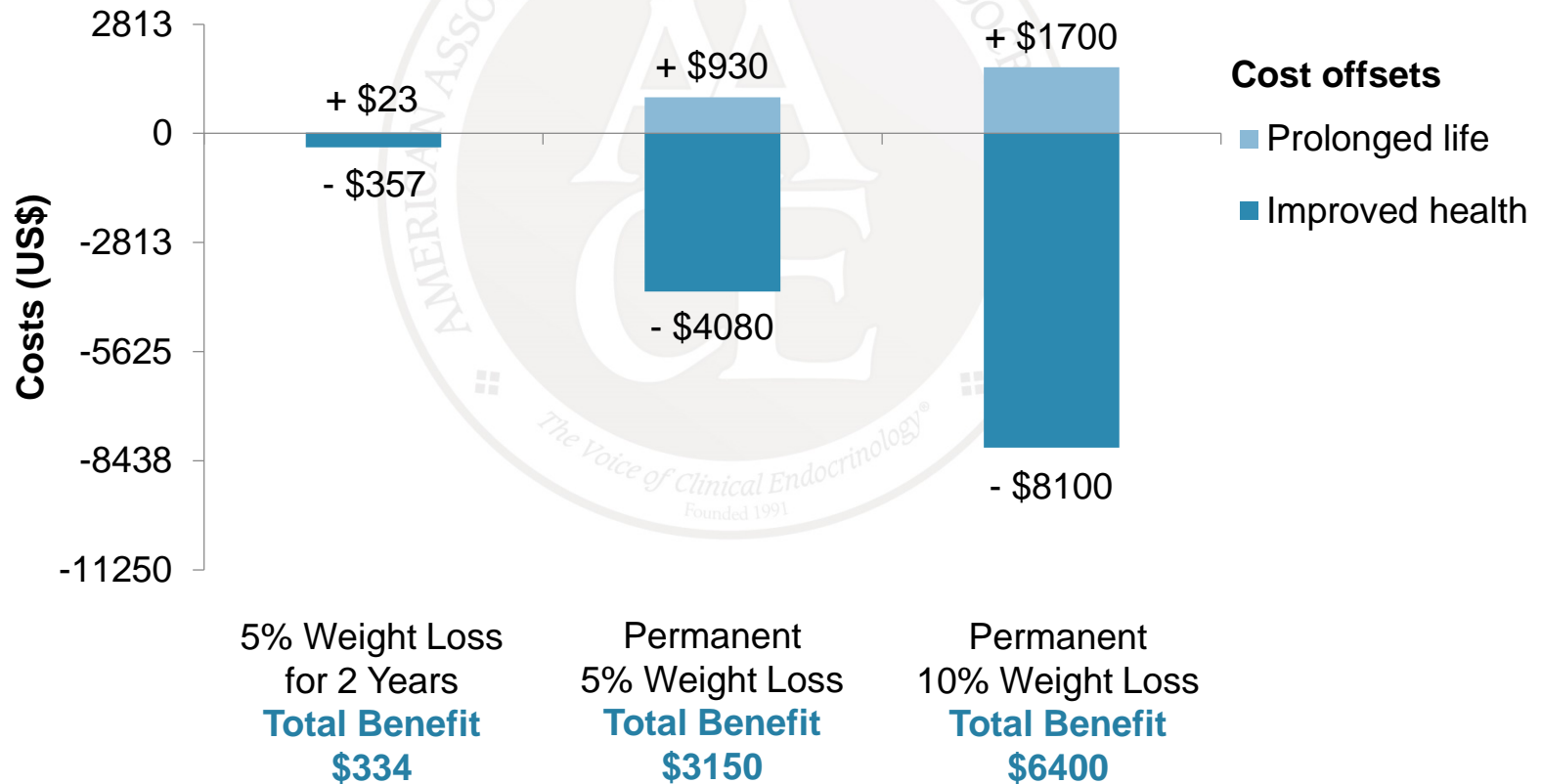
*Includes dental and other costs not shown. ** $P \leq 0.001$ vs normal weight.

BMI = body mass index in kg/m^2 .

Wilkins TL, et al. *Obesity (Silver Spring)*. 2012;20:1240-1248.

Weight Loss Reduces Lifetime Healthcare Costs

Projected Lifetime Healthcare Expenditures Obese Individuals <45 Years of Age



Summary

- Obesity is increasing globally
 - Rates of obesity have risen dramatically in the United States over the past 4 decades
 - The increase in obesity is strongly associated with the increase in diabetes in the U.S. and worldwide
- Obesity is costly

