Prevalence of Prediabetes and Abdominal Obesity Among Healthy Weight Adults: 18 Year Trend

Arch G. Mainous III, PhD
Rebecca J. Tanner, MA
Ara Jo, MS
Stephen D. Anton, PhD

University of Florida
Funded in part by NIH/NIA P30AG028740

THE STAGGERING **COSTS** OF **DIABETES IN AMERICA**

Nearly
30 million
Americans have diabetes.

$1 in $3
Medicare dollars is spent caring for people with diabetes.

Diabetes and prediabetes cost America
$322 billion
per year.

Today,
3,835
Americans will be diagnosed with diabetes. Today, diabetes will cause **200** Americans to undergo an amputation, **136** to enter end-stage kidney disease treatment and **1,795** to develop severe retinopathy that can lead to vision loss and blindness.

86 million
Americans have prediabetes.

$1 in $5
health care dollars is spent caring for people with diabetes.

Learn how to fight this costly disease at **diabetes.org/congress**

American Diabetes Association.

Prediabetes

- Prediabetes is a high risk state for the development of diabetes
- Eighty-six million Americans now have prediabetes
  - 38% of adults without diabetes have prediabetes
  - 90% of adults with prediabetes don't know it
- Without intervention, 15% to 30% of people with prediabetes will develop type 2 diabetes within 5 years.
- Intervening on prediabetes is effective in delaying or stopping the transition to diabetes

Prediabetes and Body Composition

- Secular trends indicate an increase in sedentary lifestyle
- Recent data suggest that some people at normal weight (BMI 18.5-25) may have decreased lean muscle mass
- Among healthy weight people, low grip strength is associated with undiagnosed diabetes and prediabetes

Screening for Prediabetes

- Screening for prediabetes is focused on individuals who are overweight or obese
  - Both USPSTF and ADA recommend screening based on BMI among overweight and obese adults
- Screening that is focused on the overweight and obese may miss individuals who are of healthy weight but have prediabetes.

Purpose

- Examine the nationally representative prevalence of prediabetes and abdominal obesity among healthy weight adults in 1988-1994 and 1999-2012

Methods

- National Health and Nutrition Examination Survey (NHANES) III (1988-1994), and Continuous NHANES (1999-2012)
  - Nationally representative survey sampling non-institutionalized population of the United States
  - Stratified multistage probability sample design
  - Survey includes physical examination, blood and urine tests, and a detailed interview

Methods

- Subjects
  - Adults age 20 and older who have a body mass index of 18.5-24.99, who have not been diagnosed with diabetes or had an HbA1c level of 6.5% or greater at the time of their NHANES physical examination
  - Prediabetes defined as HbA1c level between 5.7%-6.4%
  - Normoglycemia defined as HbA1c level between 4.0% and 5.6%
  - Individuals with HbA1c level below 4.0% were removed from analysis

Methods

- Abdominal Obesity
  - Unhealthy waist circumference
    - Waist circumference greater than 102 cm for men
    - Waist circumference greater than 88 cm for women
  - Unhealthy waist to height ratio (WHR)
    - WHR of .53 or greater for men
    - WHR of .49 or greater in women

