

# Successful Aging Versus Realistic Aging

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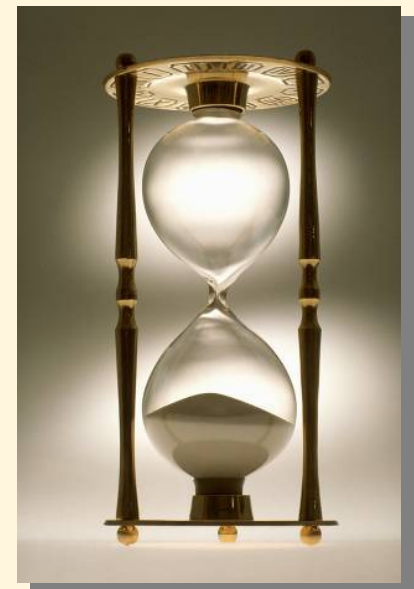
George Mason University

# Objectives

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- Define a public health perspective in healthy aging
- Examine measures of health in aging.
- Provide the science base for the risk factors and mutability of health

**Key Question:** How can we estimate what an individual can realistically expect in terms health and well being based on the science and research of healthy aging strategies?



# Public Health and Aging

- Most experts would argue that health improvements over the next decades will not come from new medical findings or cures, but rather the broader development and application of population-based prevention programs
- With rapid changes in service delivery systems and greater emphasis on health promotion and disease prevention as a means to reduce costs of care will create a broad array of new opportunities for professionals with advanced training in public health
- Advances in the understanding of how environment factors influence health provide opportunities for assuring the safety of communities as well as the work environment.
- Most individuals will experience one of more chronic illnesses in their life which may last decades. Public health addresses chronic disease management and long term care.

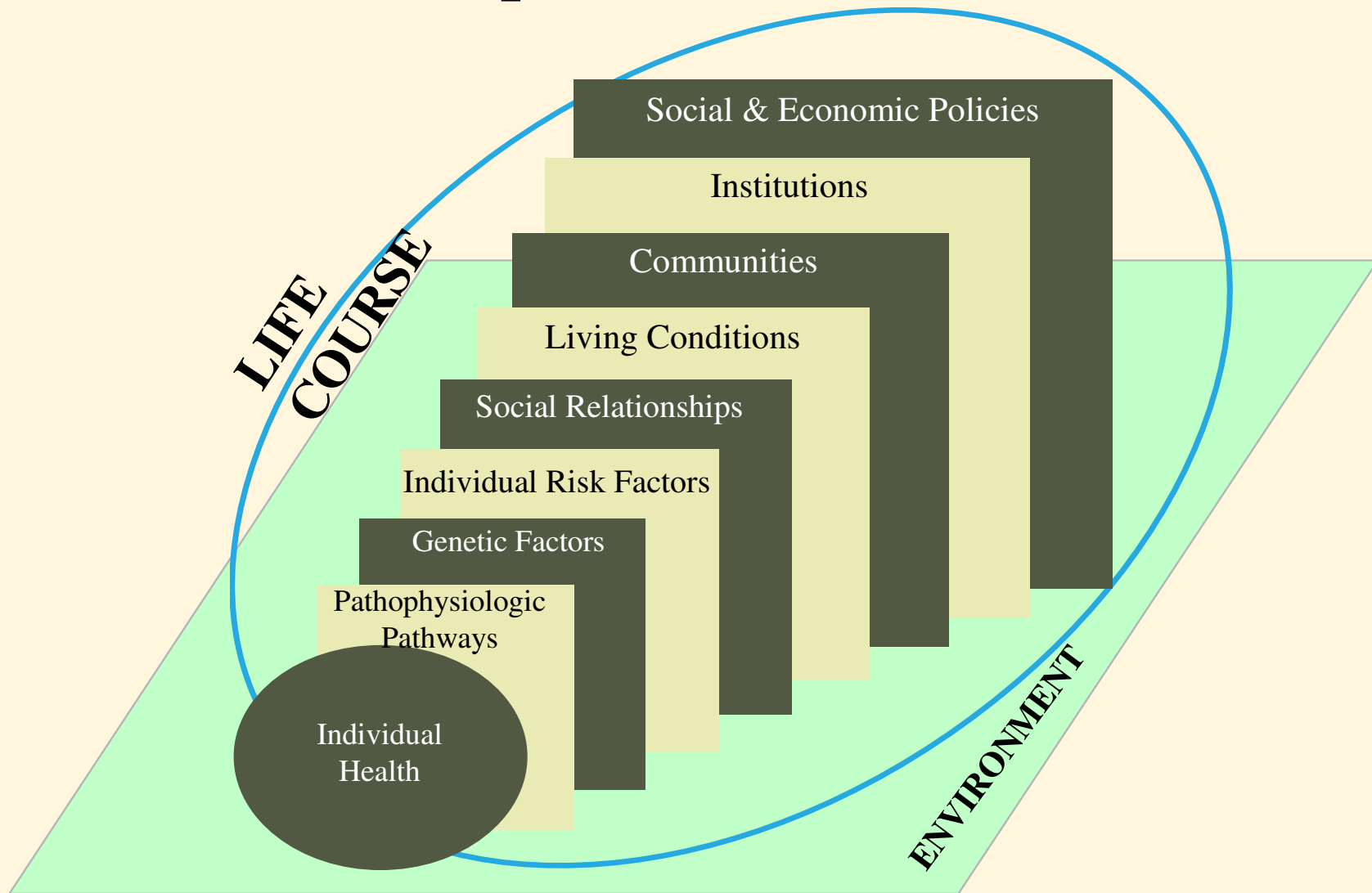
# Distinctions between Public Health and Clinical Health Professions

Public Health	Clinical Health
Population based	Individual based
Health Broadly Defined	Disease
Prevention and Health Promotion	Diagnosis and treatment
Bio-psychosocial perspective	Bio-medical perspective
Broad ecological intervention (e.g. person, family, institutions, community, environment)	Intervention on the individual

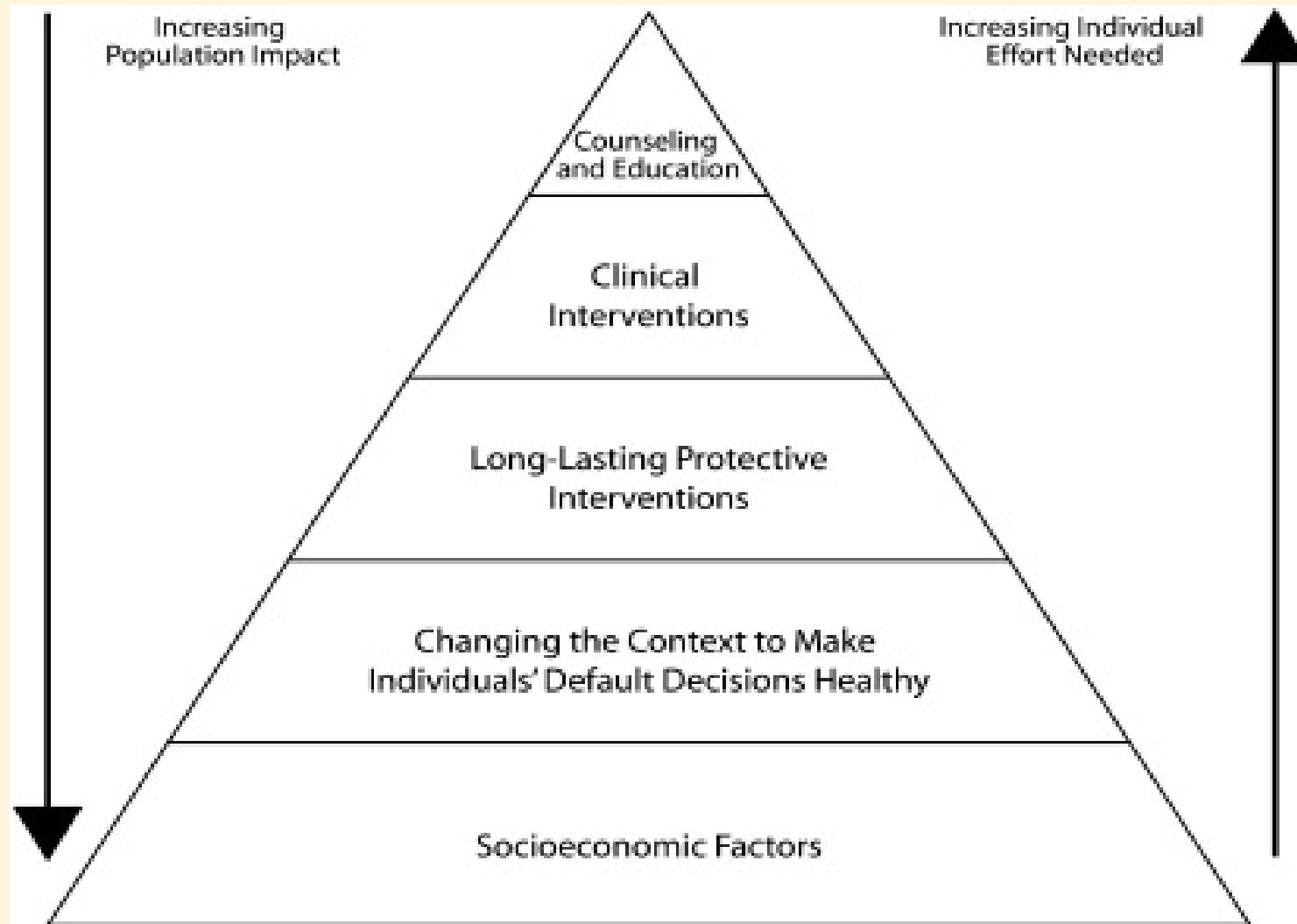
# Areas of Knowledge Basic to Public Health

- **Biostatistics** – collection, storage retrieval, analysis and interpretation of health data: design and analysis of health-related surveys and experiments; and concepts and practice of statistical data analysis
- **Epidemiology** – distributions and determinants of disease, disabilities and death in human populations; the characteristics and dynamics of human population; and the natural history of disease and the biologic basis of health.
- **Environmental health sciences** – environmental factors including biological, physical and chemical factors that affect the health of a community;
- **Health services administration** – planning, organization, administration, management, evaluation and policy analysis of health and public health programs;
- **Social and behavioral sciences** – concepts and methods of social and behavioral sciences relevant to the identification and solution of public health problems

# Upstream and Downstream Determinants of Population Health



Source: Kaplan, G.A. Epidemiol Rev 2004;26:124-35.



