Cancer & Poverty in Colorado: 1995-2002

Colorado Cancer Coalition

and

Comprehensive Cancer Program

Colorado Department of

Public Health and Environment

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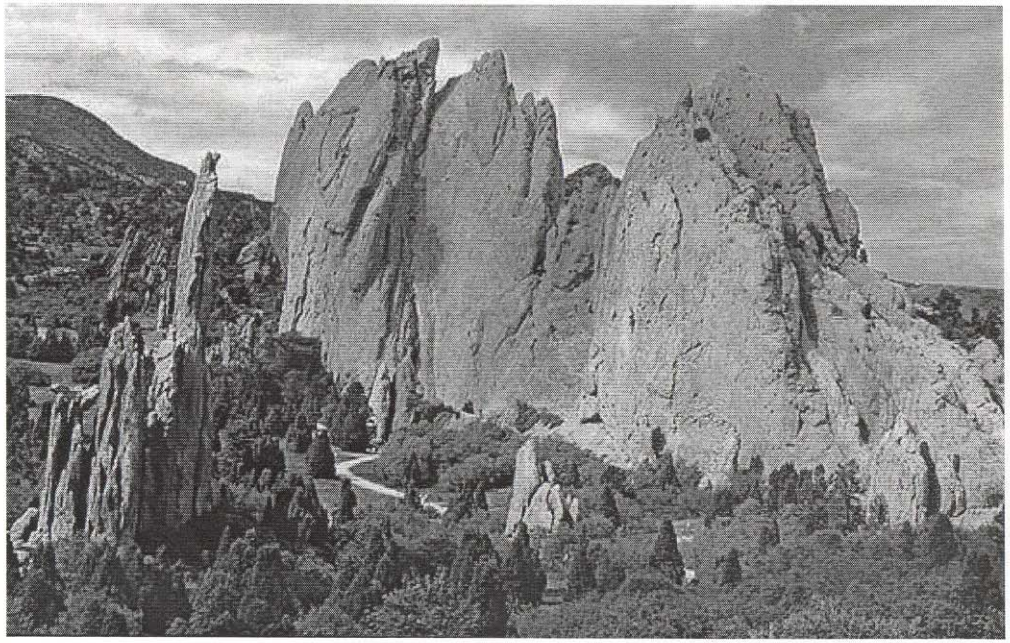
Colorado Central Cancer Registry

June 7, 2005 – NAACCR - Boston

CANCER & POVERTY



in Colorado

1995 - 2002

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Prevention and Poverty

Many of the major cancers can be prevented and/or detected at an early stage

- Approximately two out of three cancer deaths are caused by smoking, poor diet, obesity, physical inactivity, or failing to use cancer screening tests
- Many of these factors are related to poverty, which is also a barrier to accessing effective cancer therapies.

Risk Reduction and Poverty

Although, significant progress has been made in reducing mortality rates since 1990, inequalities or disparities remain among racial and ethnic populations in Colorado.

Understanding the influence of poverty on cancer risk and outcomes can assist in separating race and ethnicity factors from poverty factors, and in developing better cancer prevention and control strategies for financially disadvantaged persons in Colorado.

Research Issues

- **Outcomes reported by race/ethnicity:**
  - Disentangling the effects of race/ethnicity and SES on cancer is important in reducing the unequal burden of cancer

Burden

- Cancer is the second leading cause of death in Colorado
- An average of 15,180 malignant cancers per year were diagnosed in Colorado in 1995-2000
- Approximately 57% of cancer cases were diagnosed at an early stage in Colorado
- Incidence of all cancers in Colorado for 1998-2002 was 445.8 cases/100,000 persons
- Lifetime risk of being diagnosed with cancer in Colorado is approx. one in two for males, and one in three for females.

Main Cancer Contributors

- Lifestyle and Behavior
- Genetics
- Environment
- ***Socioeconomic status***
- ***Race/ethnicity***
- Gender

Sociodemographics and the Uninsured in Colorado

- Kaiser Family Foundation rates of uninsurance (2001-2002)
  - Overall:
    - 19% of all CO adults aged 19-64 (more than 500,000 persons)
  - By income:
    - 41% of those in poverty
    - 33% of those near poverty (100-200% of FPL)
    - 9% of those not in poverty (>200% FPL)
  - By race/ethnicity:
    - 36% of Hispanics
    - 22% of blacks
    - 11% of whites

Rocky Mountain News Article
October 12, 2004

RMN 10/12/04

Study: Aid for poor 'inadequate'

State falls behind others in help for low-income families

By Jeff Kass
ROCKY MOUNTAIN NEWS

Colorado isn't doing enough to boost its low-income working families, according to a study to be released today.

That is especially troubling, say those who are involved in the research project, because Colorado is considered a relatively affluent state.

"If you're not doing well in Colorado, you're basically receiving a very low level, an inadequate level, of state support and services to assist you in earning a better wage and finding a job," Spiros Protopsaltis, of the Bell Policy Center in Denver, said Monday. The Bell Center has worked with the Maryland-based Working Poor Families Project, which is releasing today's study and aims "to assess state efforts to assist the working poor."

But the idea of more government subsidy was criticized Monday by Colorado Springs anti-tax advocate Douglas Bruce. He specifically zeroed in on a proposal mentioned by Protopsaltis to both guarantee and increase the state earned income tax credit to poor families.

"That's just another welfare handout that creates more government dependency," Bruce said.

The study, titled "Working Hard, Falling Short," ranked all 50 states on 16 indicators.

Colorado's best ranking in the study came in the category concerning the number of jobs paying below poverty — 13.4 percent, fourth among the states in the fewest jobs below poverty. The study used 2002 census figures, the latest year for such numbers, according to study co-author Brandon Roberts. "Below poverty" is defined as a job that pays less than $18,392 annually.On the other hand, Colorado ranked 48th for the amount of state money given to adult education programs for those without a high school diploma or general equivalency diploma. The $5.54 spending per adult in Colorado compares to Florida, which had the number one ranking, with $194.07.

The study called on the federal and state governments to form new policies, including raising the minimum wage, to aid low-income families. The study found that nationally, "more than one out of four American working families now earn wages so low that they have difficulty surviving financially."

A helping hand for the working poor

How Colorado ranks in the nation on issues affecting "low-income working families"*

- **Rank: 4** in jobs paying below poverty
- **Rank: 9** in non-minority working families that are low income
- **Rank: 11** in working families that are low-income
- **Rank: 45** in low-income working families with a parent without a high school diploma
- **Rank: 47** in unemployed not receiving unemployment insurance benefits
- **Rank: 48** in state adult-education funds per adult without a high school or general-equivalency diploma

*On a scale of 1 to 50, 50 being the worst

Source: Working Poor Families Project

Rocky Mountain News Article
April 27, 2005

RMN
WEDNESDAY, APRIL 27, 2005

15% of working Coloradans are uninsured, study shows

Campaign to boost coverage criticizes access to health care

By Rachel Brand
ROCKY MOUNTAIN NEWS

More than 336,000 employed adults in Colorado lack health insurance, or about 15 percent of the working population.

Furthermore, 94,000 uninsured adults were unable to get needed medical care in the past year, which can lead to severe medical problems, a new study said.

"The myth that the uninsured can get the appropriate level of care when they need it is dispelled," said Larry Wall, president of the Colorado Health & Hospital Association.

The research was expected to be released today to kick off Cover the Uninsured Week, an annual push to extend health insurance nationwide.

The numbers are an interpretation of Centers for Disease Control and Prevention data and can't be compared with previous years.

But according to the Census Bureau, the overall number of uninsured stayed flat this year at 45 million, and even those figures could be inflated by as much as 20 percent, experts now say.

The Census Bureau's current population survey, an annual survey of household economic data, may undercount the number of people who jump on and off Medicaid by 9 million, said James Mays, vice president of Annandale, Va.-based Actuarial Research Corp.