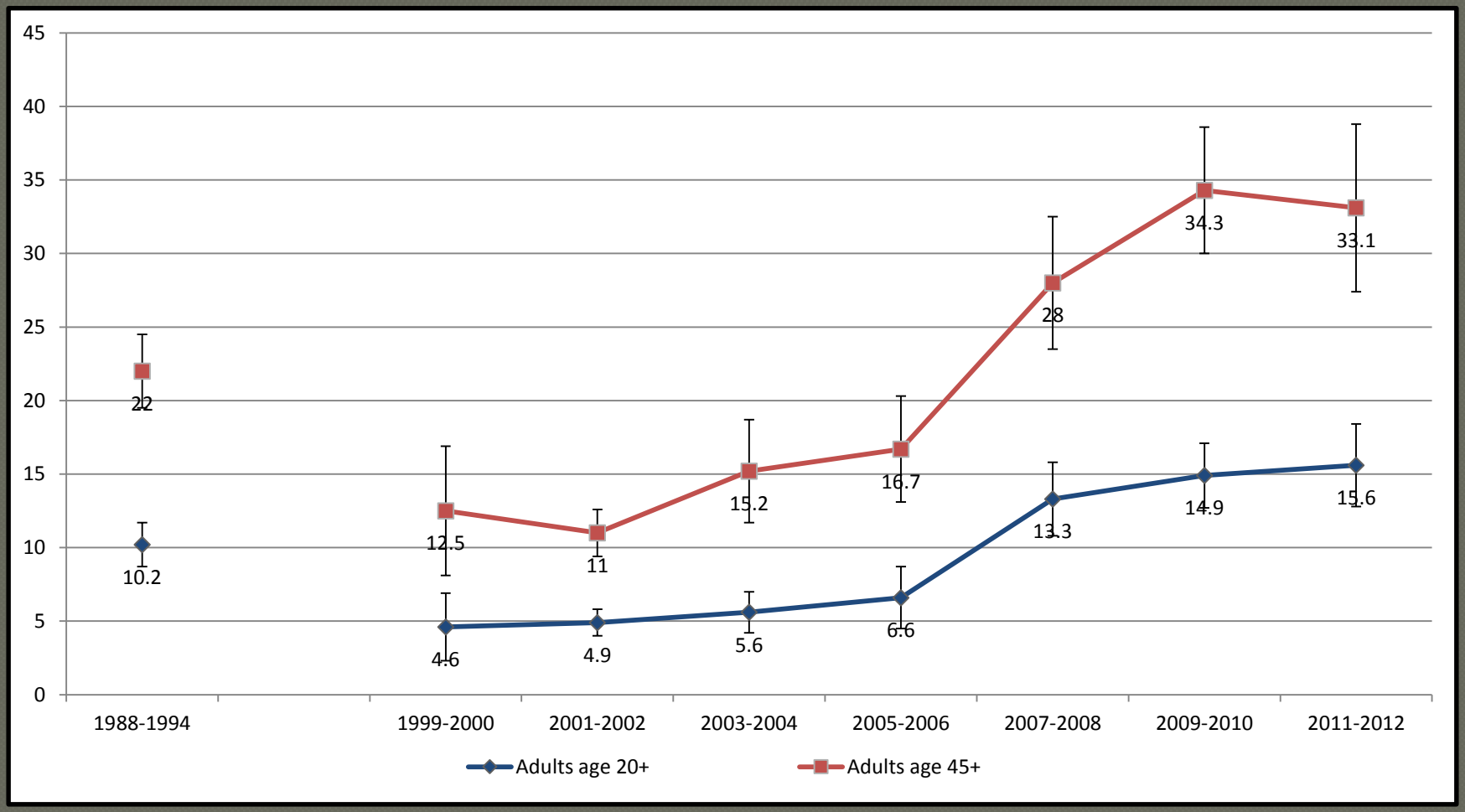
Methods

- Covariates
  - First degree relative with diabetes
  - Age
  - Race
  - Education
  - Poverty to income ratio
  - Health insurance coverage