# Example of an Ecological and Health Impact Pyramid Approach; loss of mobility

- (i) Modify the environment through policy change to maximize mobility options.
- (ii) Provide appropriate assistive devices to enhance mobility.
- (iii) Improve the capacity or reserve through exercise and health-promoting strategies.
- (iv) Support assistance through informal support networks to address unmet mobility needs.
- (v) Address beliefs, motivations, and perceptions about mobility limitations among individuals and families to help overcome “self-restricted” mobility limitations or effectively cope with the circumstances related to mobility restriction.



# Questions addressed in Public Health and Aging

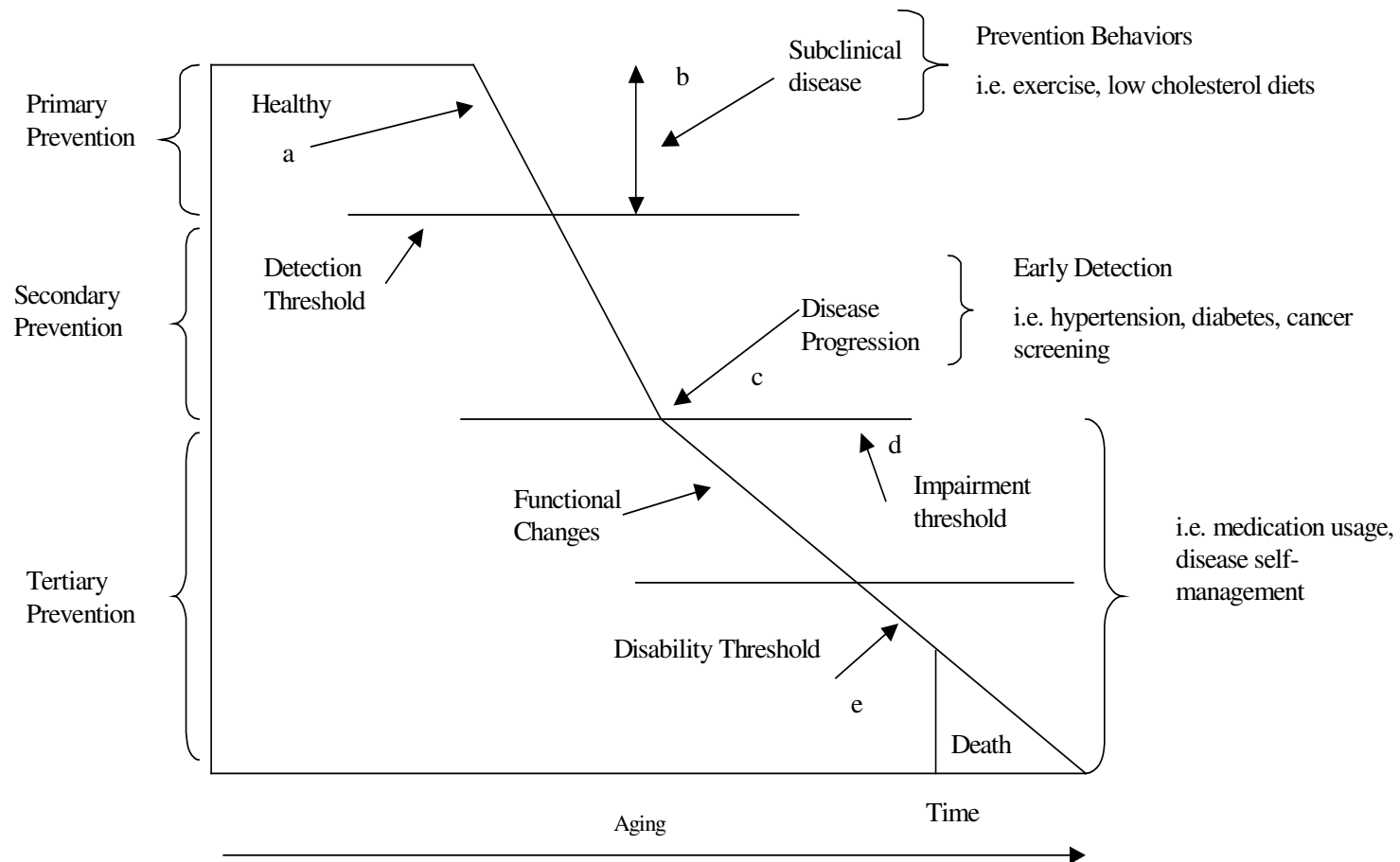
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*An assessment of research agenda items*

- What are the incidence and prevalence of health risk factors and health promotion activities in diverse populations?
- Does the risk factor or prevention activity impact on the health and well being of the older adult and if so, how?
- What are the mechanisms (e.g., psychosocial, ecological, health systems) controlling prevention decisions and behaviors in older adults?
- Can we change or intervene on these risks and does a successful intervention make a difference in the health and well being of these individuals?
- Can we successfully disseminate these programs/interventions and do the costs of these programs outweigh the benefits?

Prohaska et al. 2006 *Journal of Gerontology*

# Opportunities for Prevention

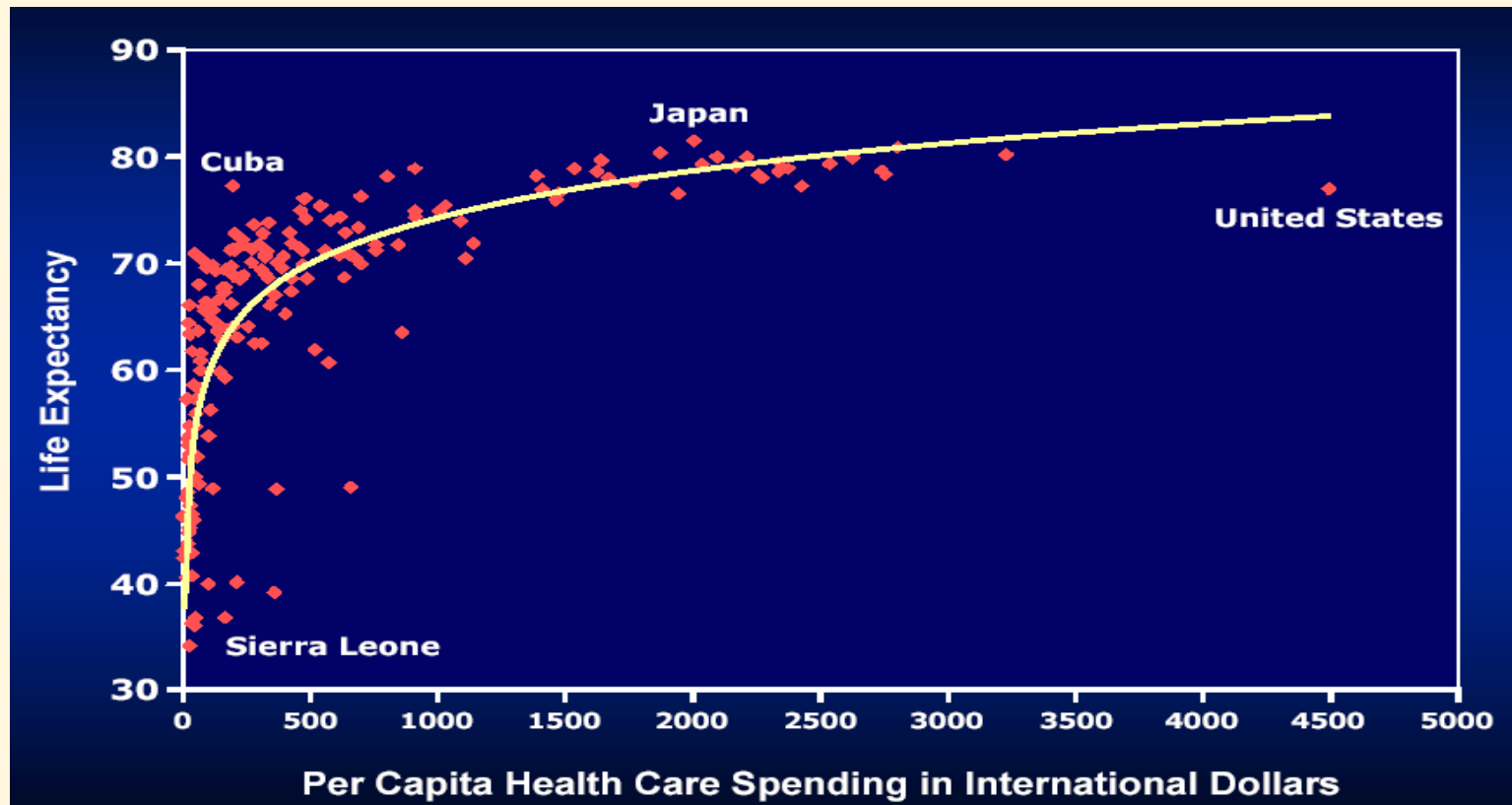


Source: Based on Kaplan (1997).

