

Monitoring cardiovascular risk factors in the US population

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Goals of National Health and Nutrition Examination Surveys (NHANES)

U.S. population-based estimates of:

- Health conditions
- Awareness, treatment and control of selected diseases
- Environmental exposures
- Nutritional status and diet behaviors

National Health and Nutrition Examination Surveys

<i>Survey</i>	<i>Dates</i>	<i>Ages</i>
NHES I	1960-62	18-79 years
NHES II	1963-65	6-11 years
NHES III	1966-70	12-17 years
NHANES I	1971-75	1-74 years
NHANES II	1976-80	6 mo.-74 years
HHANES	1982-84	6 mo.-74 years
NHANES III	1988-94	2 mo. +

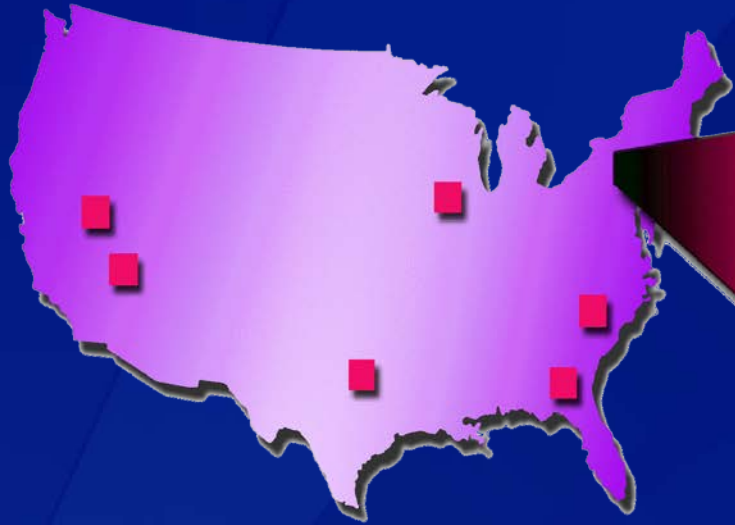
National Health and Nutrition Examination Surveys

<i>Survey</i>	<i>Dates</i>	<i>Ages</i>
NHANES	1999-2000	All ages
NHANES	2001-2002	All ages
NHANES	2003-2004	All ages
NHANES	2005-2006	All ages
NHANES	2007-2008	All ages
NHANES	2009-2010	All ages
NHANES	2011-2012	All ages

Sample

- US Civilian, non-institutionalized population
- All ages
- Oversample:
 - African Americans
 - Asian Americans
 - Hispanics/Latinos
 - Older persons aged 60+
 - Low income whites

Stage 1
Counties



Stage 2
Segments



Stage 3
Households



Stage 4
SPs



Interview

- Broad range of health conditions
- Health-related behaviors and exposures
- Health care utilization
- Health insurance
- Prescription medications
- Dietary supplements

Mobile examination center



Cardiovascular health



Laboratory



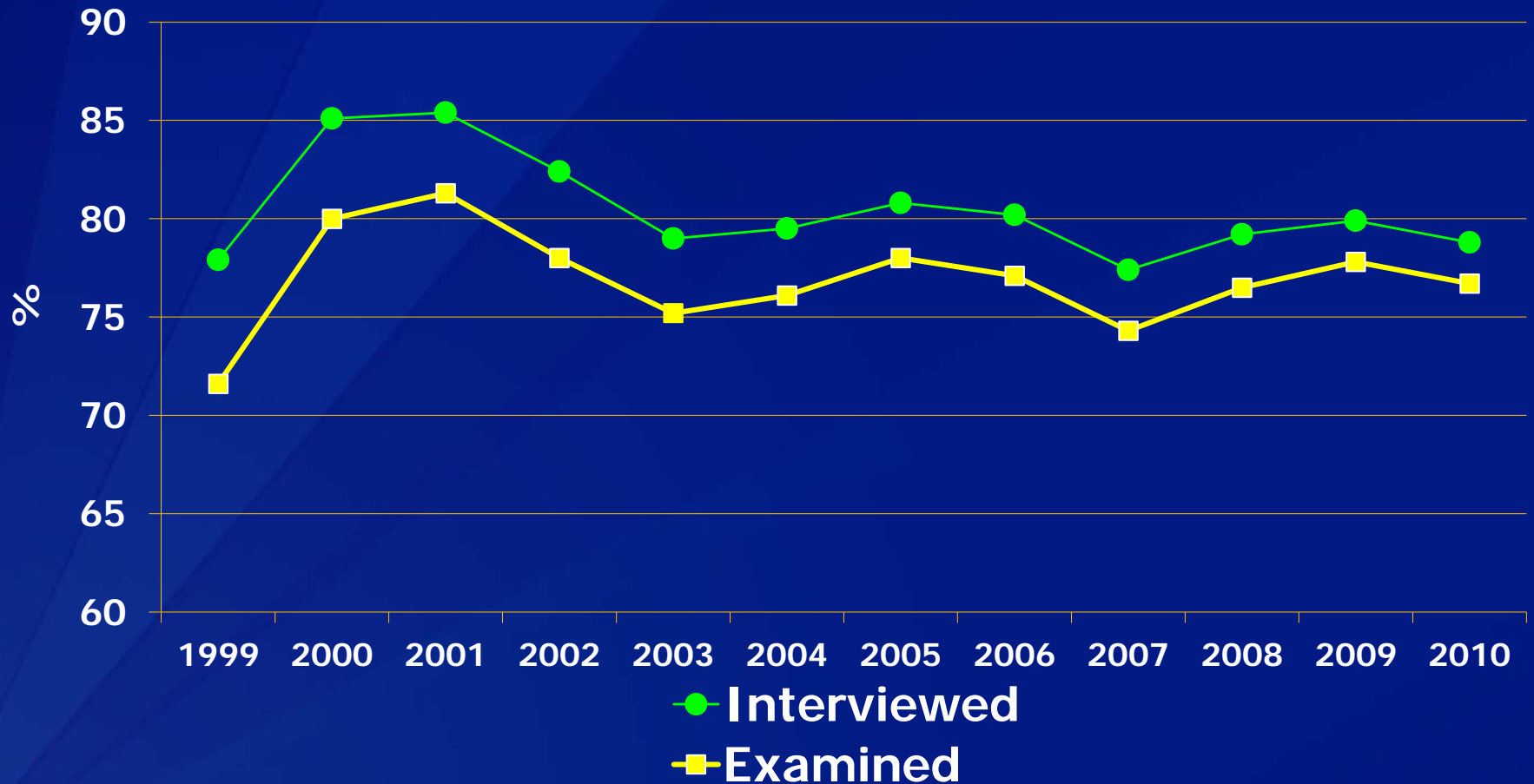
Mobile exam center laboratory

- Complete blood count
- Pregnancy test
- Specimen processing
 - Blood, urine, water, swabs, wipes
 - 300 assays
 - 24 laboratories

Laboratory tests

- Nutritional biomarkers
- Hormone tests
- Diabetes
- Lipids, CRP
- Biochemistry profile
- Infectious diseases
- Environmental exposures

NHANES response rates 1999-2010



Total and High-density Lipoprotein Cholesterol in Adults: National Health and Nutrition Examination Survey, 2009–2010

Margaret D. Carroll, M.S.P.H.; Brian K. Kit, M.D., M.P.H.; and David A. Lacher, M.D., M.Ed.

Key findings

Data from the National Health and Nutrition Examination Survey, 2009–2010

- Just over 13% of U.S. adults had high total cholesterol meeting the Healthy People 2010 objective of 17% or less for high total cholesterol. However, the objective was not achieved by women aged 40 and over.

- From 1999 through 2010, the percentage of adults aged 20 and over with high total cholesterol declined by 2.7 percent.

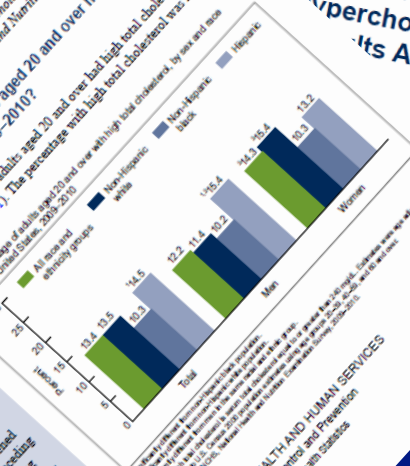
- Approximately 13% of women and 51% of men had low high-density lipoprotein cholesterol in the 2009–2010 survey.

- Overall, more than two-thirds of adults were screened for cholesterol in the preceding 5 years. However, screening rates ranged from 71% in non-Hispanic white women to 50% in non-Hispanic white or non-Hispanic black men.

High total cholesterol and low high-density lipoprotein (HDL) cholesterol are major risk factors for coronary heart disease, including heart attacks (1,2). To identify persons who may be at risk of developing coronary heart disease, the Adult Treatment Panel of the National Cholesterol Education Program recommends that adults be screened for cholesterol (3). This report presents the most recent prevalence estimates of high total cholesterol, low HDL cholesterol, and cholesterol screening. Trends over the last 12 years for high total cholesterol are also presented. Analysis is based only on measured cholesterol and does not take into account whether medication was taken.