In short, the number of people who are uninsured for 12 months straight is 36 million or less, and 45 million more accurately represents the number of uninsured on any given day, Mays said. His analysis was released at the American Enterprise Institute meeting in early April.

Regardless of how you slice the numbers, they're unacceptably high, health professionals say.

And they've grown. According to the same Census Bureau figures, the number of insured has grown from 41.6 million in 2001 to 45 million since Cover the Uninsured Week began.

In Colorado, the number of uninsured people has mushroomed from 700,000 in 2001 to more than 770,000 in 2004.

This has taken place despite a 37 percent increase in Medicaid enrollment, from 295,000 enrollees in 2001 to a projected 405,000 this year.

"If anything, there's been a lot of talk and not a lot of action," said Dr. Rick May, president-elect of the Colorado Medical Society.

As he sees it, nobody wants to pay to solve the problem, and those without health insurance tend to live at the political margins, lacking a powerful lobby.

"If you had an AARP to represent the uninsured, you'd have a huge amount of outcry," May said.

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Poverty in Colorado

- In 1999, 9.3 percent of Coloradans were living below the poverty line of $11,156 annual income for two adults.

  Poverty lines are defined as the income below which an individual or family is considered to be living in poverty (updated each year by U.S. Census Bureau)

Purpose of this Report

- To examine the relationships between poverty and . . .
  - the known risk factors for cancer
  - incidence rates
  - early stage diagnosis
  - survival with cancer in Colorado

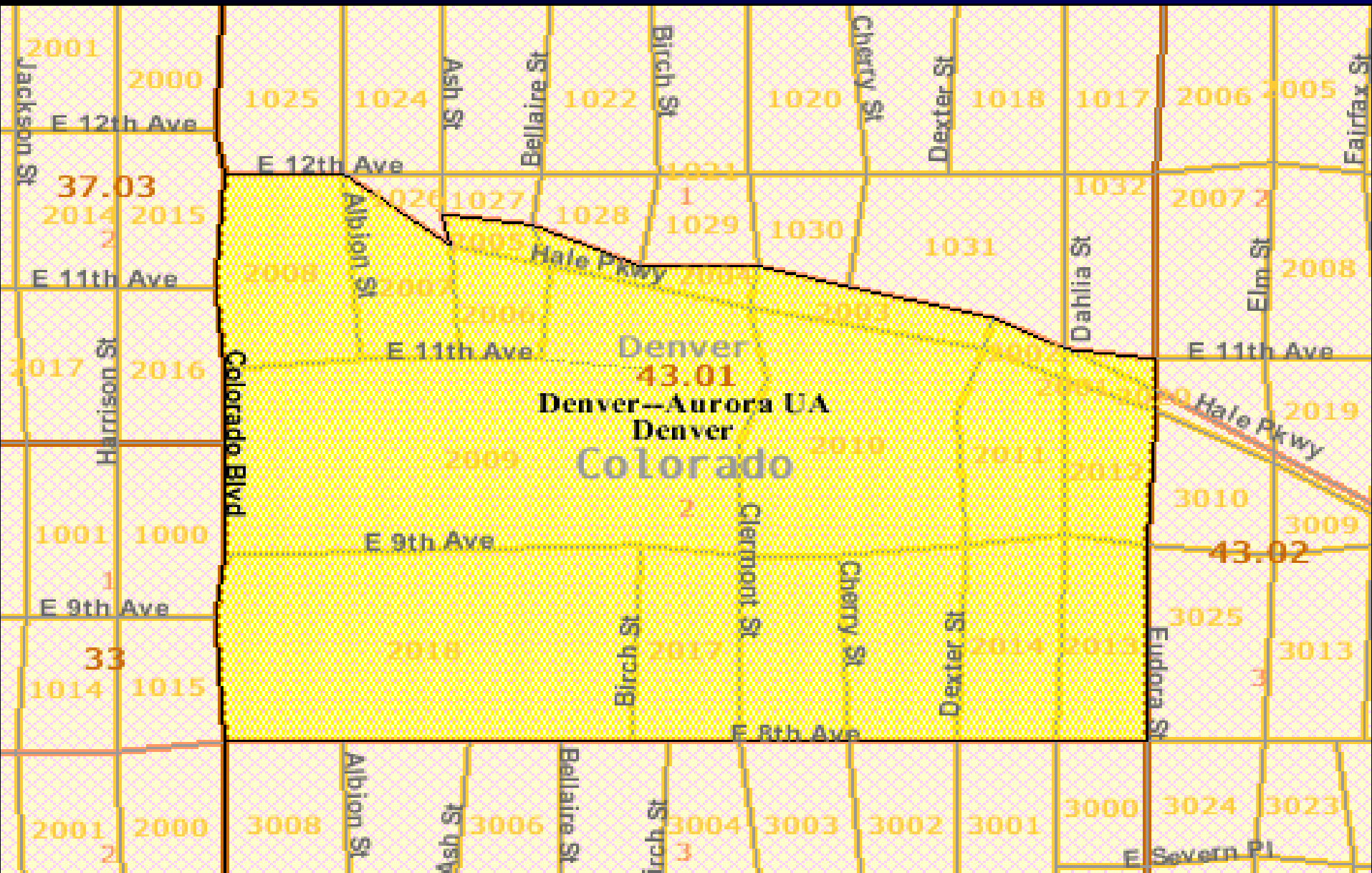
Methods

Utilizing a similar approach to the National Cancer Institute in their recent report on poverty and cancer - *Area Socioeconomic Variations in U.S. Cancer Incidence, Mortality, Stage, Treatment, and Survival, 1975-1999*

Methods continued

- Data Sources: CDPHE (Colorado Central Cancer Registry and Colorado Behavioral Risk Factor Surveillance System Surveys) and US Census Bureau
- Resources for Cancer Screening: *Guide to Clinical Preventive Services, Third Edition* (U.S. Preventive Services Task Force)
- Area Measures for this report: Socioeconomic measures were constructed using census block groups (U.S. Census) and the poverty rate (the percentage of the population living below the defined federal poverty line).
  - Census Tract – averages 4,000 residents
  - Census Block-Group – averages 1,000 residents

Example of a Census Block Group Area or "Neighborhood"



Methods continued…

- Poverty rates correlate highly with other measures of socioeconomic status, such as educational attainment, unemployment rate, and occupational composition
- Using the poverty rates and Census Block Group defined by the US Census, average area poverty levels were established throughout Colorado
  - < 10 % - Wealthier areas
  - 10 –19% - Middle poverty areas
  - 20+ % - Poorer areas

Methods continued…

- Behavioral Risk Factor Surveillance System (BRFSS) – surveys approx. 2,000 Colorado adults aged $\geq$ 18 years randomly by telephone per year
  - Information regarding household income, education, risk behaviors and preventive health practices are collected.

Cancer Outcomes Definitions

- Incidence rates measured the number of newly diagnosed primary, malignant cancers for 1998 – 2002 per 100,000 persons
- Early stage detection was defined as the percent of staged cancers that were diagnosed at early stages (*in-situ* or localized stage)
- Five-year cause-specific survival rates measured the proportion of patients surviving at least five years with a specific cancer (calculated using the NCI's SEER*STAT software package)

Survival Analyses

- Cases were treated as censored observations if…
  - Lost to follow-up
  - Alive at the end of the five-year follow-up period
  - Died of causes other than the underlying cancers.
- Cases dying of unknown causes were excluded from the analysis.

Limitations

- Differences in subgroup size – reduced ability to determine significance or compare to larger subgroups
- Debate about the best measure of socioeconomic status – use of percent in poverty validated by the NCI report
- Small proportion of cases were assigned poverty status based on zip code rather than block group
- While the BRFSS gives a reliable estimate of cancer–related behaviors for the state, it is not a survey of Coloradans in the Cancer Registry.