# Indicators of Health

Life Expectancy/Active Life Expectancy

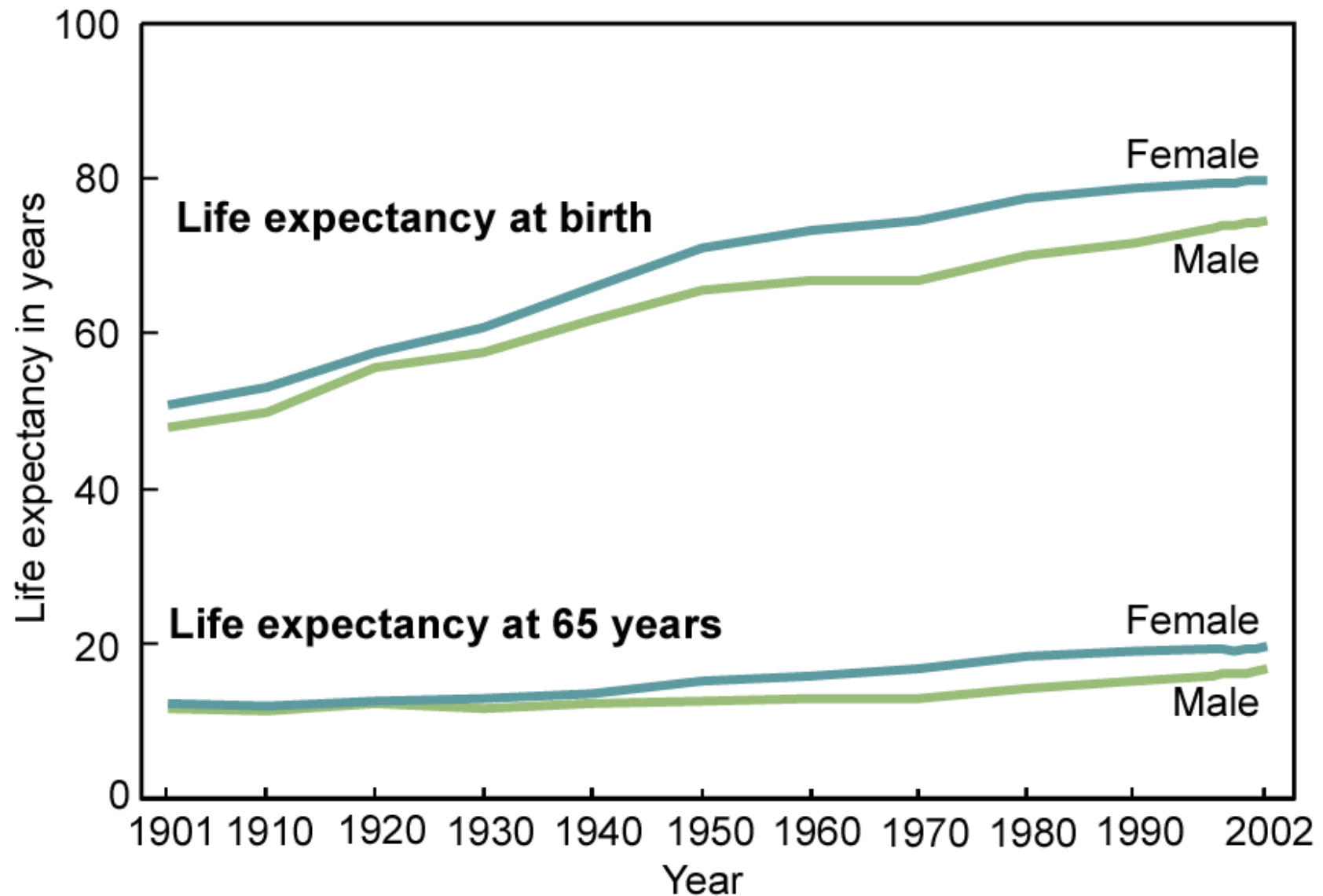
# Life Expectancy by Health Care Spending



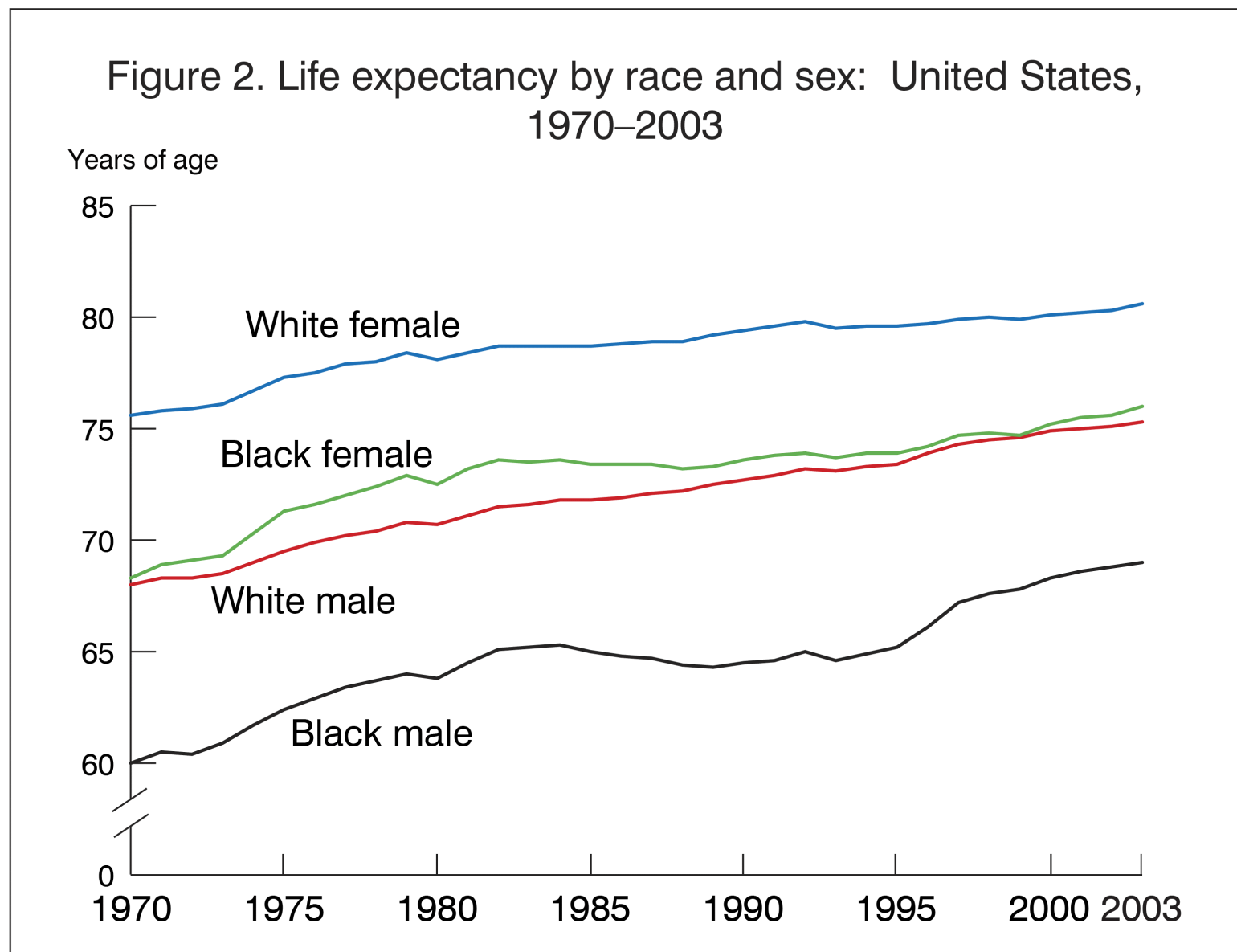
Our nation spends more on health care than any other country in the world

Mensah: [www.nga.org/Files/ppt/0412academyMensah.ppt#22](http://www.nga.org/Files/ppt/0412academyMensah.ppt#22)