Keywords: cholesterol screening • high total cholesterol • low high-density lipoprotein cholesterol • National Health and Nutrition Examination Survey • What percentage of adults aged 20 and over had high total cholesterol during 2009–2010?

Figure 1. Percentage of adults aged 20 and over with high total cholesterol by sex and race and ethnicity: United States, 2009–2010



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Centers for Disease Control and Prevention
National Center for Health Statistics



Health Insurance Affects Diagnosis and Control of Hypercholesterolemia and Hypertension Among Adults Aged 20–64: United States, 2005–2008

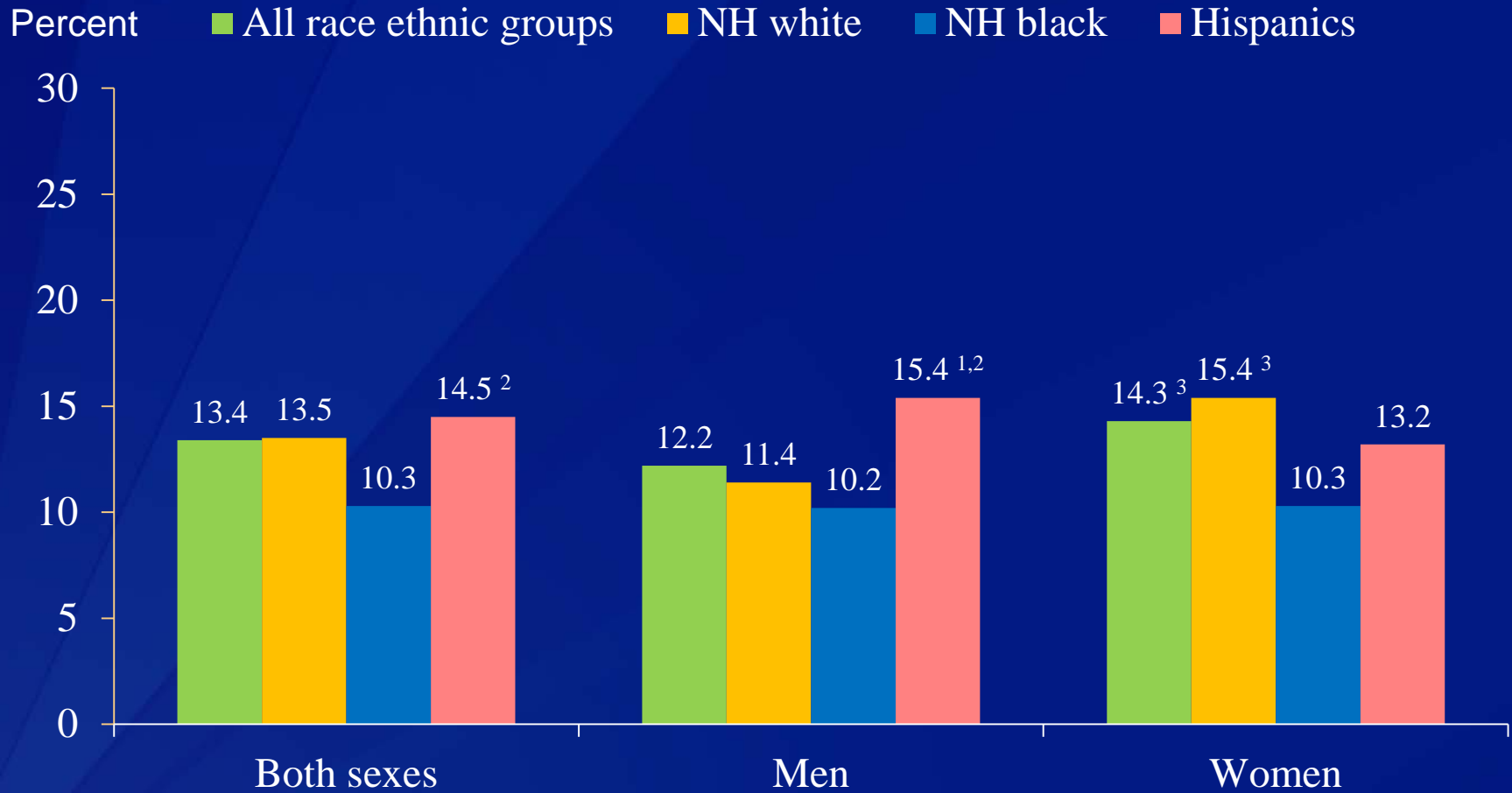
Ph.D.; Diane M. Makuc, Dr.P.H.; Cindy Zhang, M.D., M.P.H.; Beverly-Stephenson, M.S.; and Vicki Burt, Sc.M., R.N.



Health insurance presents a barrier to obtaining routine preventive care, diagnosis and management of chronic conditions. In 2005–2008, only 23% of adults aged 20–64 had no health insurance. High total cholesterol or hypertension (high blood pressure or taking medication to lower blood pressure) are major risk factors for cardiovascular disease, and untreated and uncontrolled hypertension and hypercholesterolemia are common among adults. In 2005–2008, 23% of adults aged 20–64 had hypertension and 23% had hypercholesterolemia. The objective of this study was to identify the association between health insurance coverage and diagnosis and control of hypercholesterolemia and hypertension among adults aged 20–64 with those conditions. The criteria used to define these conditions are in the “Definitions” section of the report.

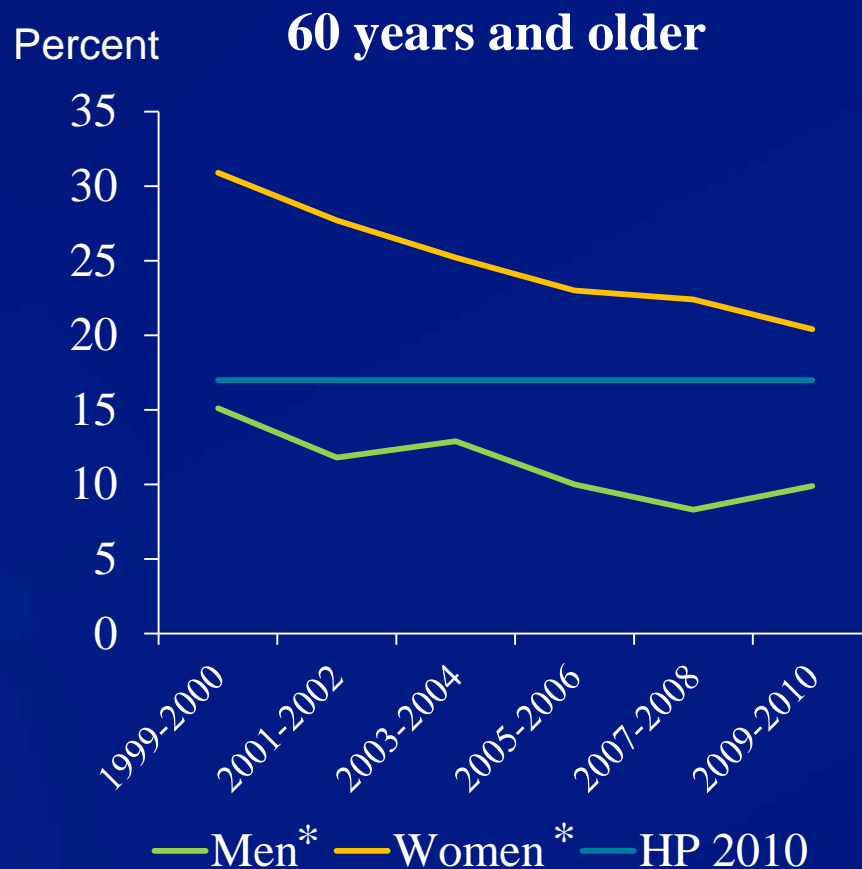
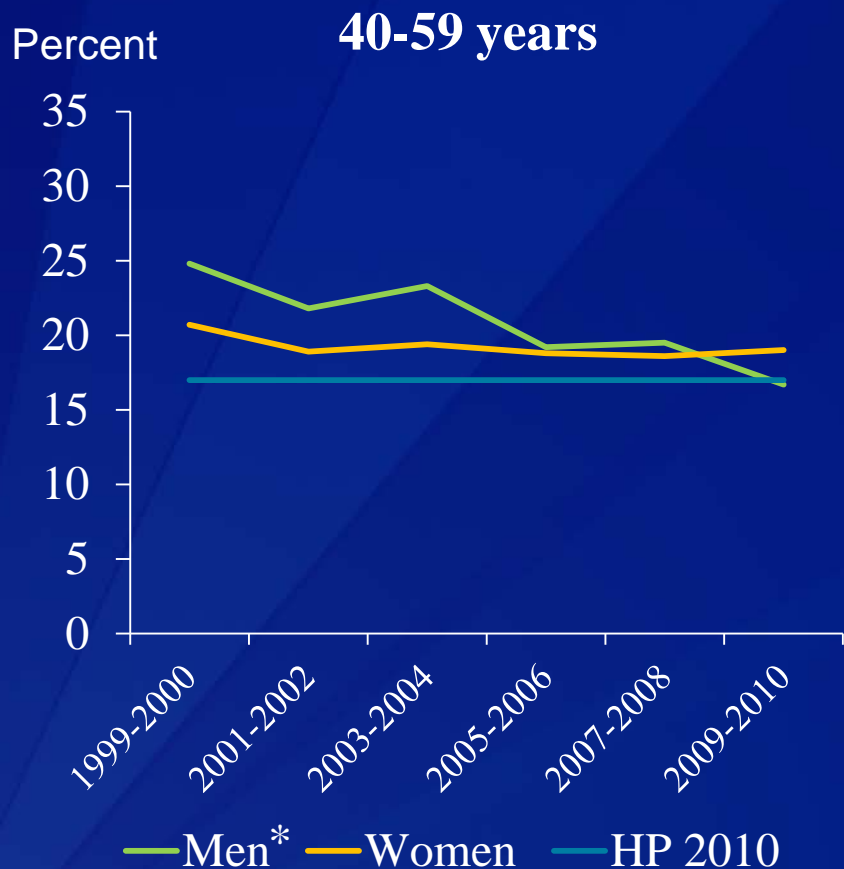
Keywords: health care access • high total cholesterol • high blood pressure