Methods

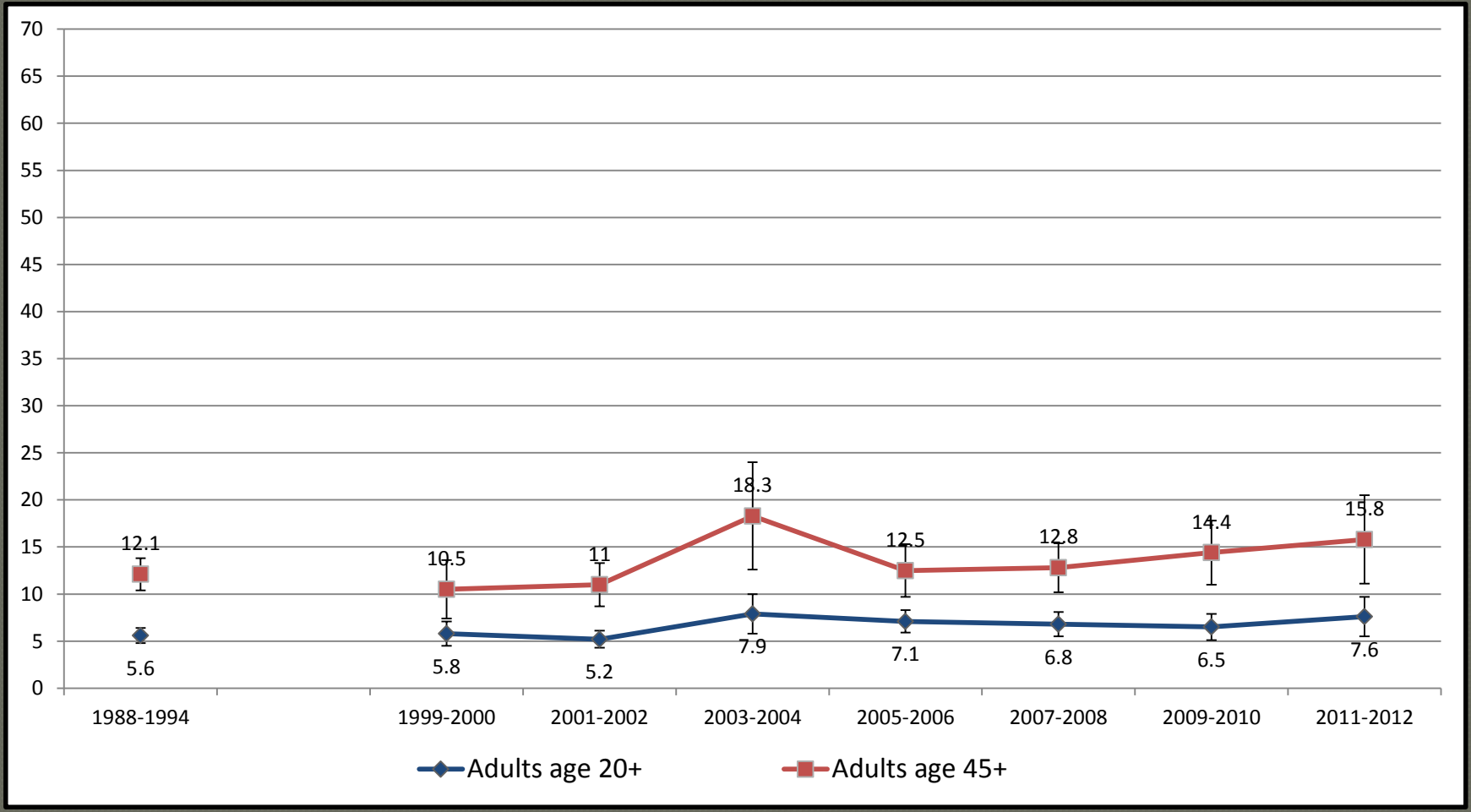
- Data Analysis
  - Data were weighted and accounted for complex sampling design using SUDAAN 11.0
  - Prevalence estimates of prediabetes
  - Trend analysis: 1999-2012 data using logistic regression for trends in prediabetes and abdominal obesity
    - Time modeled as a continuous variable
  - Prediabetes and Abdominal Obesity: T-tests to calculate mean difference in BMI, waist circumference, and WHR between individuals with and without prediabetes
  - Forced logistic regression using 2011-2012 data to assess impact of WC and WHR on prediabetes