# Life expectancy

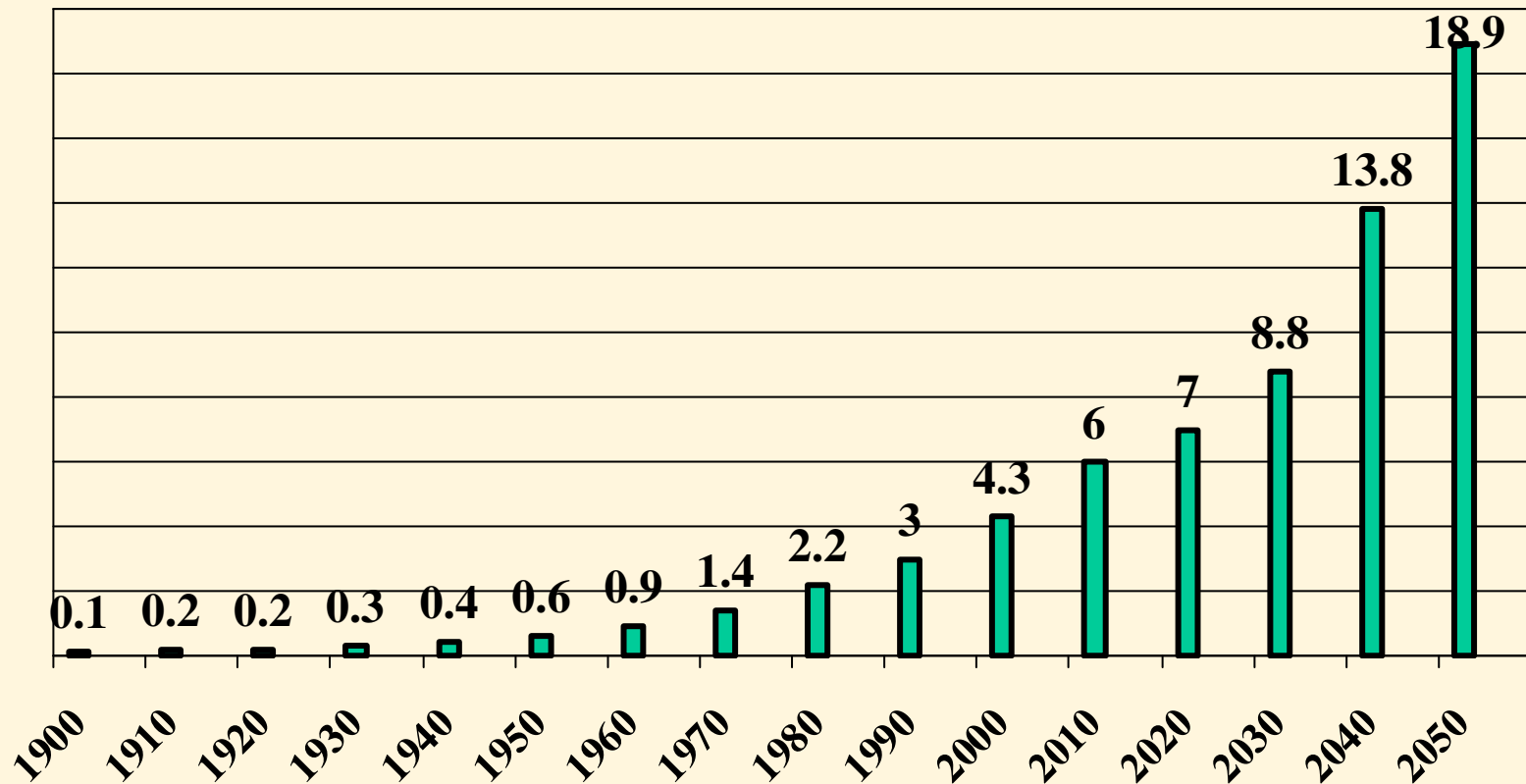


SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, *Health, United States, 2005*, figure 26.



Hoyert DL, Heron M, Murphy SL, Kung HC. Deaths:  
Final data for 2003. Health E-Stats. Released January

# Population 85 Years and Over: 1900 to 2050



Source: U.S. Bureau of the Census, Decennial Censuses for specified years and *Population Projections of the United States by Age, Sex, Race, and Hispanic Origin: 1993 to 2050*, Current Population Reports, P25-1104, U.S. Government Printing Office, Washington, DC, 1993. Data for 1990 from *1990 Census of Population and Housing, CPH-L-74, Modified and Actual Age, Sex, Race, and Hispanic Origin Data*

# Why is there such an increase in the aging population?

- Demographics- Large number of “baby boomers”
- Shift from infectious disease as leading cause of death to chronic illnesses as leading cause of death
- Decreased mortality rates, CHD in particular
- Increased life expectancy
  - Improved medical care partially responsible for improvements in mortality rates and life expectancy
  - Emphasis on preventative care and improved health behaviors to reduce burden of chronic illnesses



# Indicators of Health

## Chronic Illnesses and Causes of Death

Chronic diseases account for 75% of the  
\$1.4 trillion we spend on health care.



**1980**

**\$245 billion**

*an average of \$1,066 per person*



**2001**

**\$1.4 trillion**

*an average of \$5,039 per person*



**2011**

**\$2.8 trillion**

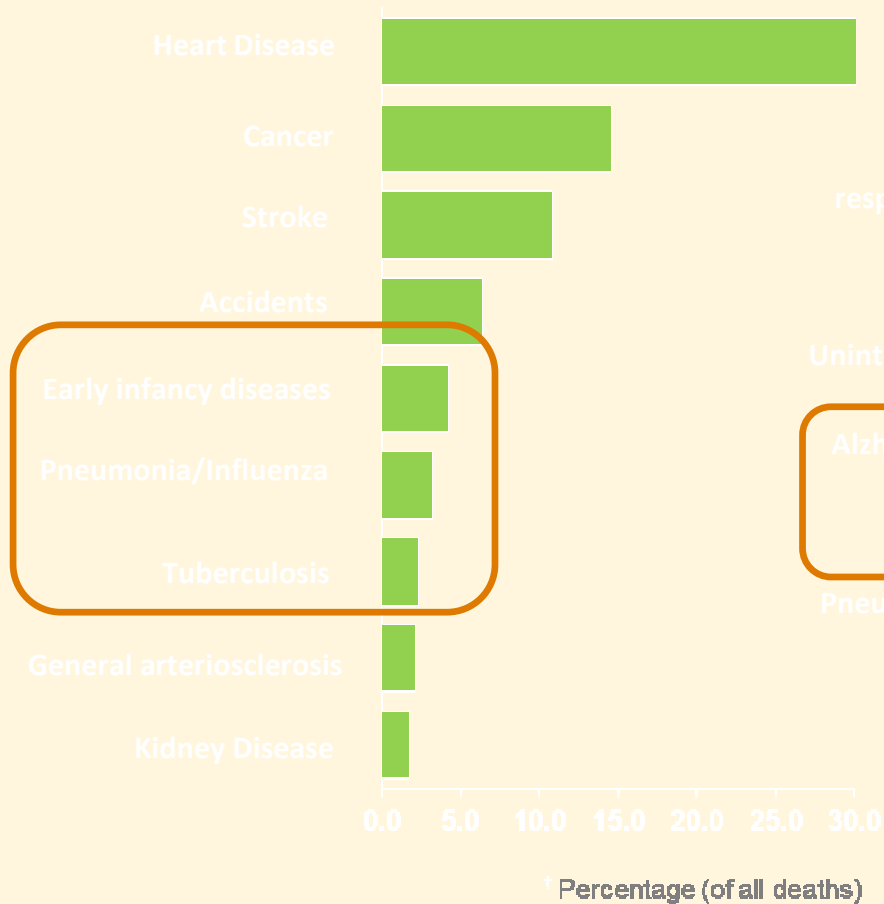
*an average of \$9,216 per person*

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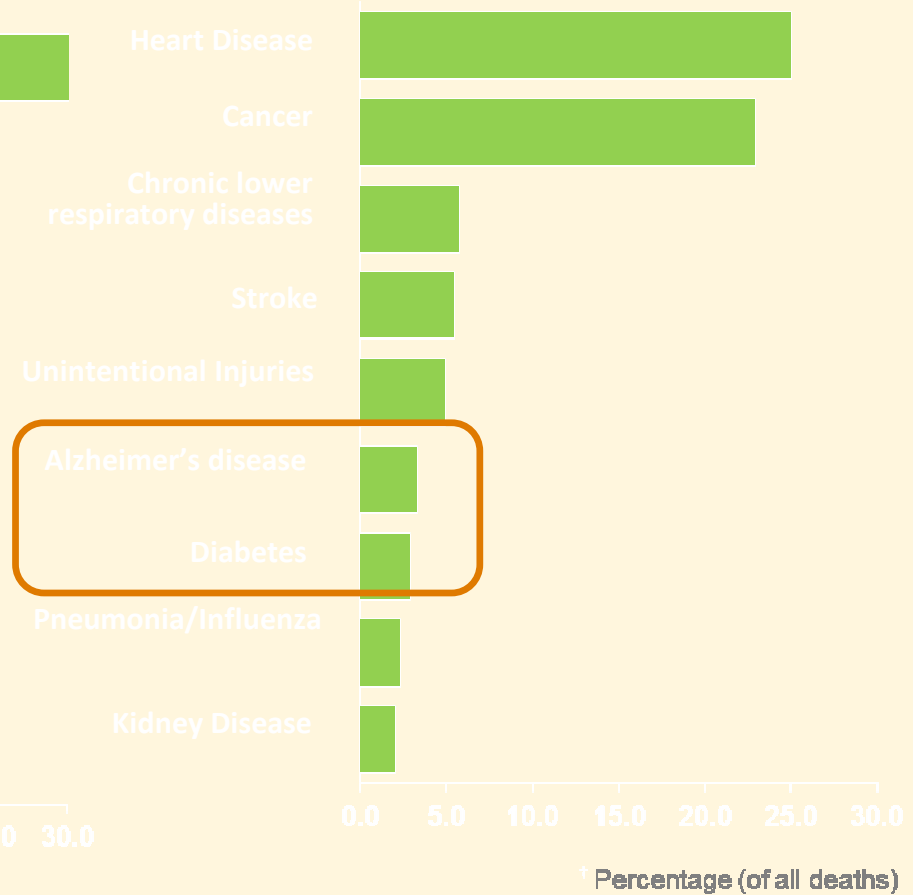
Heffler et al. *Health Affairs*, March/April 2002.