Percent of adults with high serum total cholesterol, US, 2009-2010



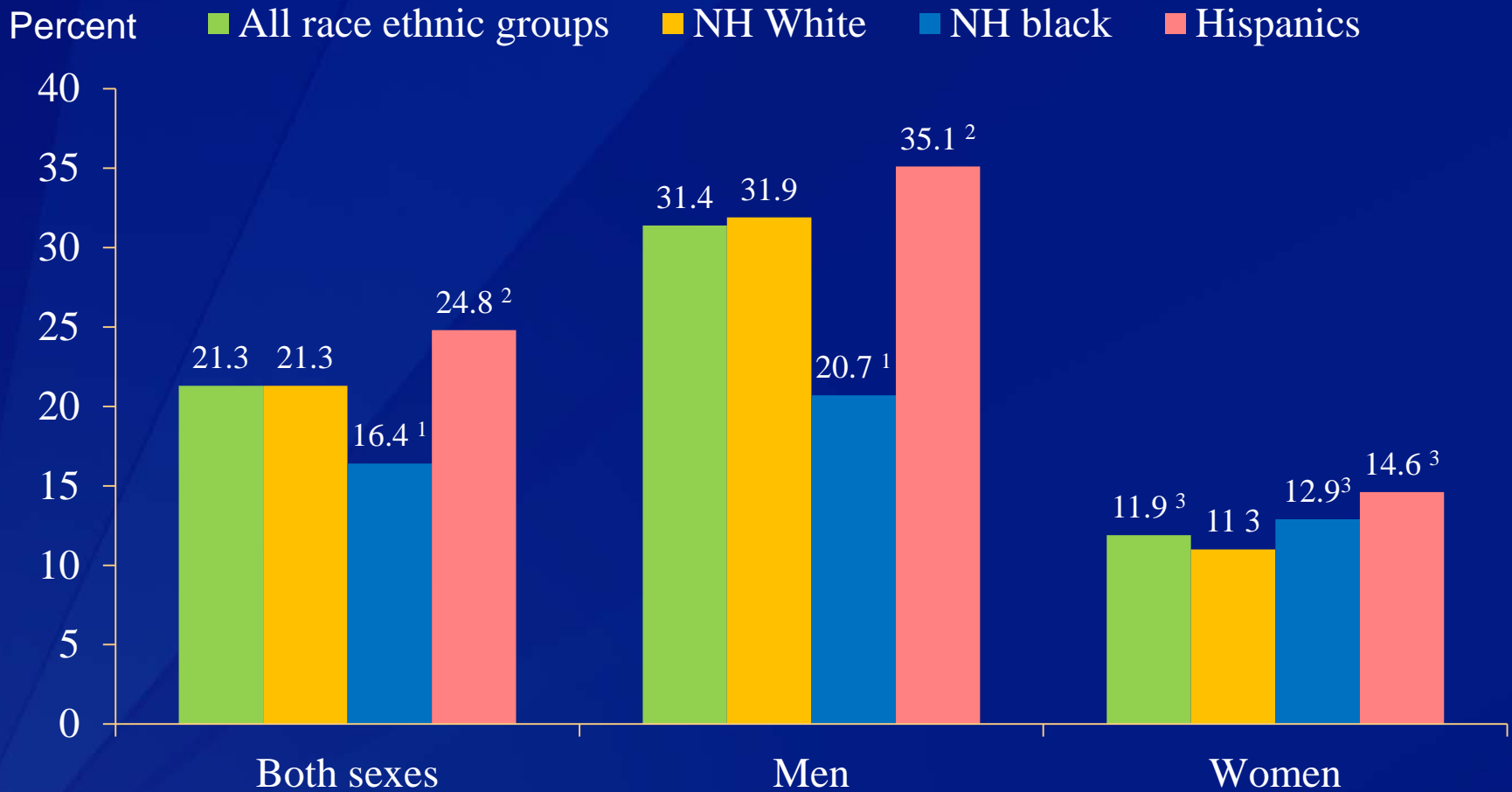
Greater than or equal to 240 mg/dL; 1 Significantly different from non-Hispanic white; 2 Significantly different from non-Hispanic black; 3 Significantly different from men in the same race/ethnicity group. SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey. Carroll et al NCHS Data Brief 2012

Trends in the percent of adults with high serum total cholesterol, US, 1999-2010



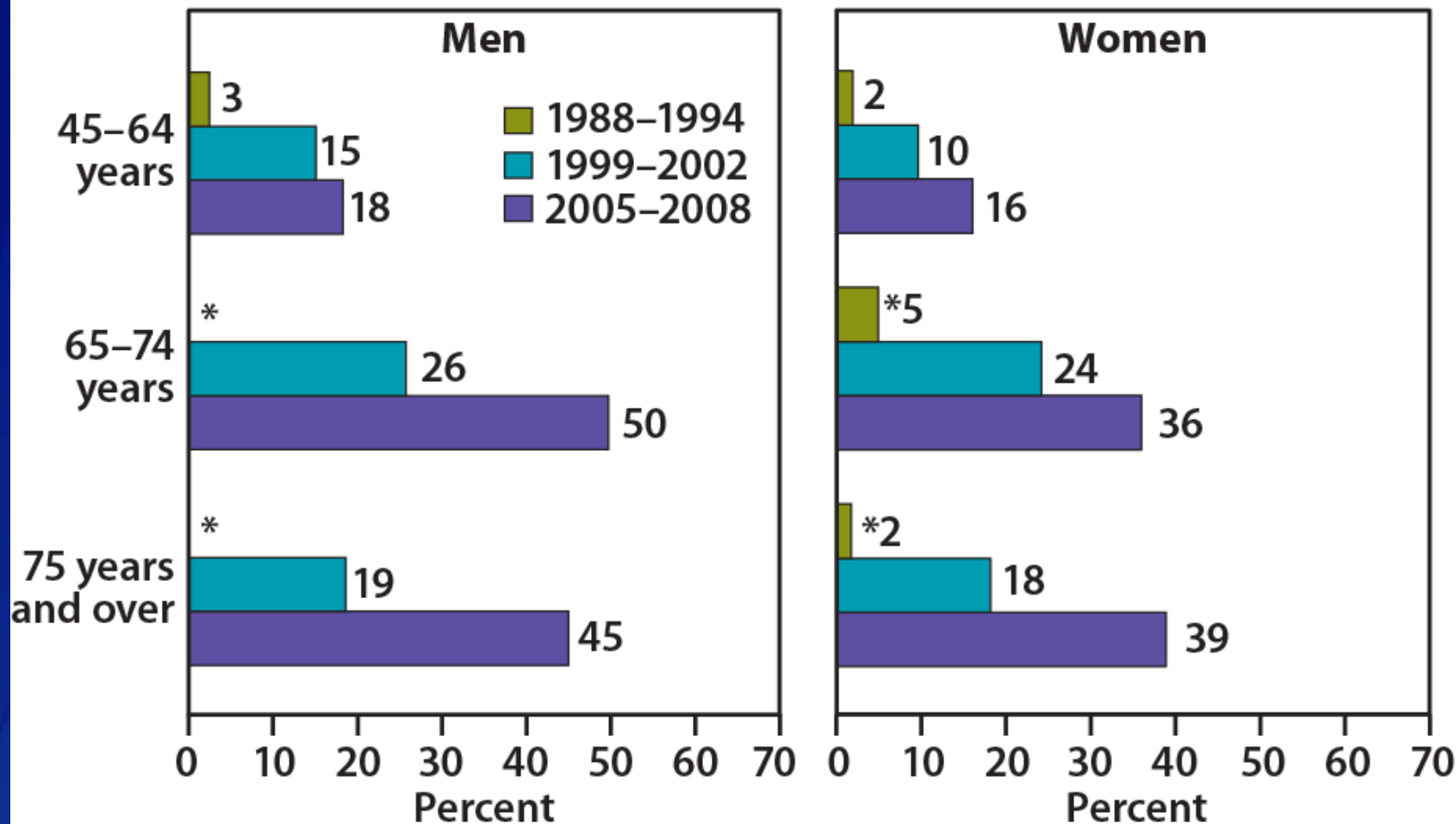
† A serum total cholesterol greater than or equal to 240 mg/dL *Significant decreasing trends (p<0.005) NOTES: HP 2010 = Healthy People 2010 Objective (17%). SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey,.