Demographics of Colorado

- Estimated median household income in Colorado
  - –Poorest areas - $23,000
  - –Middle poverty areas - $33,000
  - –Wealthier areas - $53,000
- Education reported as whether or not college graduation was achieved for adults 25 years or older
  - –Poorest areas – 12%
  - –Wealthier areas – 25%

Race/Ethnicity by Poverty Level in Colorado

- Poorest areas
  - 8% black
  - 40% Hispanic
  - 48% non-Hispanic white
- Wealthier areas
  - 82% non-Hispanic white

Findings of Risk Factors Related to All Cancers

- Smoking - less common in Coloradans with higher incomes
- Obesity – those reporting lower incomes were more likely to be obese than those reporting higher incomes
- Physical activity – those reporting lower incomes were less likely to achieve recommended levels of physical activity compared to higher incomes
- Fruits and Vegetables – fewer than one in four Coloradans reported eating fruits or vegetables. Those least likely to get recommended fruits/vegetables servings were those living at or near the poverty level.

Breast Cancer and Poverty

- Most common cancer diagnosed among women in Colorado and nationally
- Second leading cause of cancer-related deaths
- Lifetime risk for women is one in seven
- An average of 2,800 malignant breast cancer cases per year are diagnosed in Colorado women.

Breast Cancer and Poverty – Risk Factors

- Risk factor for developing breast cancer:
  - Age
  - Family History
  - Biopsy-confirmed atypical hyperplasia
  - Having a first child after age 30
  - Obesity
  - Physical inactivity
  - Drink one or more alcoholic drinks per day
  - Taking hormone supplements after menopause

Breast Cancer and Poverty - Prevention

- Mammography, with or without clinical breast examination, every one to two years for women aged 40 and older
- Detecting breast cancer early saves lives and increases treatment options

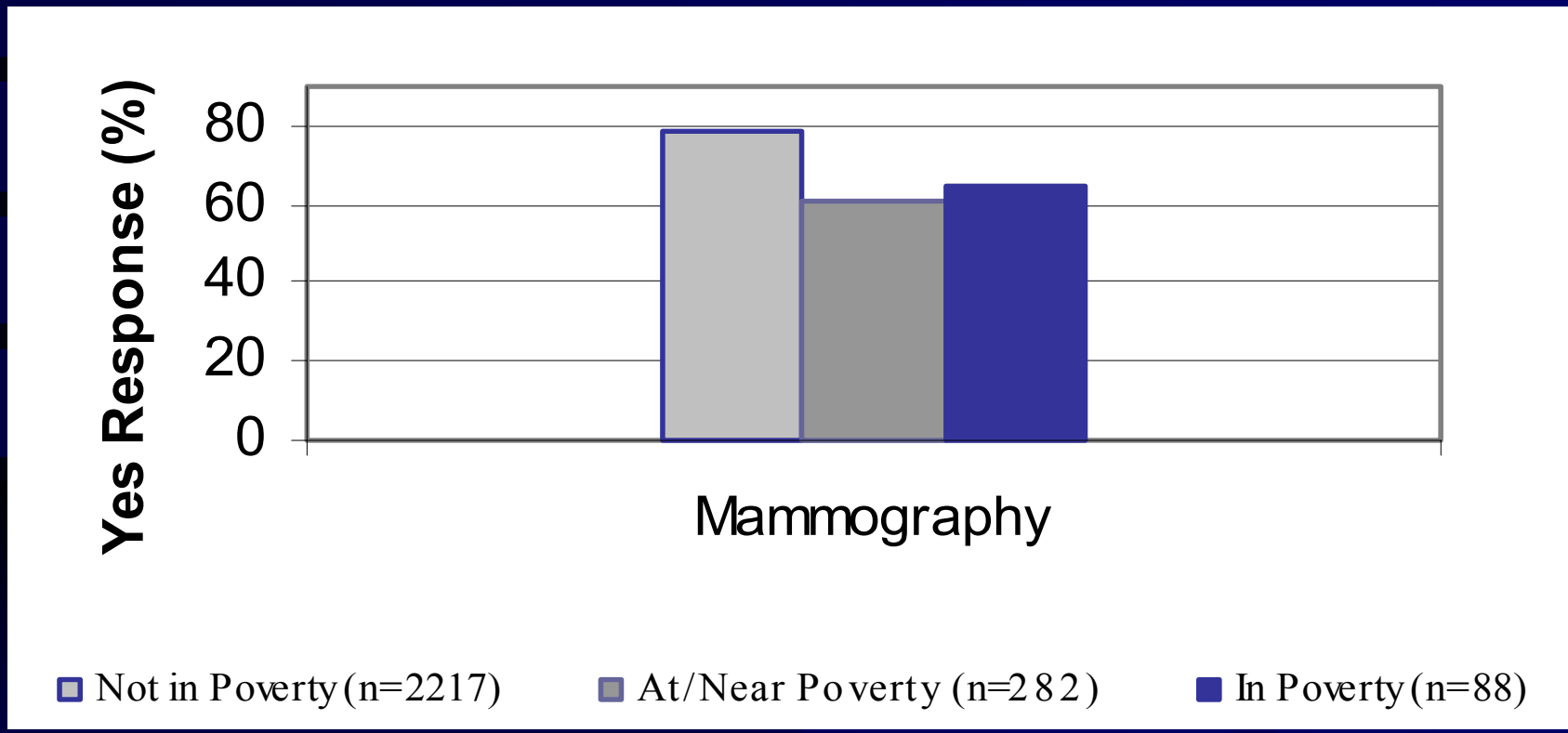
Breast Cancer and Poverty - Findings

- BRFSS – Higher income women had screening rates that were 14-18 percentage points above those living at/or near or in poverty
- Incidence rate – 135.2 / 100,000 women in 1998-2002
  - Wealthier areas – 138.5 / 100,000 persons
  - Poorest areas – 110.1 / 100,000 persons