# Leading Causes of Death

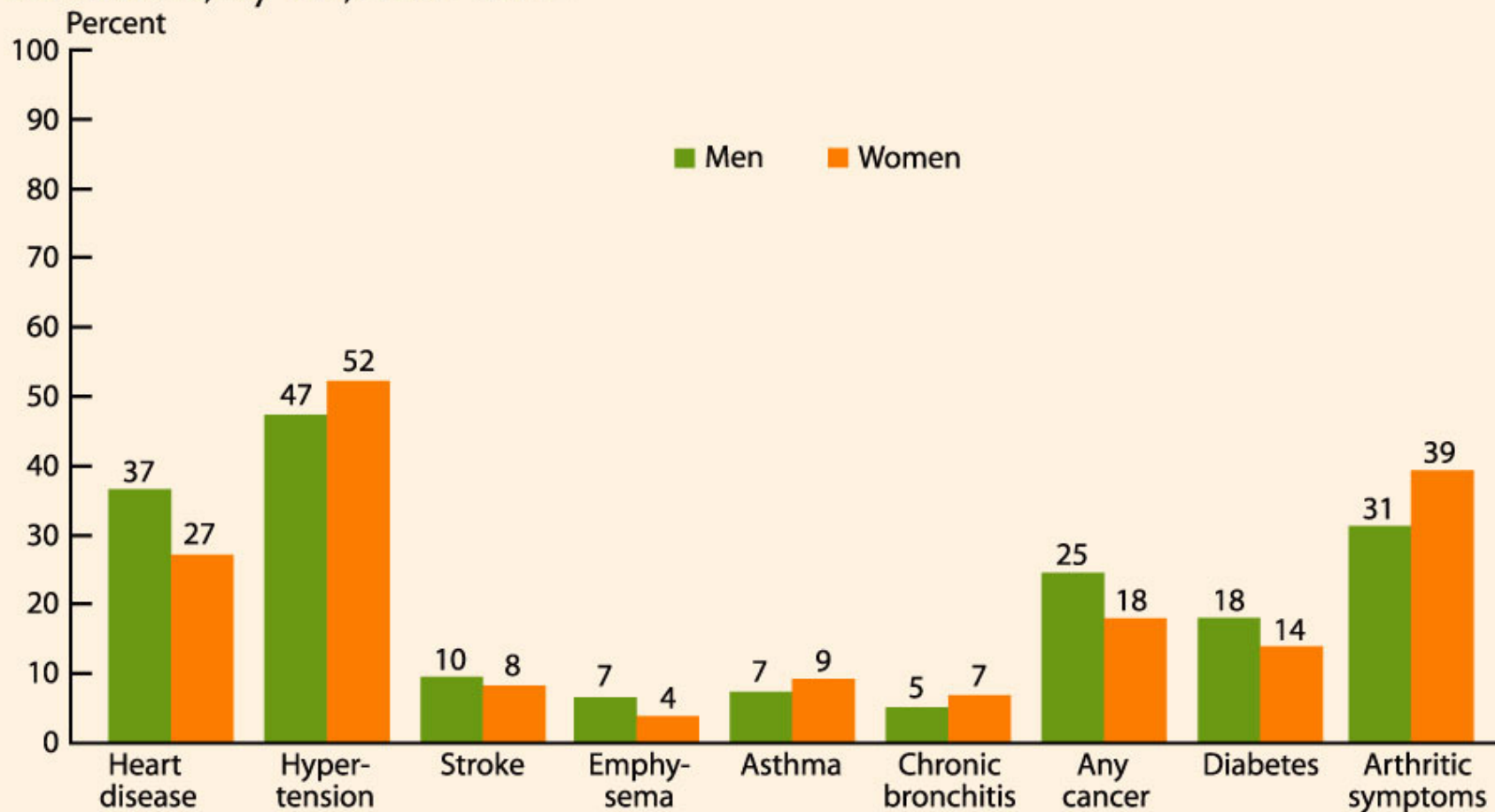
Leading Causes of Death<sup>†</sup>  
United States, 1950



Leading Causes of Death<sup>†</sup>  
United States, 2008



## Percentage of people age 65 and over who reported having selected chronic conditions, by sex, 2001-2002

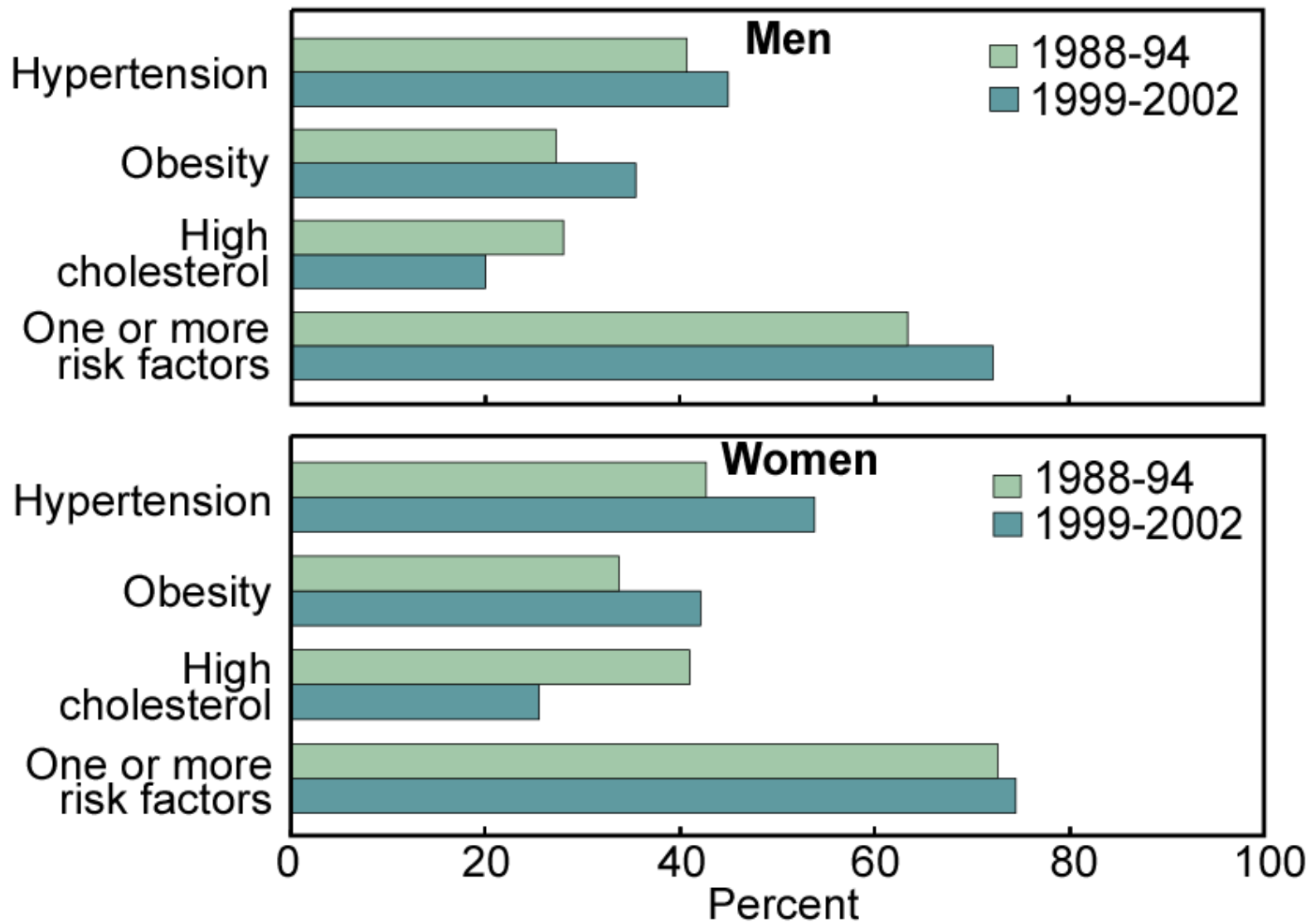


Note: Data are based on a 2-year average from 2001-2002. Data for arthritic symptoms are from 2000-2001.

Reference population: These data refer to the civilian noninstitutionalized population.