Percent of adults with low HDL, US, 2009-2010



†Less than 40 mg/dL 1 Significantly different from non-Hispanic white 2 Significantly different from non-Hispanic black 3 Significantly different from men in the same race/ethnicity group SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey

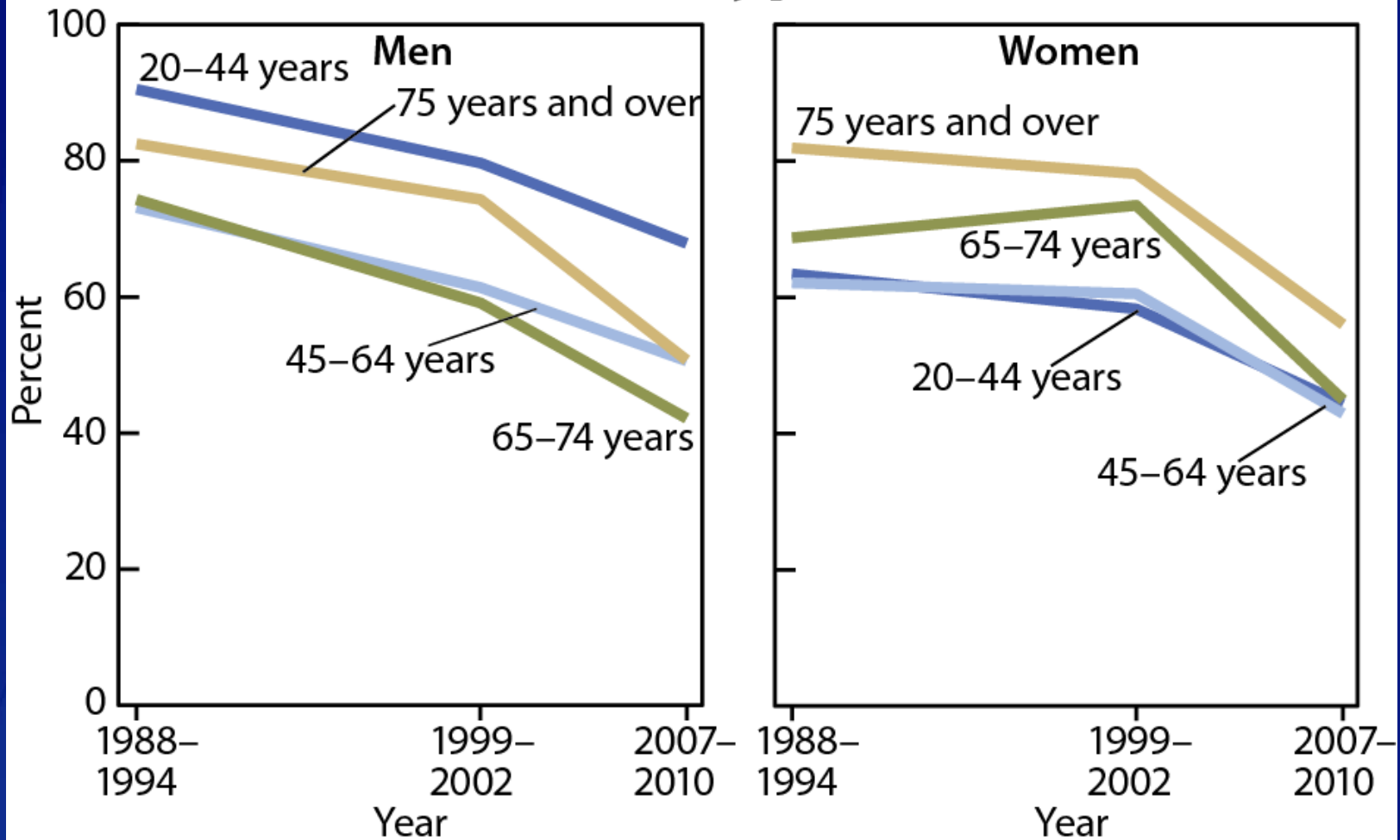
Statin drug use in the past 30 days



*Estimates are considered unreliable. Data preceded by an asterisk have a relative standard error (RSE) of 20%–30%. Data not shown have an RSE of greater than 30%.

SOURCE: CDC/NCHS, *Health, United States, 2010*, Figure 17. Data from the National Health and Nutrition Examination Survey.

Uncontrolled high blood pressure for adults with hypertension

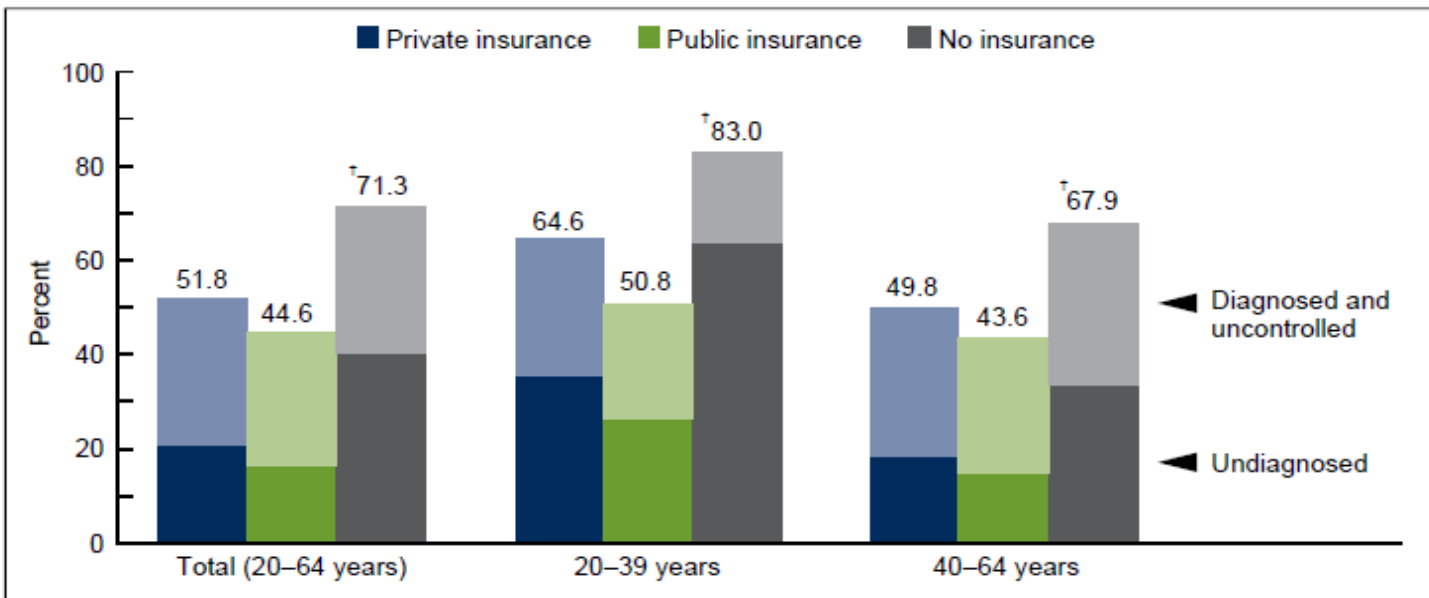


NOTE: Uncontrolled high blood pressure is a measured systolic blood pressure of at least 140 mm Hg or a measured diastolic blood pressure of at least 90 mm Hg among those with measured high blood pressure or who reported taking antihypertensive medication.
 SOURCE: CDC/NCHS, *Health, United States, 2011*, Figure 9. Data from the National Health and Nutrition Examination Survey.

Analysis Linking Health Insurance Questionnaire and Exam Data

Hypertension is more likely to be uncontrolled, and more likely to be undiagnosed, among uninsured adults with the condition than among those with health insurance.

Figure 3. Uncontrolled hypertension among adults aged 20–64 with hypertension, by insurance coverage and age: United States, 2005–2008



† Significantly different from those with private health insurance and those with public health insurance.

NOTE: Access data table for Figure 3 at: http://www.cdc.gov/nchs/data/databriefs/db57_tables.pdf#3.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2005–2008.



NHANES and Million Hearts



Status of the ABCS

A spirin	People at increased risk of cardiovascular disease who are taking aspirin	47%
B lood pressure	People with hypertension who have adequately controlled blood pressure	46%
C holesterol	People with high cholesterol who have adequately controlled hyperlipidemia	33%
S moking	People trying to quit smoking who get help	23%

Prevalence of Uncontrolled Risk Factors for Cardiovascular Disease: United States, 1999–2010

Cheryl D. Fryar, M.S.P.H.; Te-Ching Chen, Ph.D.; and Xianfen Li, M.S.

Key findings

Data from the National Health and Nutrition Examination Survey

- In 2009–2010, about 47% of adults had at least one of three risk factors for cardiovascular disease—uncontrolled high blood pressure, uncontrolled high levels of low-density lipoproteins (LDL) cholesterol, or current smoking.