Breast Cancer and Poverty - Findings

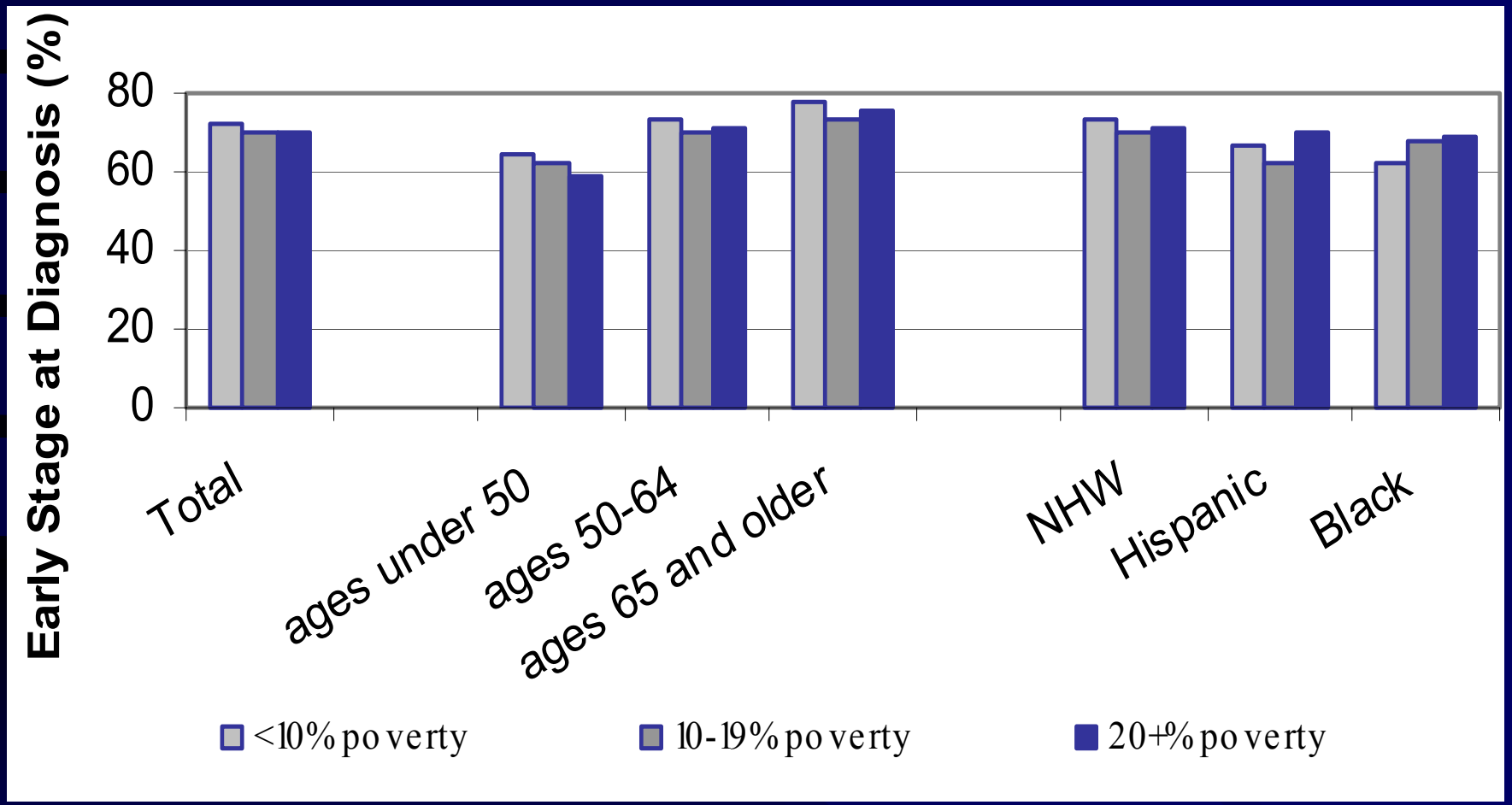
- Early Detection – For all race/ethnicities combined, fewer cancers were detected at early stage in the poorer areas
- Survival – approx. 85% of women with breast cancer survive at least 5 years after diagnosis
  - Rates were lower in poorer areas for all ages
  - For NHW and Hispanics, rates were worse in poorer areas
  - For black women there was a survival advantage in the poorer areas (Colorado Women's Cancer Control Initiative Program)

Percent of Colorado females aged 40+ who have had a mammogram in the past two years by Poverty Level, 1995-2000



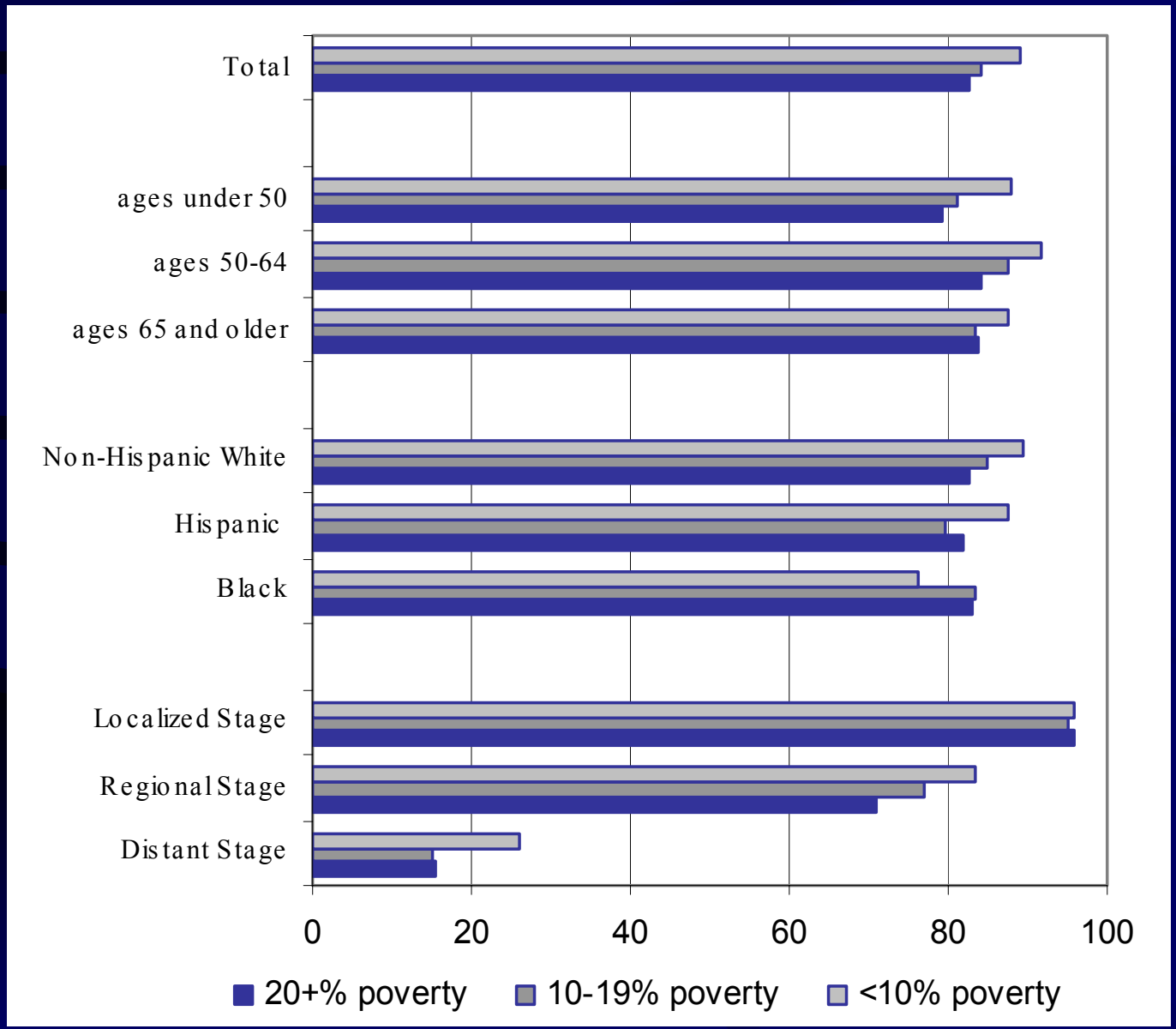
Source: Health Statistics Section, Colorado Department of Public Health and Environment, June 2004.

Early Stage at Diagnosis for Breast Cancer by Area Poverty Level, Age, and Race, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Five-Year Survival for Breast Cancer by Area Poverty Level, Age, Race and Stage, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Cervical Cancer and Poverty

- Before introduction of the Pap Smear screening test, invasive cervical cancer was the most common cause of cancer death in women
- Lifetime risk of invasive cervical cancer for female in Colorado is one in 140
- This report focuses on cervical cancer malignancies that have invaded the thin layer of cells covering the cervix (not including *in-situ* cancers).