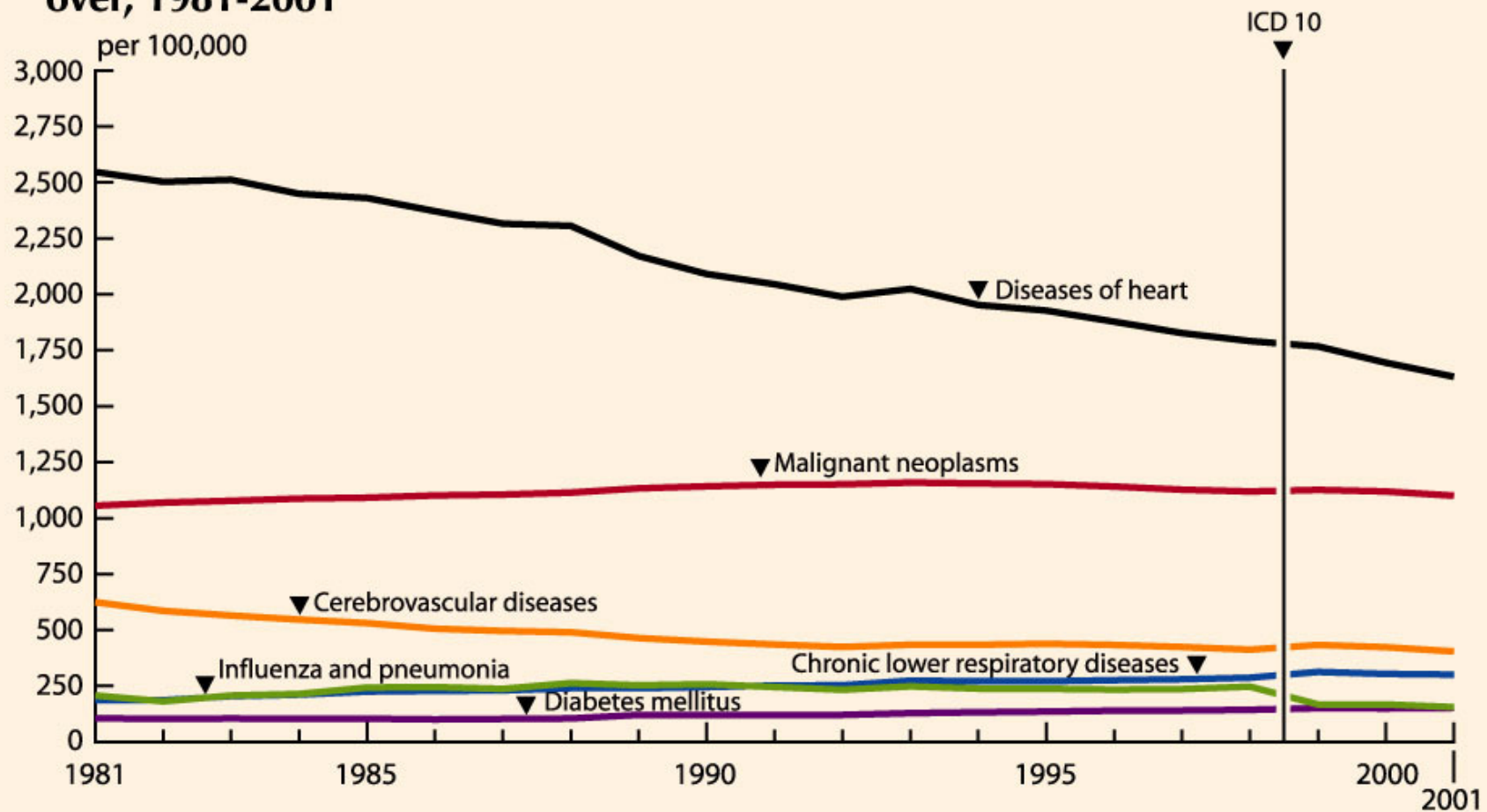
Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey.

## Cardiovascular risk factors, adults 55-64 years



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, *Health, United States, 2005*, figure 34.

## Death rates for selected leading causes of death among people age 65 and over, 1981-2001



Note: Death rates for 1981-1998 are based on the 9th revision of the *International Classification of Disease* (ICD-9). Starting in 1999, death rates are based on ICD-10, and trends in death rates for some causes may be affected by this change.<sup>20</sup> For the period 1981-1998, causes were coded using ICD-9 codes that are most nearly comparable with the 113 cause list for ICD-10 and may differ from previously published estimates. Rates are age-adjusted using the 2000 standard population.

Reference population: These data refer to the resident population.

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System.

# Risk Factors

# Categories of Risk Factors

- Socio-Demographic
  - Age, gender, race, education, income level
- Behavioral
  - Physical activity, diet, tobacco use,
- Environmental
  - Access to care, healthy options,
- Genetic
- Psychosocial
  - Stress, social support/engagement



# What is a health behavior?

- “Any action by an individual that has potential consequences for physical or psychological functioning” (Leventhal, Rabin, Levanthal & Burns, 2001)
- Typically, health behaviors include:
  - Lifestyle behaviors (smoking, exercise, diet, alcohol consumption, etc.)
  - Preventative care (screenings & regular checkups)
  - Other health-related choices (e.g., sunscreen use, eye exams, flu shots)

# Importance of engaging in selected health behaviors

- Lack of physical activity and poor nutrition are the leading cause of death among US adults.
  - Considered underlying cause for 100,000 deaths per year
  - Unhealthy diets are associated with 4 of the 10 leading causes of death in the US: heart disease, cancer, stroke & type 2 diabetes
- Individuals in the highest quintile for fruit and vegetable consumption have demonstrated lower risks for all-cause mortality (HR=0.63; 95% CI: 0.51-0.78) and cancer (HR=0.65; 95% CI: 0.45-0.93) (Genkinger et al., 2004)
- Another study of 3,234 non-diabetic overweight adults found that a reduced fat diet plus 30 minutes of moderate intensity exercise most days of the week achieved a 71% reduction in incident diabetes among adults age 60 and older (Diabetes Prevention Program, 2001)

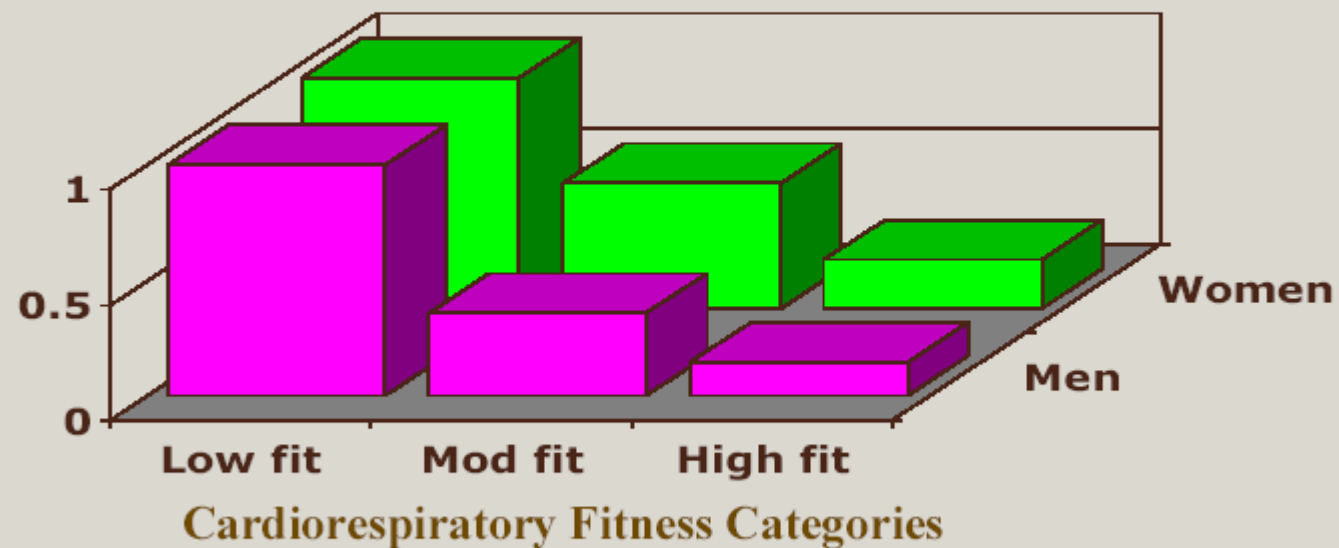
# Health behavior considerations

- Health behaviors play out differently within different demographics of the population
  - Individuals of lower SES often engage in fewer protective health behaviors (e.g., lower rates of physical activity; Poorer dietary composition)
    - Some of this is associated with socio-environmental factors such as access
  - Minority populations (e.g., non-Hispanic blacks, Hispanics) are often described as having poorer health behaviors
    - Must account for factors such as SES, education, health status as these factors may be the real culprits, not ethnicity per se
- You must understand the context in which the behavior will occur before trying to intervene

# Multiple Risk Factors

- When examining the relationship between health behaviors and outcomes it is important to consider:
  - Risk factors/ risk behaviors often do not occur in isolation
    - Poor behaviors tend to cluster (e.g., smoking and alcohol consumption) as do healthy behaviors (e.g., nutrition, physical activity)
  - Can have an interaction effect: When the incidence rate of disease in the presence of 2 or more risk factors differs from the the incidence rate expected from their individual effects

## Adjusted\* Odds Ratios for Development of Functional Limitations



\*Adjusted for age, BMI, length of follow-up, smoking status

Blair, 1999

# Example

Relative Risk of oral cancer according to presence of absence of two Exposures.