- Men were more likely than women to have at least one of the three cardiovascular disease risk factors.

- From 1999–2000 through 2009–2010, a decrease was observed in the percentage of non-Hispanic white and Mexican-American adults who had at least one of the three risk factors for cardiovascular disease. However, this decrease was not found among non-Hispanic black adults.

- The prevalence of uncontrolled high blood pressure and of uncontrolled high LDL cholesterol declined between 1999–2000 and 2009–2010, but no significant change occurred in the percentage of adults who smoke cigarettes.

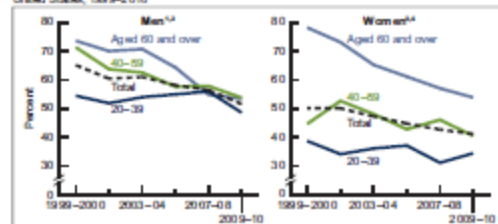
Heart disease is the leading cause of death in the United States (1). High blood pressure, high cholesterol, and smoking are all risk factors that could lead to cardiovascular disease (CVD) and stroke. The recently announced Million Hearts Initiative is aimed at preventing 1 million heart attacks and strokes over the next 5 years (2–4). This report expands on results previously published (2) by presenting the most recent prevalence estimates and trends of uncontrolled high blood pressure, uncontrolled high levels of low-density lipoproteins cholesterol (LDL-C), and current cigarette smoking among adults aged 20 and over.

Keywords: uncontrolled high blood pressure • uncontrolled high cholesterol • smoking • National Health and Nutrition Examination Survey

Did the percentage of adults who have at least one of three CVD risk factors change from 1999 through 2010?

During 1999–2010, a decreasing trend was observed in the percentage of adults with at least one of three risk factors for CVD, from 57.8% (about

Figure 1. Age-adjusted percentage of adults aged 20 and over who have uncontrolled high blood pressure or uncontrolled high LDL cholesterol, or who currently smoke, by sex and age—United States, 1999–2010



Significant differences between trends for age groups (LDL-C and smoking) ($p < 0.05$).
 * $p < 0.05$ CVD, significantly different between sexes.
 † $p < 0.05$ CVD, significantly different between age groups (CVD was $p < 0.01$).
 ‡ $p < 0.05$ CVD, significantly different between non-Hispanic aged 20–39, 40–59, and 60 and over.
 § $p < 0.05$ CVD, significantly different between non-Hispanic aged 20–39, 40–59, and 60 and over.
 ¶ $p < 0.05$ CVD, significantly different between non-Hispanic aged 20–39, 40–59, and 60 and over.
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 †††† $p < 0.05$ CVD, significantly different between non-Hispanic aged 20–39, 40–59, and 60 and over.



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The 3 Risk Factors

Uncontrolled High Blood Pressure

Measured systolic blood pressure ≥ 140 mm Hg or a diastolic blood pressure ≥ 90 mm Hg, based on the average of up to three measurements

Persons may or may not have been taking medication

Uncontrolled High LDL-Cholesterol

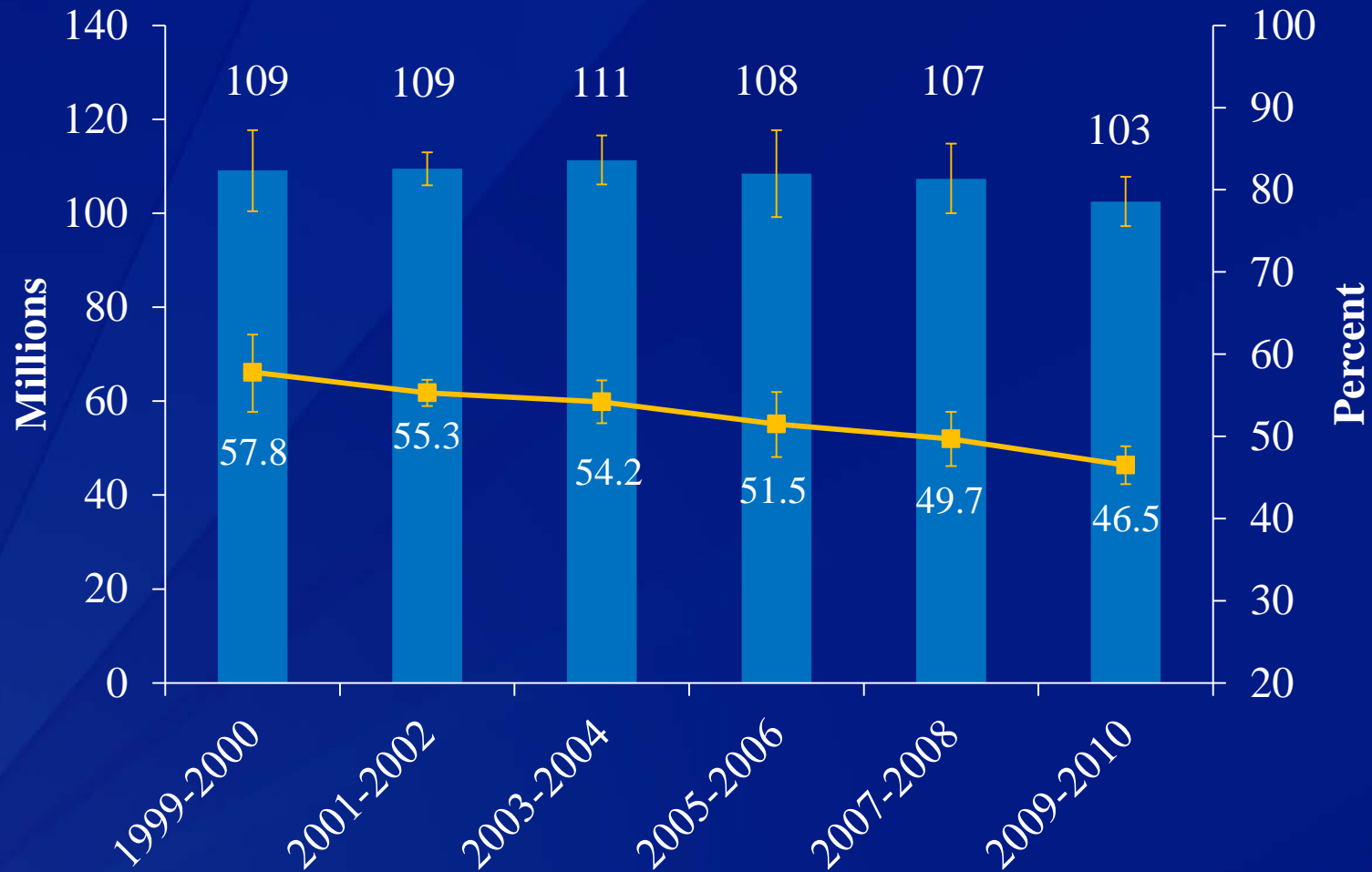
Measured levels of LDL cholesterol above the treatment goals established by the National Cholesterol Education Program (NCEP) Adult Treatment Panel-III (ATP-III) guidelines: <160 mg/dL, <130 mg/dL, and <100 mg/dL for low-, intermediate-, and high-risk groups, respectively.

Persons may or may not have been taking medication.