Cervical Cancer and Poverty – Risk Factors & Prevention

- Risk Factors
  - Sexual behaviors that increase exposure to human papilloma virus (HPV)
  - Cigarette smoking
- Prevention
  - UPSTF recommends screening begins at age 21, or within 3 years of becoming sexually active

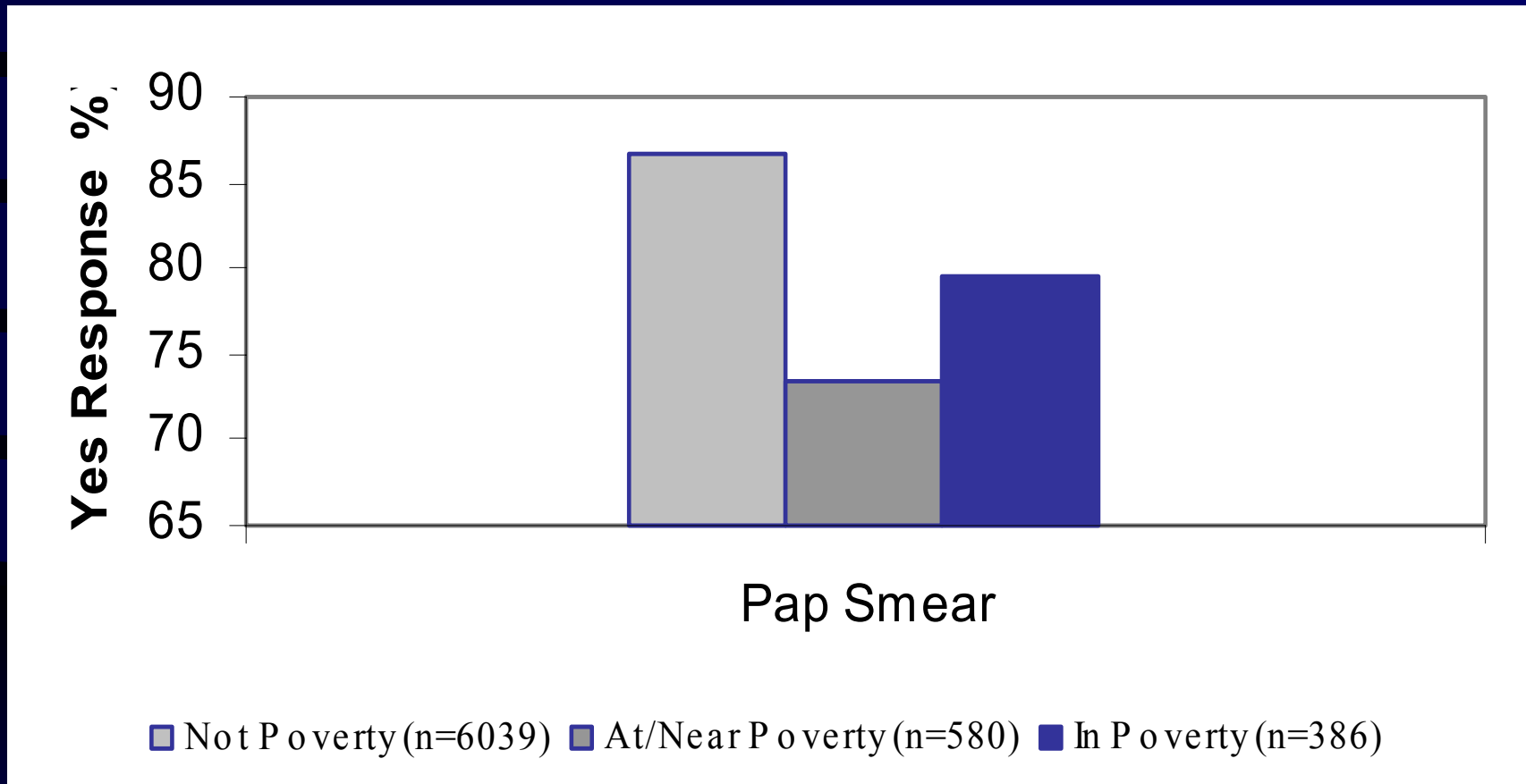
Cervical Cancer and Poverty - Findings

- BRFSS – poorer women were less likely to have had a Pap test within the past three years than women reporting incomes above the poverty level
- Incidence – 7.3 cases per 100,000 females in Colorado for 1998-2002
  - Wealthier areas – 6.2 per 100,000 females
  - Poorest areas – 10.9 per 100,000 females

Cervical Cancer and Poverty - Findings

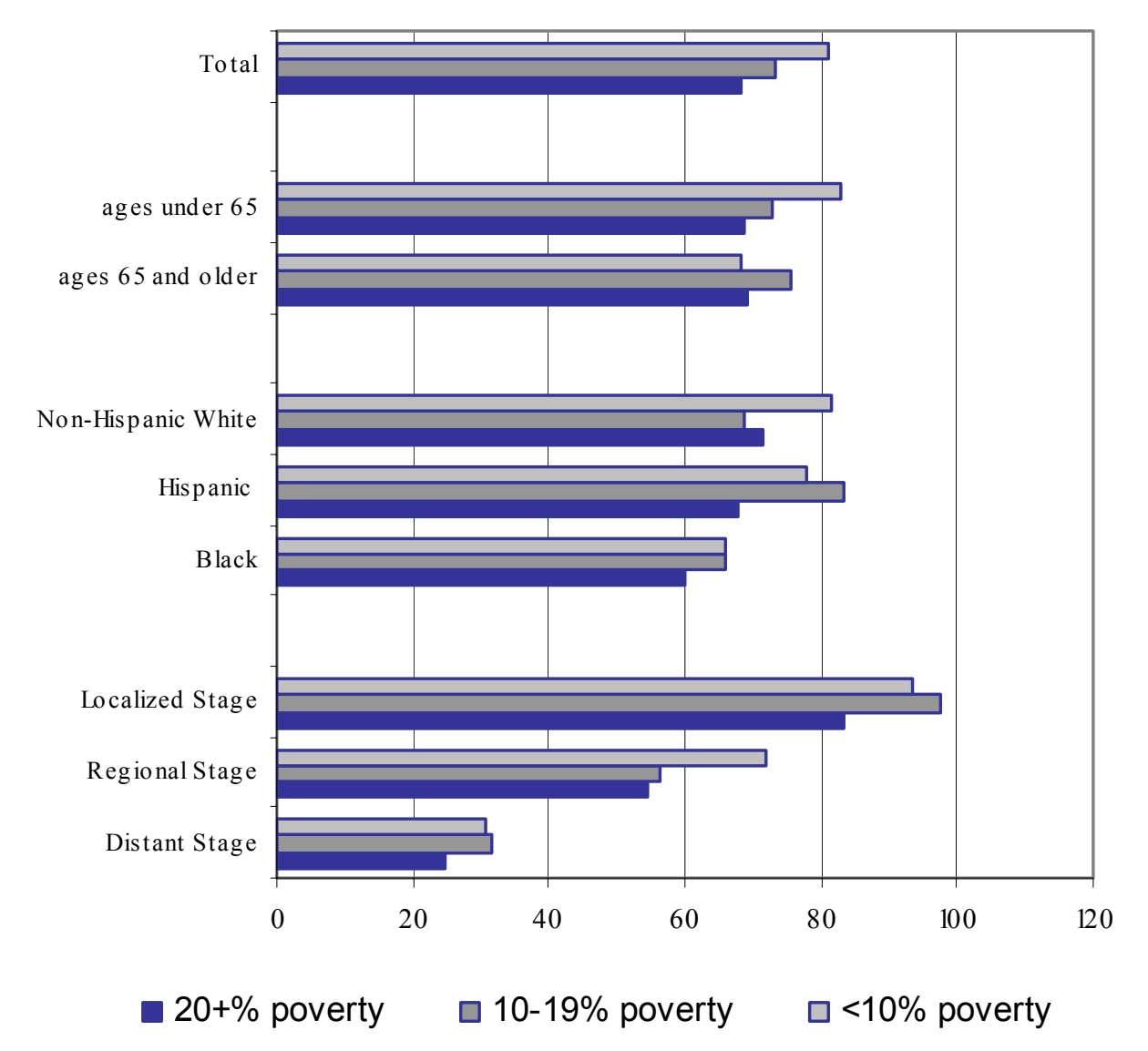
- Early Detection – was not calculated for cervical cancer because in-situ cases are not reportable to state cancer registries.
- Survival – survival rates for Hispanic and black women were lowest in the poorest areas of Colorado. Among NHW, rates were similar in the two poorer areas (9 to 12 percentage points lower than the rate in wealthier areas).