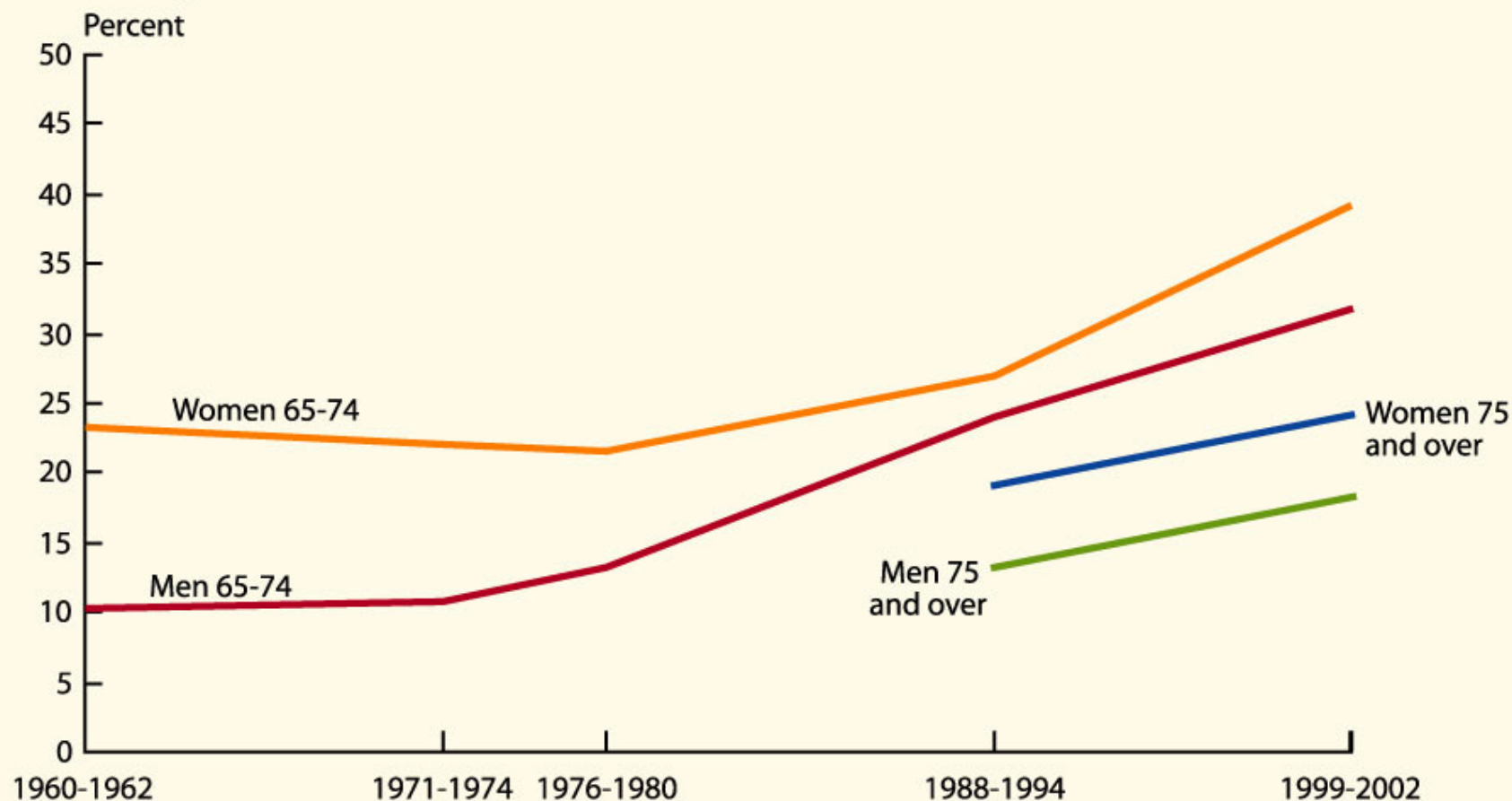
Cigarette Smoking	<u>Alcohol Use</u>	
	No	Yes
No	1.0	1.53
Yes	1.23	5.71

# Importance of changing health behaviors

- Shift from infectious disease to chronic and/or degenerative illnesses emphasizes the need for primary, secondary and tertiary preventative measures
  - Average 75 year old has 3 chronic conditions and uses 5 prescription medications
  - More than 65% of men & women age 65 and older have some form of cardiovascular disease
  - Chronic diseases responsible for nearly  $\frac{3}{4}$  of all deaths of adults over the age of 65
  - Chronic illnesses reduce quality of life and functional status with nearly 12 million elderly individuals reporting functional limitations
    - 25% of those reporting functional limitations are unable to perform activities of daily living, such as bathing, shopping, dressing or eating

# Obesity & Older Adults

**Percentage of people age 65 and over who are obese, by sex and age group, selected years 1960-2002**



Reference population: These data refer to the civilian noninstitutionalized population.

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey.



# Obesity & Older Adults

- Overweight or obese individuals have a greater risk of developing heart disease, diabetes, HTN, arthritis-related disabilities & cancer
- Obesity accounts for 9% of all health expenditures
  - Attributable Medicare expenses = 20.9 – 23.5 billion
- Overweight/obesity among older adults is associated with increases in self-reported functional limitations, decreased physical performance, and subsequent functional decline
  - If overweight/obesity continues at current rates, it is anticipated that there will be an 18 to 22% increase in prevalence of ADL's among 50-69 year olds

# Physical Activity, Morbidity & Mortality

- Regular physical activity is associated with a decreased risk of hypertension, dyslipidemia, cardiovascular disease, stroke, diabetes, obesity, osteoporosis and certain types of cancer including breast and colon cancer (USDHHS, 1996; Freidenrich, 2001)
- Regular physical activity is also associated with decreased overall mortality and mortality from cardiovascular disease (USDHHS, 1996)

# Benefits of Physical Activity

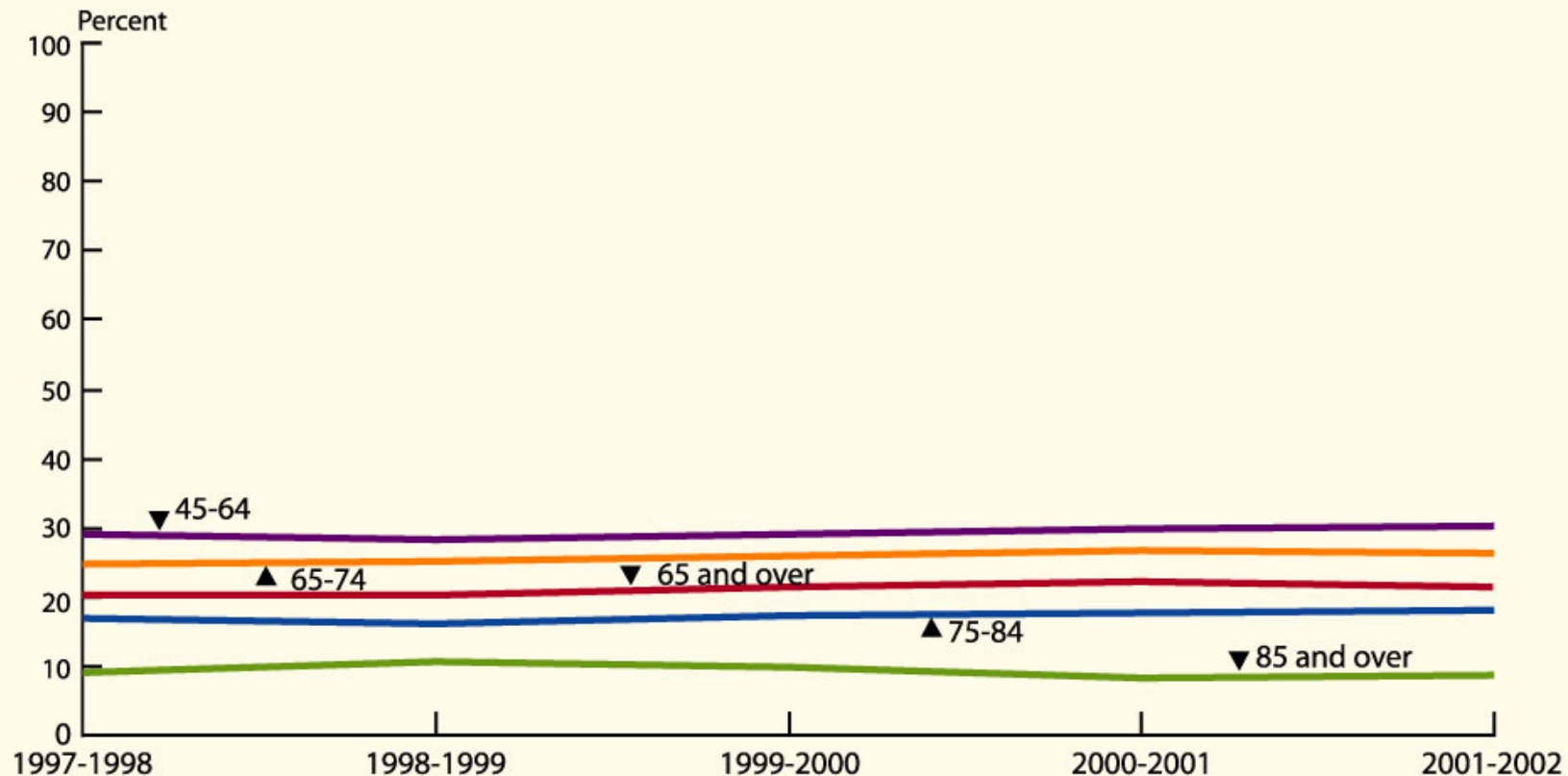
- Blair & colleagues (1989) demonstrated a linear relationship between fitness & risk of death among individuals age 60+
- Paffenbarger (1993) found energy expenditure from walking, stair climbing and sports to be monotonically related to risk of death.
  - 60-69 year-old men who expended less than 500 kcal per week of exercise had twice the risk of death compared to those expending 2000 kcal per week
- Manson & colleagues found an inverse relationship between physical activity and cardiovascular events among post-menopausal women
  - Both walking AND vigorous activity conferred a reduction in risk of cardiovascular events.