Smoker

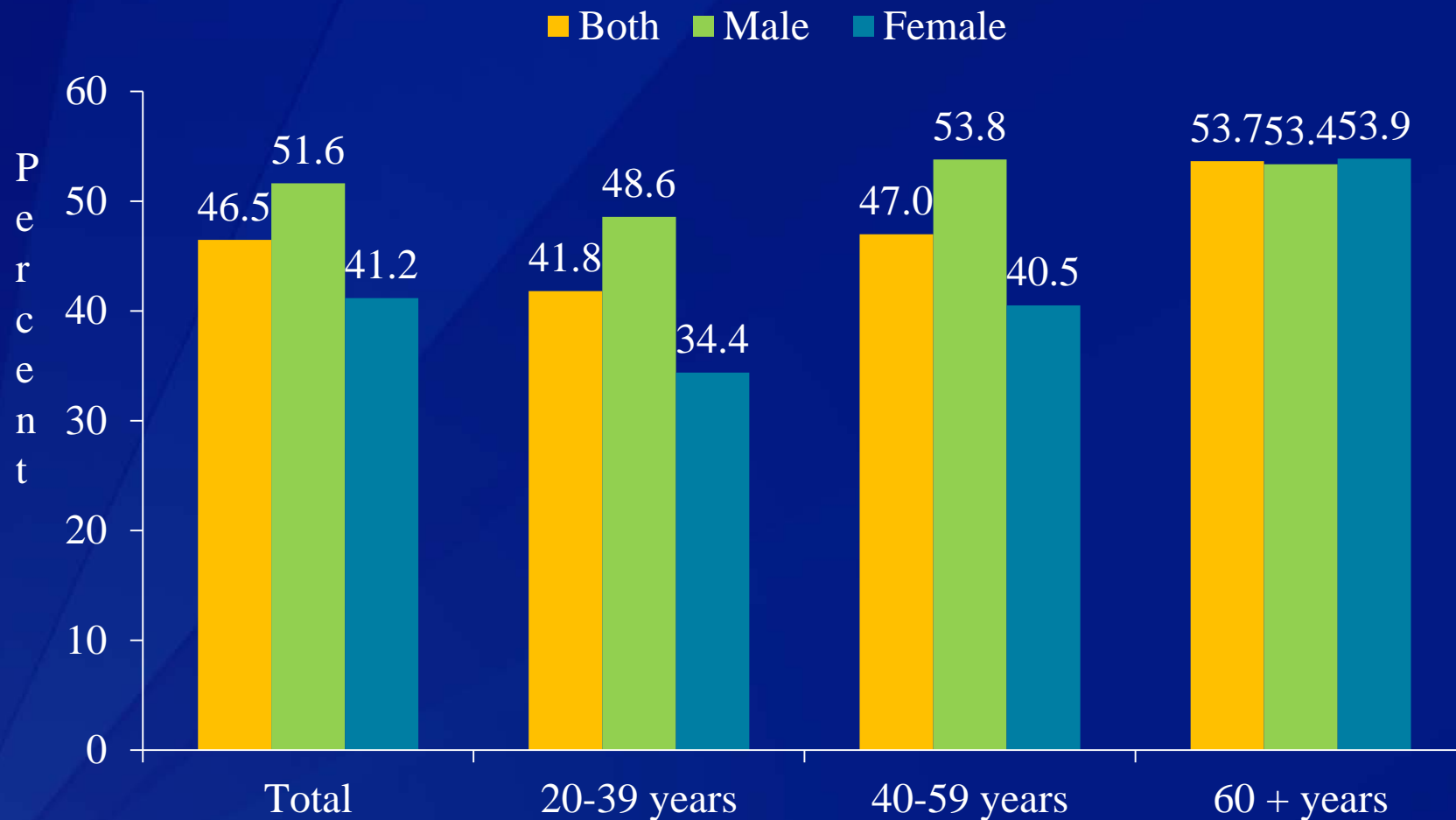
Person reporting that they smoked at least 100 cigarettes in their lifetime and now smoke every day or some days, or a measured serum cotinine (the primary nicotine metabolite) level >10 ng/mL.

Prevalence and number of US adults who smoke or have uncontrolled high BP or uncontrolled high cholesterol



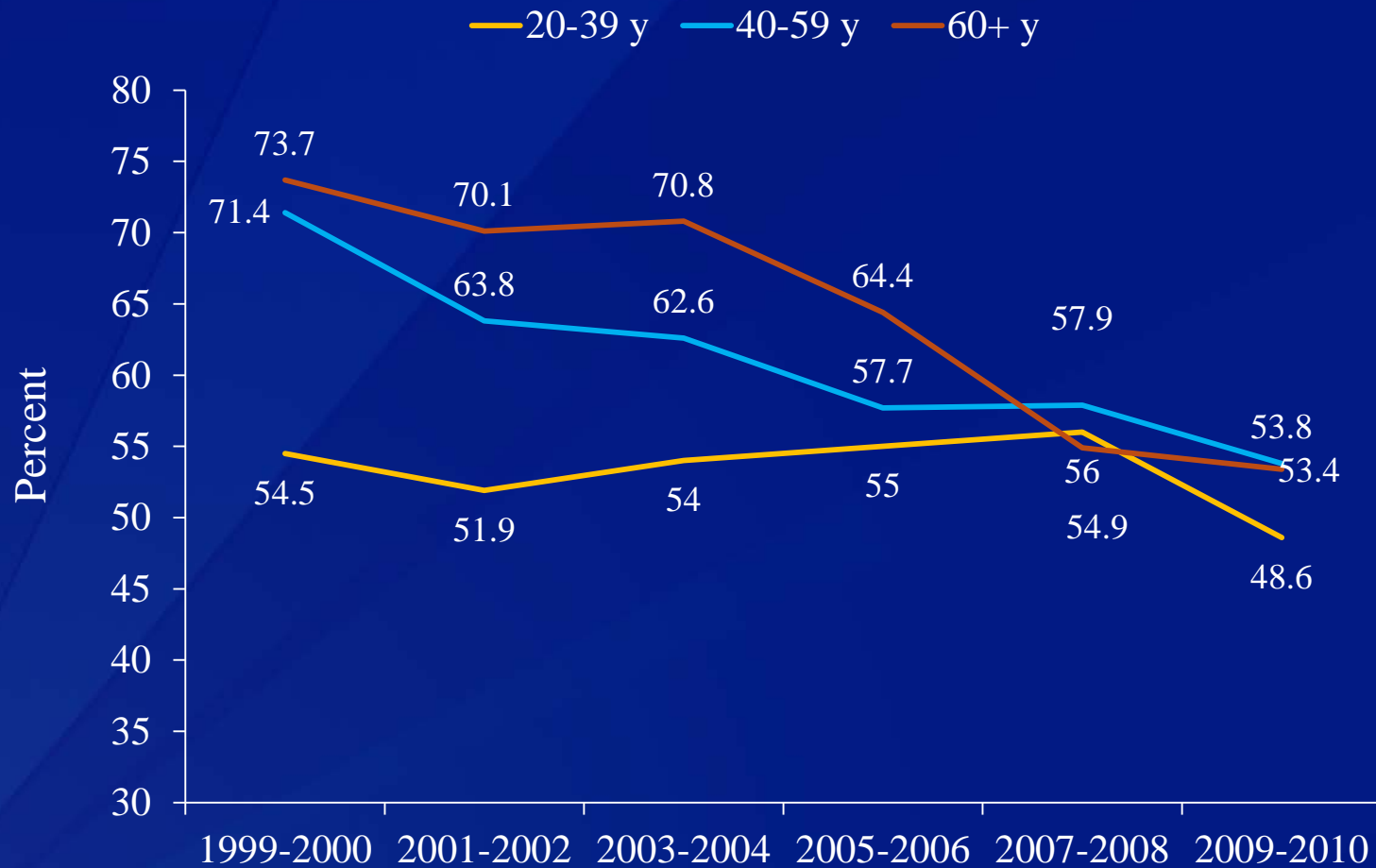
Linear trend in prevalence significant ($p < 0.01$) after adjustment for sex, age group, race/ethnicity, and poverty-income ratio. MMWR Sept 2011. Updated with 2009-10 data.

Percentage of US adults with at least 1 risk factor



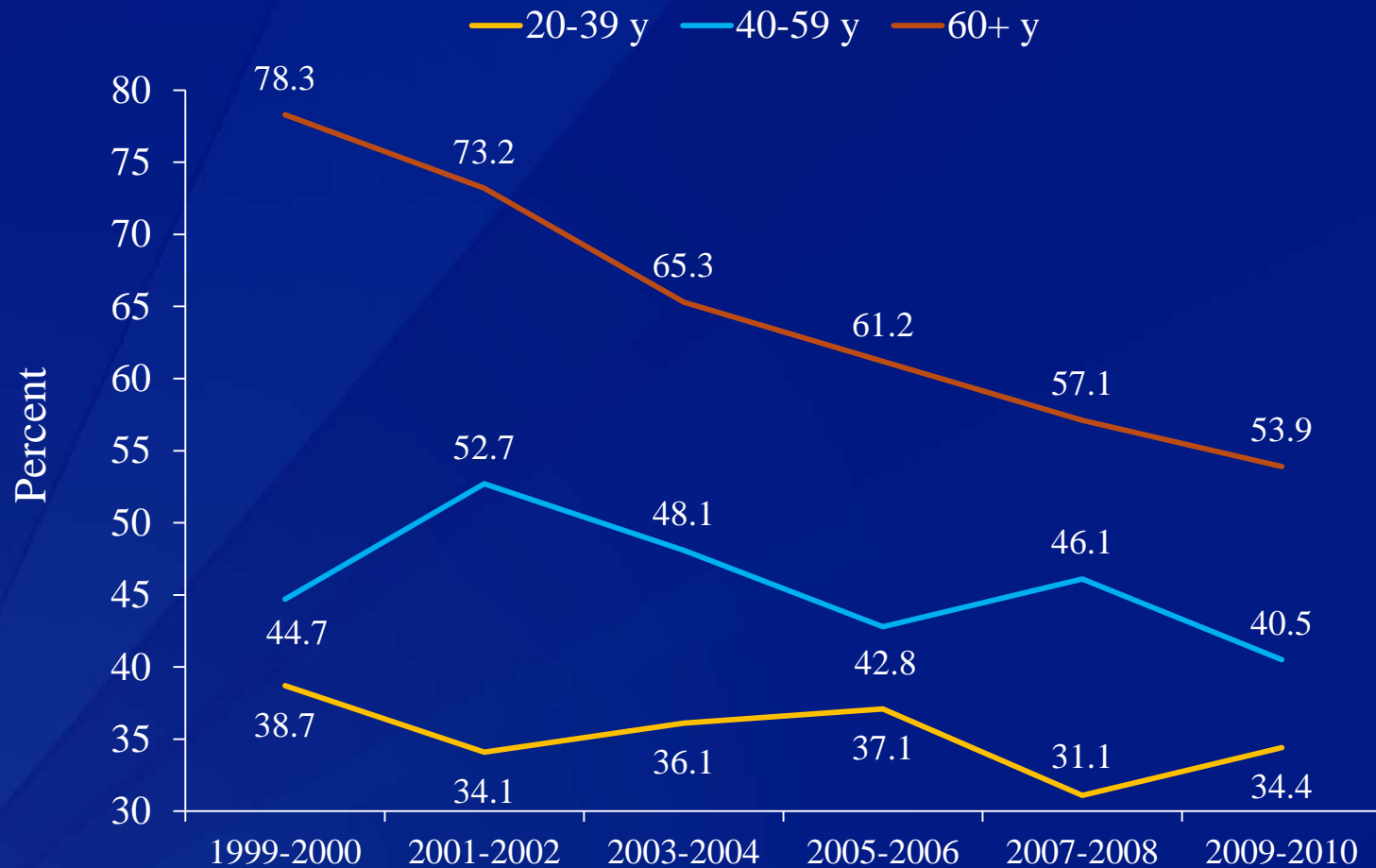
Source: CDC/NCHS, National Health and Nutrition Examination Survey 2009-2010