Percent of Colorado females who have had a Pap Smear in the past three years by Poverty Level, 1995-2000



Source: Health Statistics Section, Colorado Department of Public Health and Environment, June 2004.

Five-Year Survival for Cervical Cancer by Area Poverty Level, Age, Race, and Stage, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Colorectal Cancer and Poverty

- Second leading cause of cancer death in Colorado
- Cumulative lifetime risk is one in 13 for males, and one in 17 for women
- An average of 1,700 malignant colorectal cancers per year are diagnosed in Colorado.

Colorectal Cancer and Poverty-Risk Factors

- Age (more than 90% occurs in persons older than 50 years of age)
- Family history
- Colon polyps
- Inflammatory bowel disease
- Smoking
- Obesity
- Physical inactivity
- Low consumption of fruits and vegetables

Colorectal Cancer and Poverty-Prevention

- UPSTF recommends colorectal cancer screening begin at age 50 for all adults without additional risk factors
- Screening options include:
  - Fecal Occult Blood Testing (FOBT) every year
  - Sigmoidoscopy every five years
  - Double contrast barium enema every five years
  - Colonoscopy every 10 years

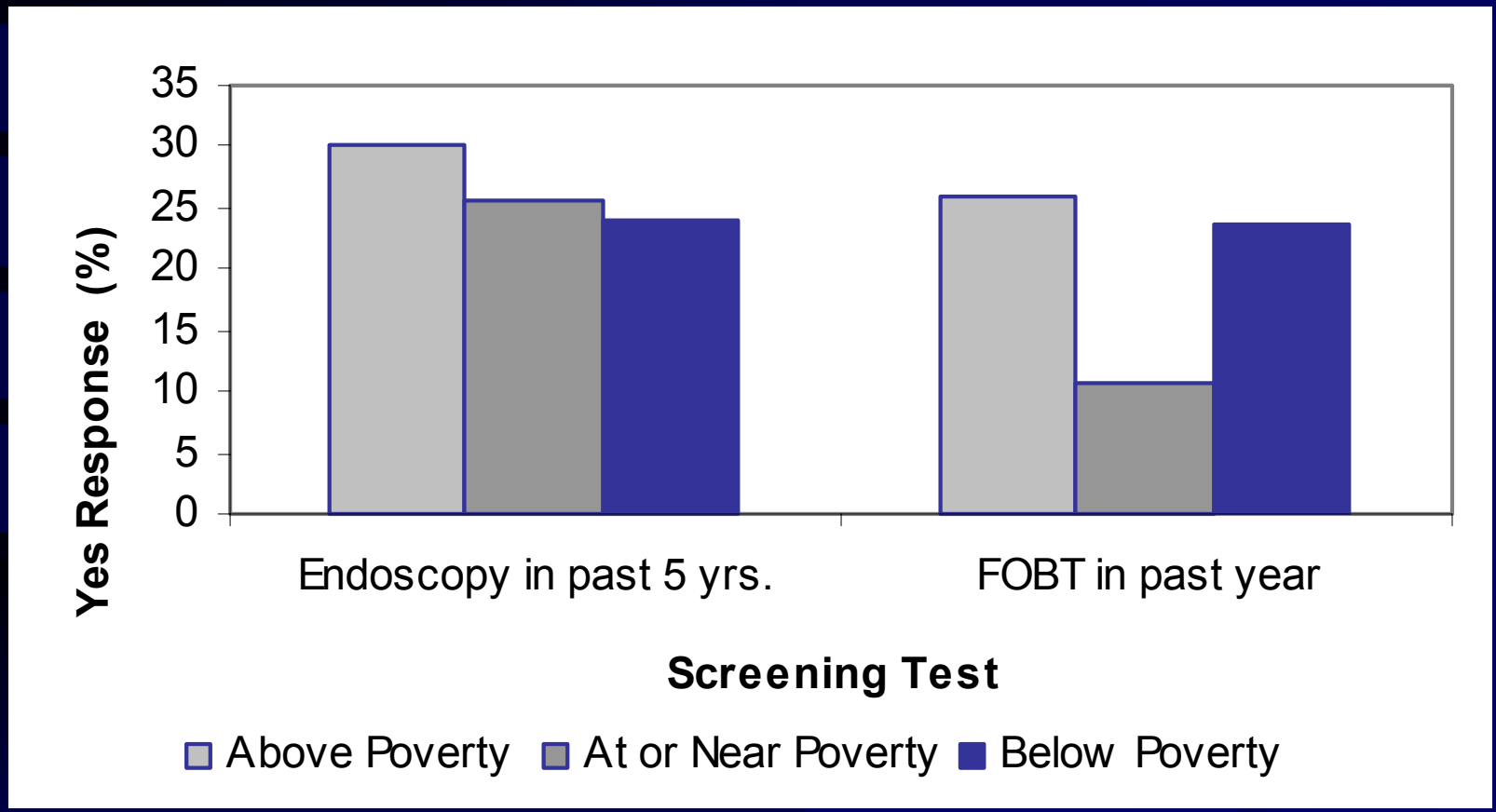
Colorectal Cancer and Poverty-Findings

- BRFSS – Coloradans reporting lower incomes were less likely to have undergone recommended screening
- Incidence rate – 47.6 cases per 100,000 persons
  - Wealthier areas – 46.6 / 100,000 persons
  - Poorest areas – 51.2 / 100,000 persons