# Benefits of physical activity

- Among functionally limited women, those who walked regularly, showed less decline in walking ability and functional performance score compared to those who did not walk (Simonsick et al., 2005)
- In the Nurse's Health Initiative, both physical activity and adiposity independently predicted risk of CHD
  - Being physically active moderately attenuated the adverse effect of obesity on CHD

# But are older adults engaging in physical activity?

**Percentage of people age 45 and over who reported engaging in regular leisure time physical activity, by age group, 1997-2002**



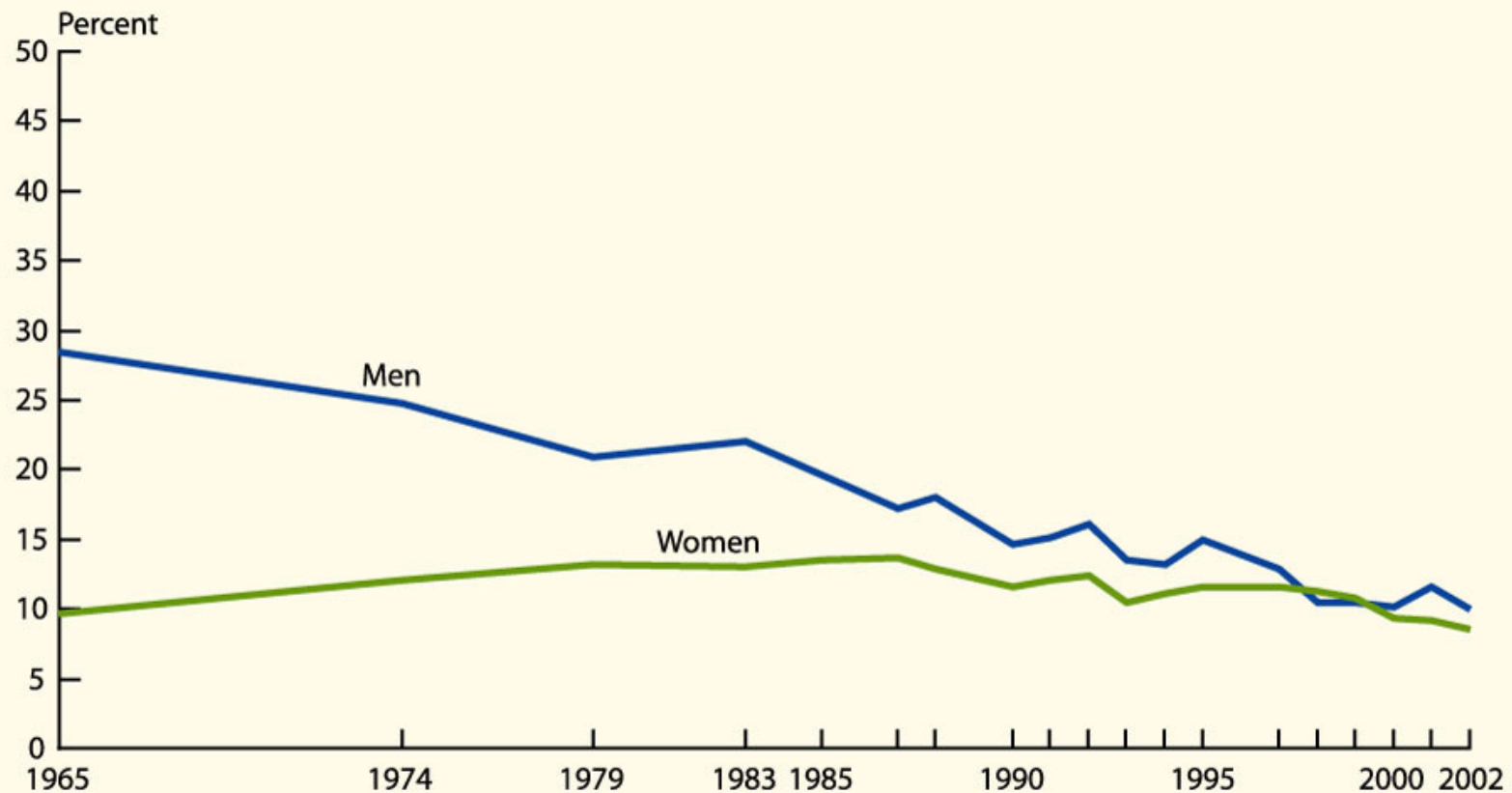
Note: Data are based on 2-year averages. "Regular leisure time physical activity" is defined as "engaging in light-moderate leisure time physical activity for greater than or equal to 30 minutes at a frequency greater than or equal to 5 times per week, or engaging in vigorous leisure time physical activity for greater than or equal to 20 minutes at a frequency greater than or equal to 3 times per week."

Reference population: These data refer to the civilian noninstitutionalized population.

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey.

# Smoking

**Percentage of people age 65 and over who are current cigarette smokers, by sex, selected years 1965-2002**



Reference population: These data refer to the civilian noninstitutionalized population.

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey.

# Consequences of Smoking

- Higher risk of mortality:
  - Accounts for 1 out of every five deaths in the US and an estimated 5 million years of potential life lost annually (CDC, 1990; DHHS 1989)
  - Among 60-90 year-olds in the Alameda health study, current smokers had 50% higher risks of dying than non-smokers (Kaplan et al., 1987)
  - Over a nine-year period of time, those who continued to smoke had a 76% increased risk of death, while those who quit had a 33% increase of death (Kaplan & Haan, 1989)
  - Even among those with documented coronary artery disease , Hermanson and colleagues found a reduction in all-cause mortality associated with smoking cessation

# Consequences of Smoking

- Higher risk of cancer (lung, esophagus, throat, mouth); cardiovascular disease (CAD, PVD, & Stroke) and lung disease (Emphysema, COPD, Asthma & Pneumonia)
  - Tobacco is one of the most potent human carcinogens
  - Smoking promotes atherosclerosis and is a leading risk factor for MI, CHD and CVD
  - Smoking causes 85,000 deaths per year from respiratory illnesses including COPD and pneumonia (USDHHS, 1990)
- Smoking is associated with poorer physical functioning
  - LaCroix found that smokers who were mobile at baseline had the greatest declines in mobility over a 4 year period and former smokers had intermediate declines
  - Kaplan et al., 1993 found similar declines in functioning among smokers relative to former and never smokers



# Smoking

- Rates of smoking are going down, however, effects of smoking are distal to the exposure
- Large percentage of older adults, especially veterans of WWII, smoked heavily in youth
- Smoking cessation is associated with a reduced risk of cancer and is protective, but risk is not completely avoided

# Health Behavior Considerations

## Continued

- Important to consider both the timing of the exposure and the level of exposure necessary to have beneficial outcomes
  - Clearly identify outcome of interest
  - Appropriate measure used for both behavior and outcome
  - Identify timing of exposure

# Realistic Aging

# Health behavior considerations

- Not all health behaviors have a linear relationship with health outcomes
  - For example, alcohol consumption has a curvilinear relationship with cardiovascular health- moderate amounts are associated with improvements in cholesterol levels and heart health, while drinking in excess is associated with HTN, high triglycerides and heart failure

# Health behavior considerations

- Health behaviors play out differently within different demographics of the population
  - Individuals of lower SES often engage in fewer protective health behaviors (e.g., lower rates of physical activity; Poorer dietary composition)
    - Some of this is associated with socio-environmental factors such as access
  - Minority populations (e.g., non-Hispanic blacks, Hispanics) are often described as having poorer health behaviors
    - Must account for factors such as SES, education, health status as these factors may be the real culprits, not ethnicity per se
- You must understand the context in which the behavior will occur before trying to intervene

# Health behavior considerations

- The relative risk for the association between a health behavior and a health outcome is relatively stable across the lifetime
- However, the absolute risk of a health behavior is greater in older adults

# Multiple Risk Factors

- When examining the relationship between health behaviors and outcomes it is important to consider:
  - Risk factors/ risk behaviors often do not occur in isolation
    - Poor behaviors tend to cluster (e.g., smoking and alcohol consumption) as do healthy behaviors (e.g., nutrition, physical activity)
  - Can have an interaction effect: When the incidence rate of disease in the presence of 2 or more risk factors differs from the the incidence rate expected from their individual effects

# Interaction effects

- Interaction effects can be multiplicative or additive
  - Additive= exposure to second risk factor adds to the effect of the first exposure
  - Multiplicative = exposure to second risk factor multiplies the effect of the first exposure
  - Effects are considered synergistic if there is an effect greater than additive



# Chronic Disease is an Epidemic of Unparalleled Proportions.

- More than 1.7 million Americans die of a chronic disease each year.
- 80% of older adults have at least one chronic condition; 50% at least two.
- Greater prevalence among minority populations
- 95% of health care spending for older adults attributed to chronic conditions.
- Four chronic diseases – heart disease, cancer, stroke, and diabetes – cause almost two-thirds of all deaths each year.

Mensah: [www.nga.org/Files/ppt/0412academyMensah.ppt#18](http://www.nga.org/Files/ppt/0412academyMensah.ppt#18)

State of Aging and Health in America 2007: [www.cdc.gov/aging](http://www.cdc.gov/aging)

# Underlying Risk Factors – “The Actual Causes of Death”

<b>Behavior 2000</b>	<b>% of deaths,</b>
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Smoking	19%
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Poor diet & nutrition/ sedentary	14%
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Alcohol	5%
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Infections, pneumonia	4%
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Racial, ethnic, economic disparities	?
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“No longer is each risk factor and chronic illness being considered in isolation. Awareness is increasing that similar strategies can be equally effective in treating many different conditions.” Epping-Jordon, WHO, 26 March 2004

# Threats to Health and Well-being Among Seniors

- 73% age 65-74 report no regular physical activity (PA)
- 81% age 75+ report no regular PA
- 61% unhealthy weight
- 33% fall each year
- 15%-20% clinically significant depression
- 35% no flu shot in past 12 months
- 45% no pneumococcal vaccine
- 20% prescribed “unsuitable” medications

# Prevention Does Work for Older Adults

- Longer life
- Reduced disability
  - Later onset
  - Fewer years of disability prior to death
  - Fewer falls
- Improved mental health
  - Positive effect on depressive symptoms
  - Possible delays in loss of cognitive function
- Lower health care costs

# Determining Realistic Risk

The most fundamental misinterpretation of behavioral (and other forms of risk) is a direct inference of personal risk based on research that estimated population risk.

It is inappropriate to provide individual “guarantees” for positive outcomes or adverse health outcomes based on health risk behavior.

Prohaska and Clark, 1994