Percentage of men with at least 1 risk factor, by age: US, 1999-2010



Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Percentage of women with at least 1 risk factor, by age: US, 1999-2010



Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Percentage of adults with at least 1 risk factor, by sex and age: US, 1999-2010

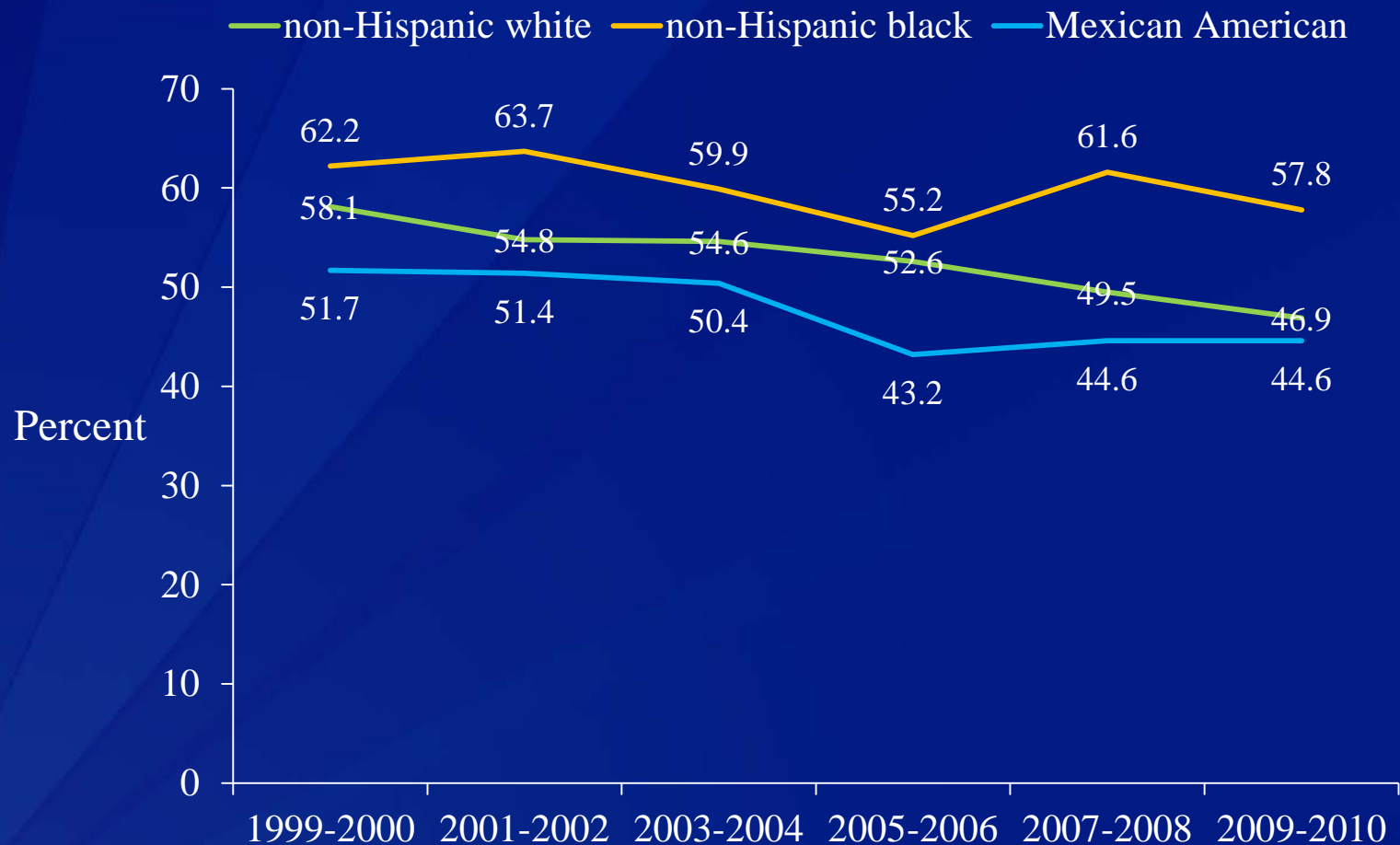


Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Sex specific results

- 1999-2010 decrease
 - Men 40-59 and 60+ years
 - Women 60+ years
- Men more likely
- Older women more likely than younger

Percentage of adults with at least 1 risk factor, by race/ethnicity: US, 1999-2010

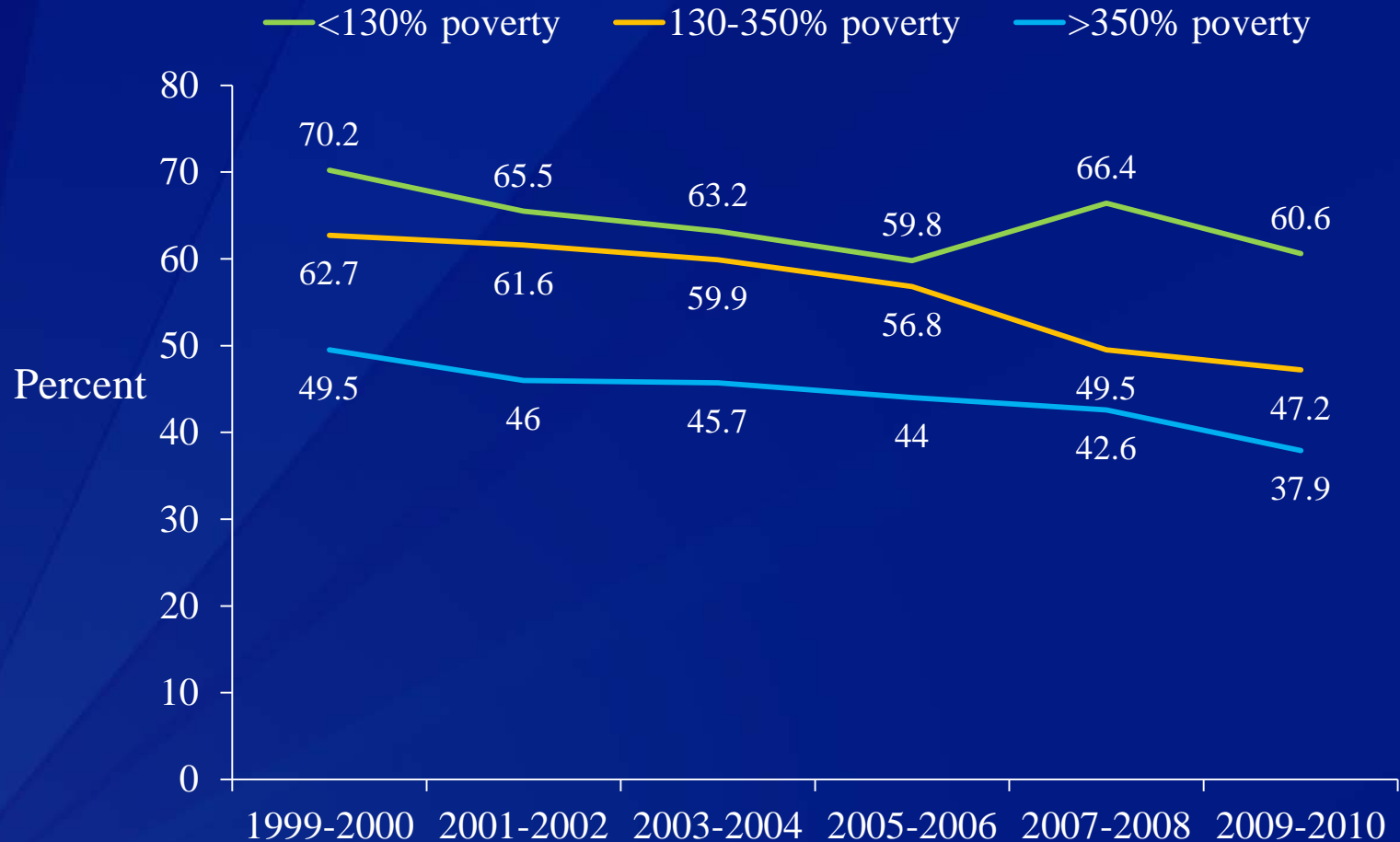


Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Race/ethnicity specific results