Colorectal Cancer and Poverty-Findings

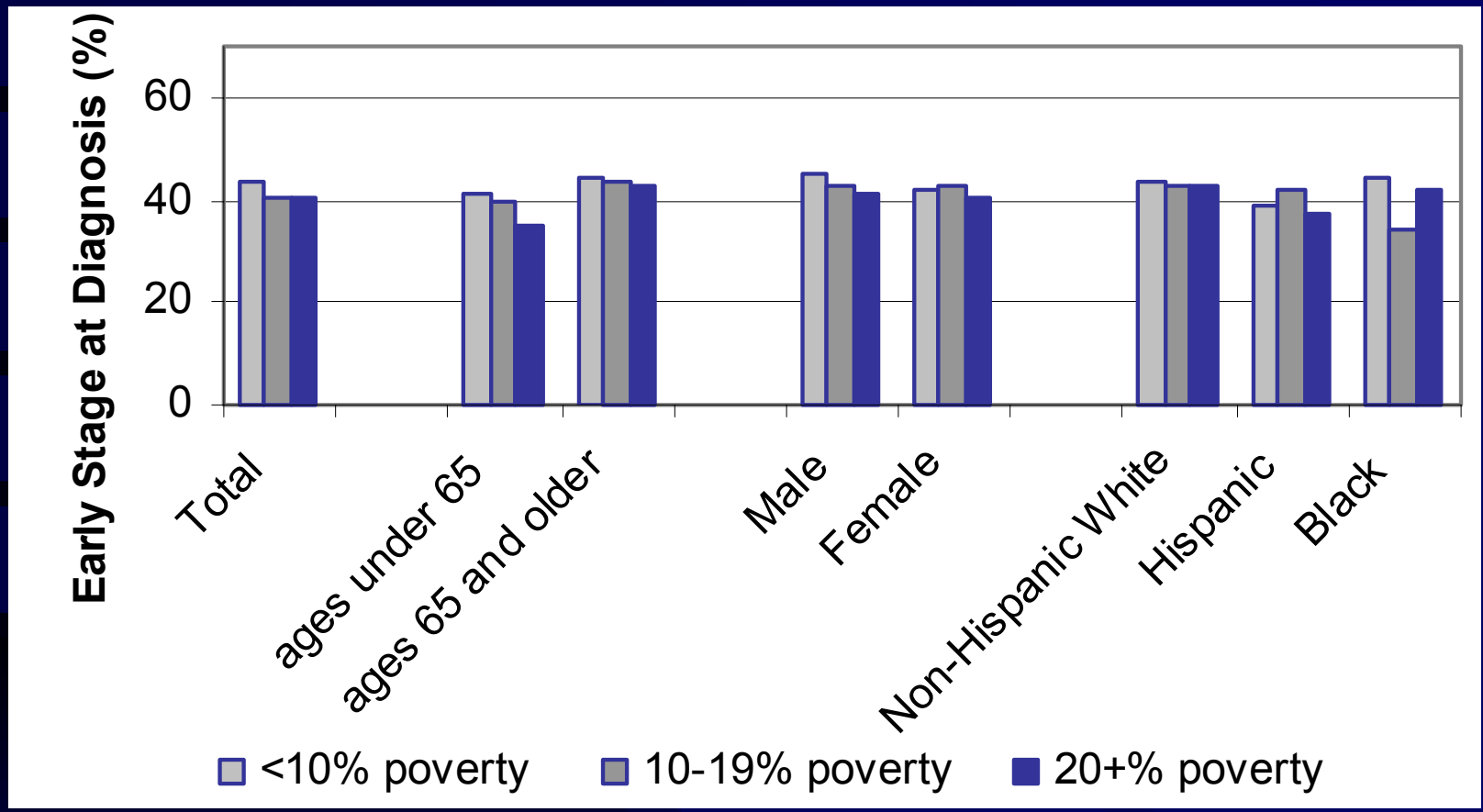
- Early Detection – 43% of cancers were diagnosed at an early, more curable stage (1995-2000).
  - Poverty gradient not noted by race/ethnicity or sex
  - For those <65 years, the percentage diagnosed early was lowest in the poorest areas
- Survival – persons from the poorest areas of the state showed the worst survival rates, regardless of race/ethnicity, sex, or age
  - Greatest disparities by poverty level were noted among males and persons younger than 65, where each group showed survival rates that were 16 percentage points lower in the poorest areas compared to the wealthier areas.
  - Largest poverty gradient was seen for cases diagnosed at the regional stage.

Percent of Coloradans over age 50 who have ever had sigmoidoscopy in past 5 years/Colonoscopy or FOBT in past year, by Poverty Level, 1995-2000



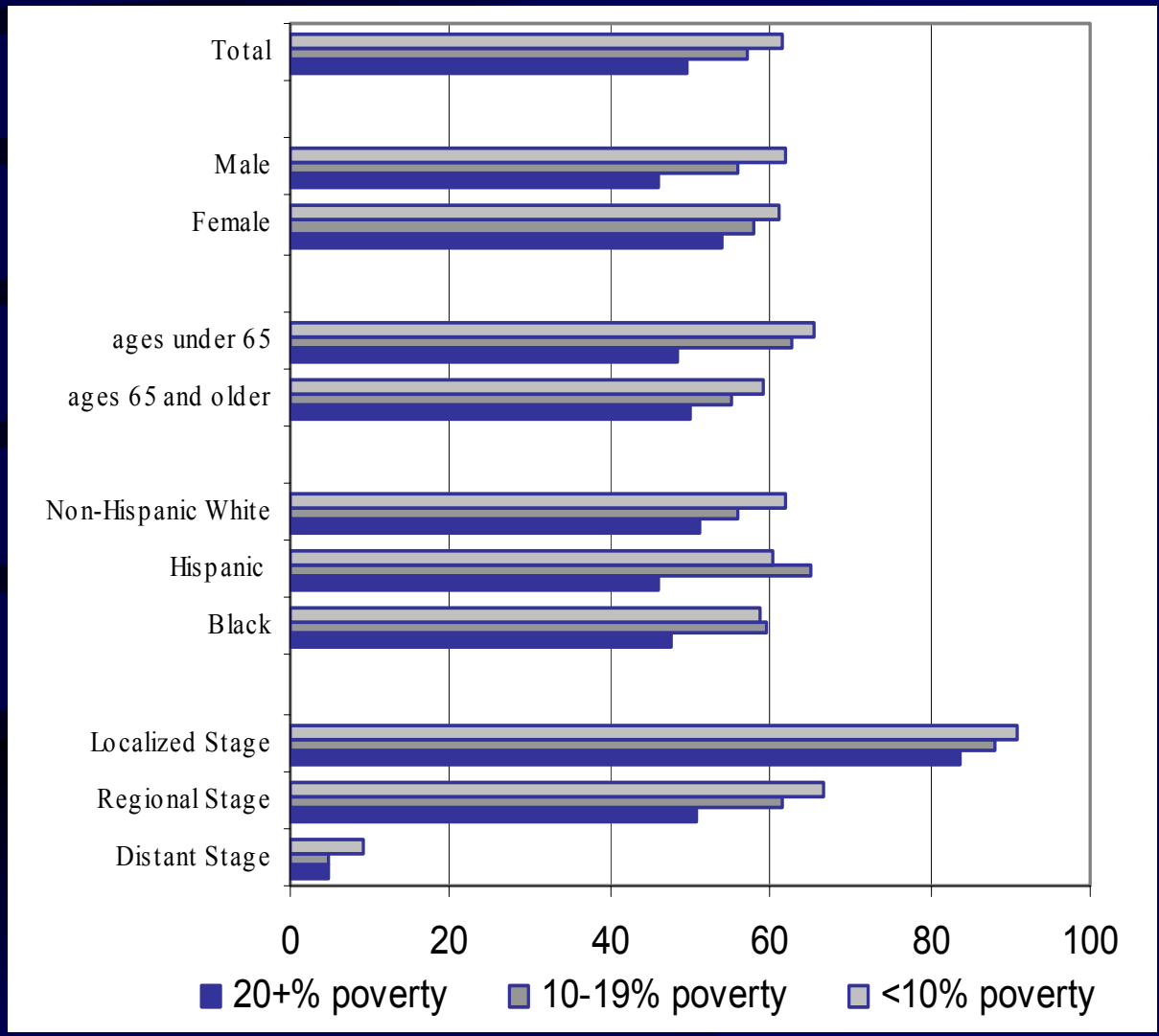
Source: Health Statistics Section, Colorado Department of Public Health and Environment, June 2004.

Early Stage at Diagnosis for Colorectal Cancer by Area Poverty Level, Age, Gender and Race, 1995–2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Five-Year Survival for Colorectal Cancer by Area Poverty Level, Age, Gender, Race, and Stage, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Lung Cancer and Poverty

- Leading cause of cancer deaths in men and women
- Lifetime risk of developing lung cancer is one in 10 for men, and one in 17 for women
- An average of almost 1,900 malignant lung cancers per year are diagnosed in Colorado.