Prevalence of Prediabetes for Healthy Weight Adults Age 20+ and 45+



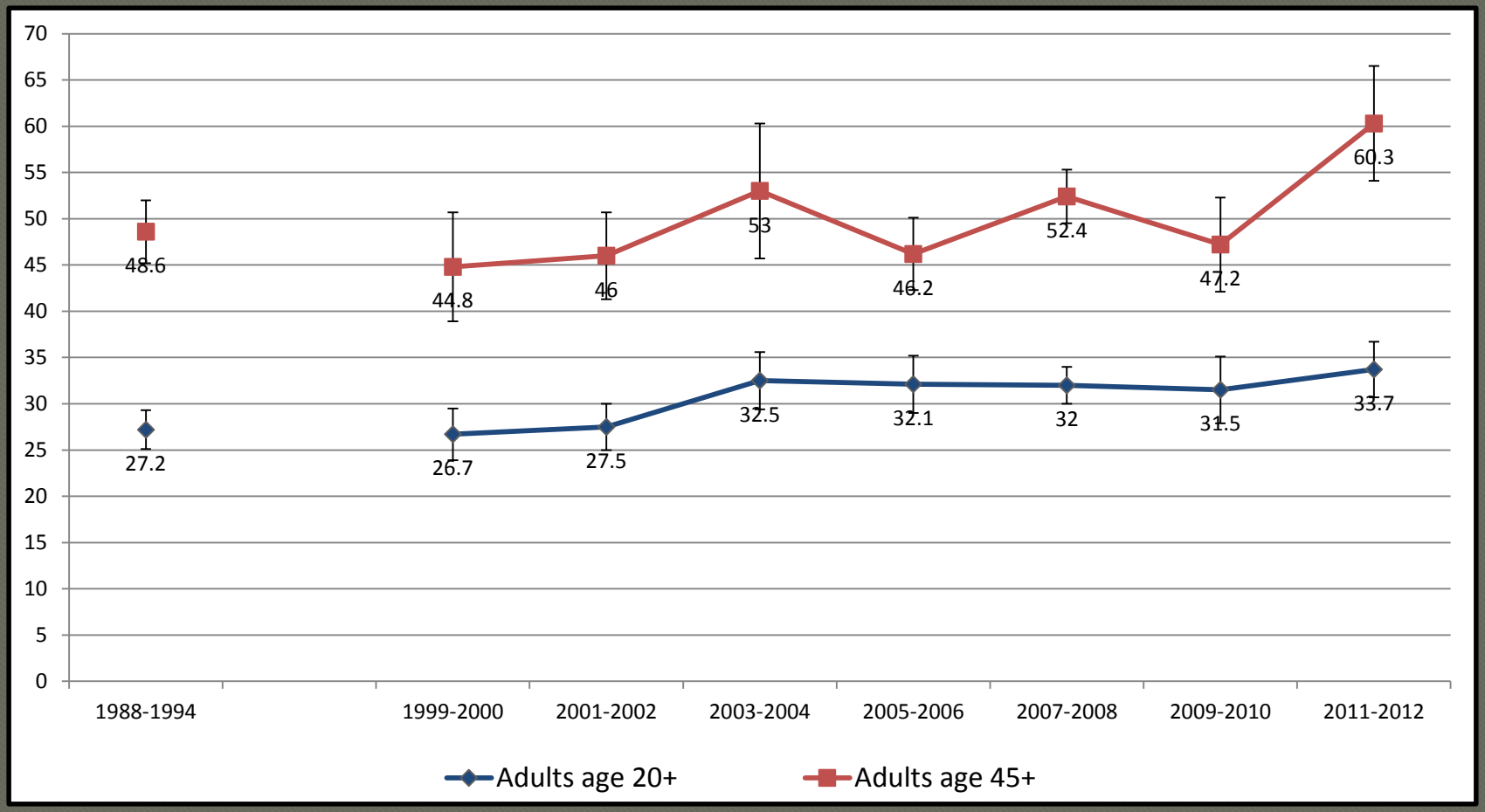
p<.0001

Prevalence of Unhealthy Waist Circumference for Healthy Weight Adults Age 20+ and 45+



P=.38

Prevalence of Unhealthy Waist to Height Ratio for Healthy Weight Adults age 20+ and 45+



P=.01

Odds Ratios for Abdominal Obesity on Prediabetes

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
Age 20 and older		
Unhealthy Waist Circumference	2.30 (0.93-5.72)	1.03 (0.41-2.60)
Unhealthy Waist-to-height Ratio	2.58 (1.63-4.10)	1.01 (0.60-1.68)
Age 45 and older		
Unhealthy Waist Circumference	1.27 (0.46-3.54)	.95 (0.40-2.27)
Unhealthy Waist-to-height Ratio	1.40 (0.90-2.18)	1.00 (0.60-1.66)

*Controls for age, sex, race/ethnicity, education, poverty-to-income ratio, health insurance and presence of a first degree relative with diabetes.

Discussion

- Prediabetes prevalence has increased over time among healthy weight adults
- Abdominal obesity has increased by one measure, waist to height ratio, in the same time frame but abdominal obesity does not seem to be the key to prediabetes
- Sedentary lifestyle has increased during the same time

Limitations

- Different sampling methodologies between NHANES III and Continuous NHANES
- Unable to explain apparent decrease in prediabetes in data that occurs between 1988-1994 data and 1999-2008 data.
- Unable to assess difference between ethnic groups
- Only use HbA1c to assess prediabetes

Conclusion

- Prediabetes is quite prevalent among individuals with a healthy BMI (33% of individuals 45 and older)
- Many individuals with a healthy BMI who have prediabetes may not be caught under current screening guidelines
- Reconsideration of screening recommendations may be in order