- 1999-2010 decrease
 - Non-Hispanic white adults
 - Mexican American adults
- Non-Hispanic black adults more likely

Percentage of adults with at least 1 risk factor, by poverty level: US, 1999-2010

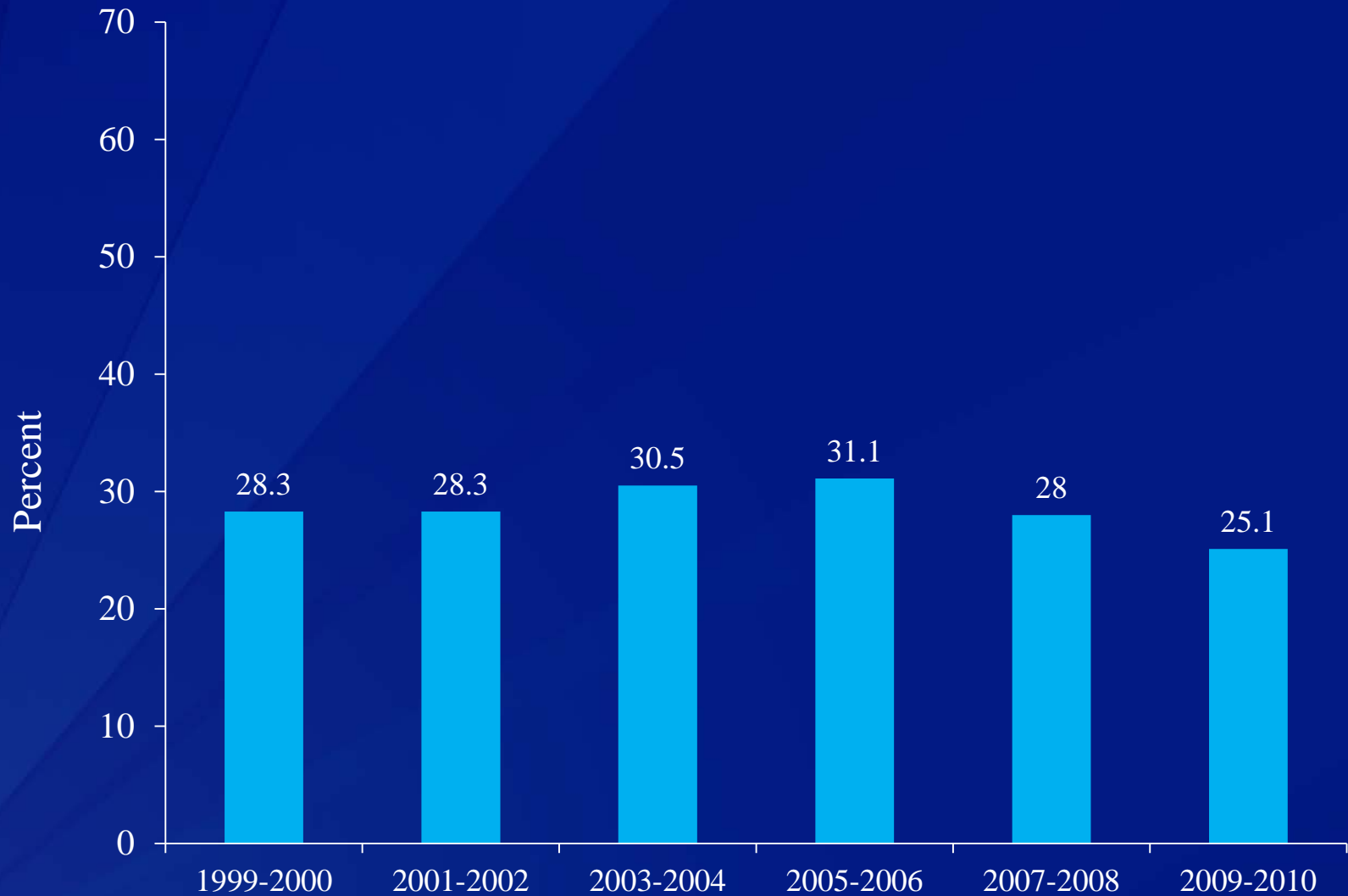


Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

PIR specific results

- 1999-2010 decrease
 - All income groups
- Lowest income adults more at likely

Percentage of adults who smoke: US, 1999-2010



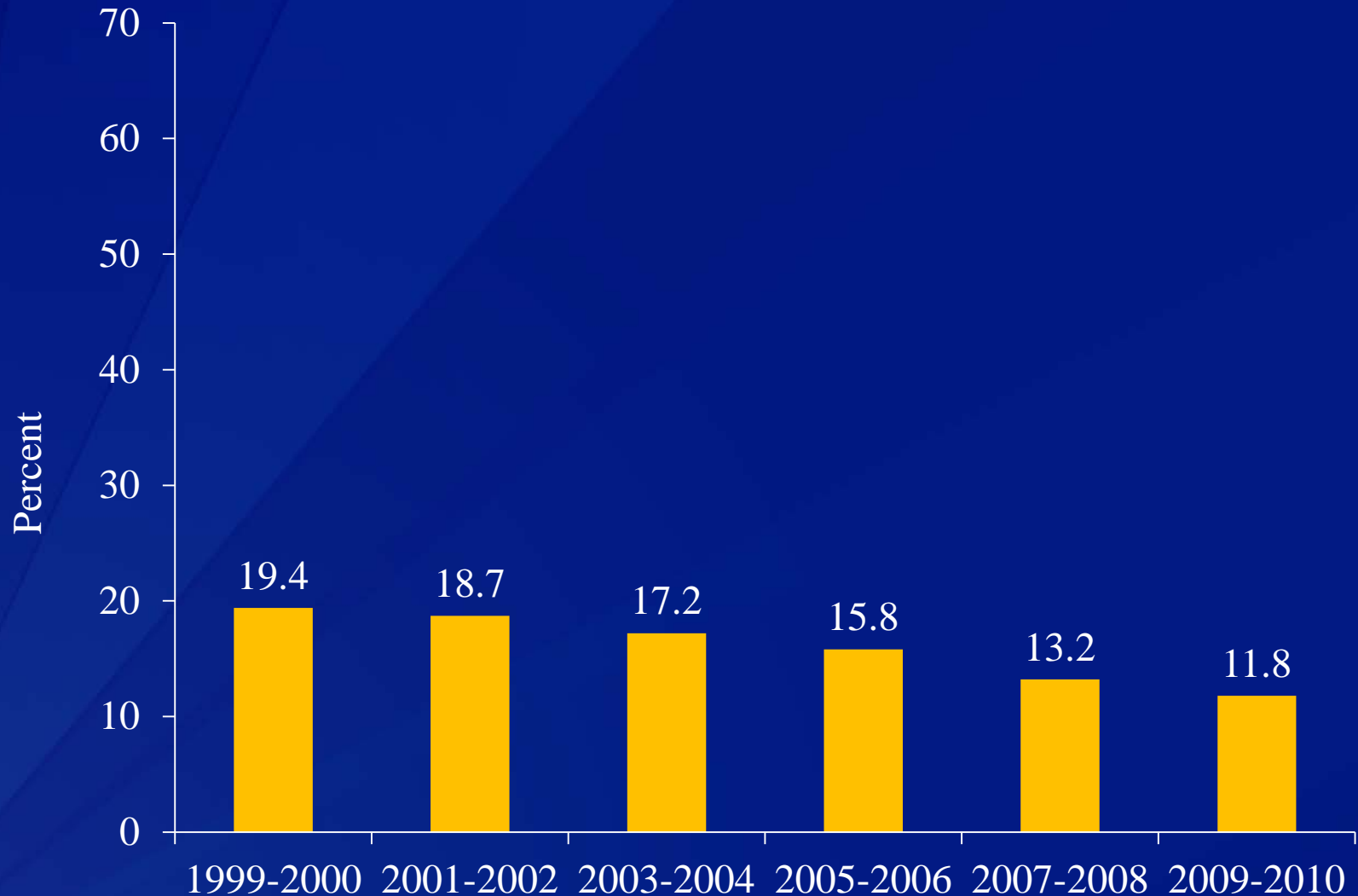
Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Percentage of adults with uncontrolled high LDL cholesterol: US, 1999-2010



Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Percentage of adults with uncontrolled high blood pressure: US, 1999-2010



Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Percentage of adults with at least 1 risk factor: US, 1999-2010



Source: National Health and Nutrition Examination Surveys; Fryar et al 2012 NCHS Data Brief

Individual risk factors

- 1999-2010 decrease
 - Uncontrolled high blood pressure
 - Uncontrolled high LDL cholesterol

NHANES and CVD risk factors

- NHANES resource for monitoring trends
- Percent of US adults with 1+ risk factor
 - Decrease 1999-2010
 - Not among African Americans
 - Men, older adults, African Americans, lower income adults more likely to have risk factors
- Percent of US adults with Individual risk factors
 - Decrease in uncontrolled high blood pressure and uncontrolled high LDL cholesterol
 - No significant change in smoking

Thank you to our colleagues

Margaret Carroll, MSPH

Te-Ching Chen, PhD

Xianfen Li, MS

Disclaimer

The findings and conclusions in this presentation are those of the author and not necessarily of CDC