Lung Cancer and Poverty – Risk Factors and Prevention

- Risk Factors
  - Smoking – responsible for 90% of cases
  - Second-hand smoke
- Prevention
  - UPSTF – insufficient evidence to recommend for or against screening asymptomatic persons for lung cancer

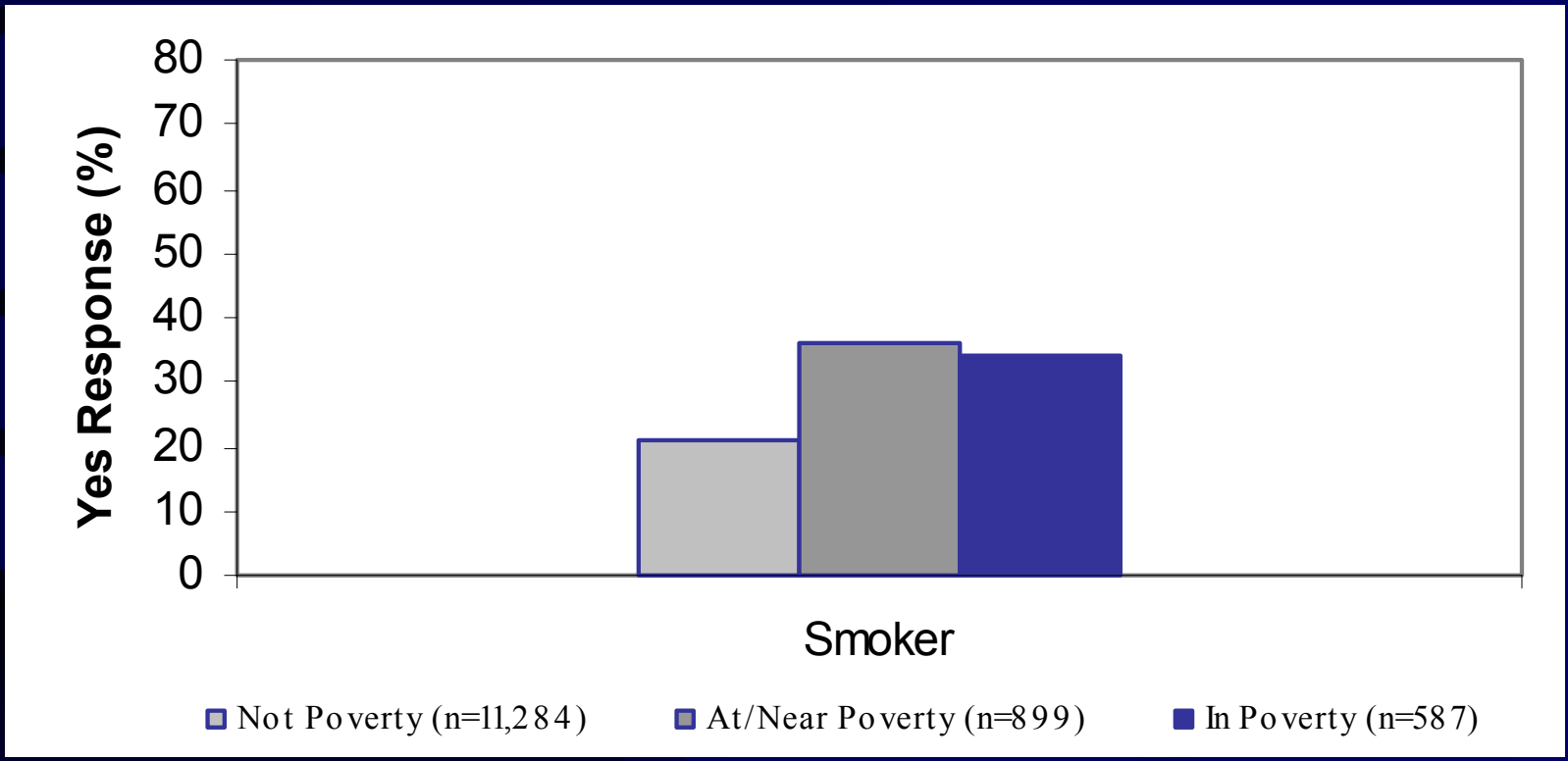
Lung Cancer and Poverty – Findings

- BRFSS – smoking was less common among Coloradans reporting higher incomes.
  - More then one in three Coloradans with incomes near or below the poverty level were current smokers, compared to less than one in five reporting incomes above poverty
- Incidence rates – 53.6 cases per 100,000 persons for 1998 – 2002
  - Wealthier areas – 50.0 / 100,000 persons
  - Poorest areas – 61.4 / 100,000 persons

Lung Cancer and Poverty – Findings

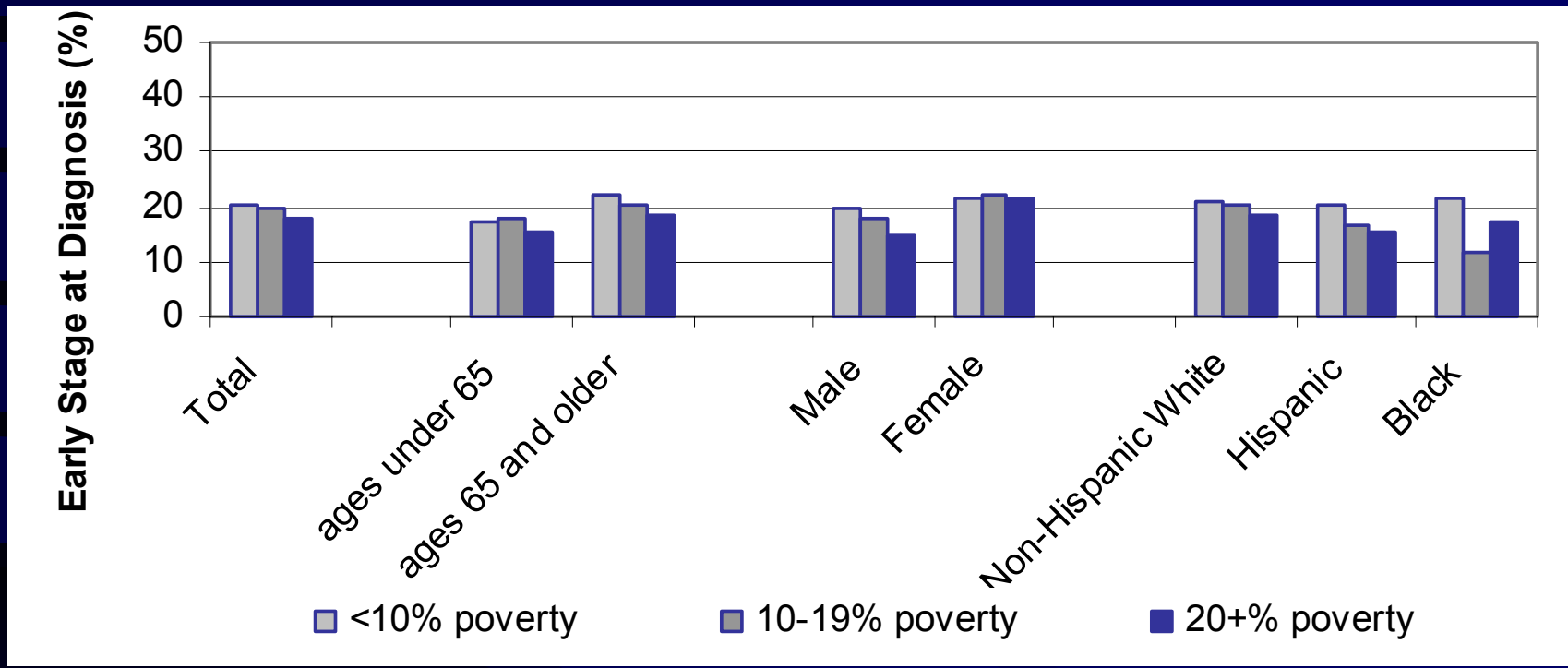
- Early Detection – Only one in five cancers, approximately 20% were diagnosed at an early, more curable stage
  - Black men from middle poverty areas had the worst early stage detection (12% or 1 in 8 detected early)
- Survival – Due to advanced stage detection all rates are very low regardless of race/ethnicity, sex, or age
  - For all stages 12-21% survived 5-years after diagnosis.
  - Middle poverty areas show the worst survival rates
  - Poverty gradient for localized stage only was noted

Percent of Coloradans who are current smokers by Poverty Level, 1995-2000



Source: Health Statistics Section, Colorado Department of Public Health and Environment, June 2004.

Early Stage at Diagnosis for Lung Cancer by Area Poverty Level, Age, Gender and Race, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

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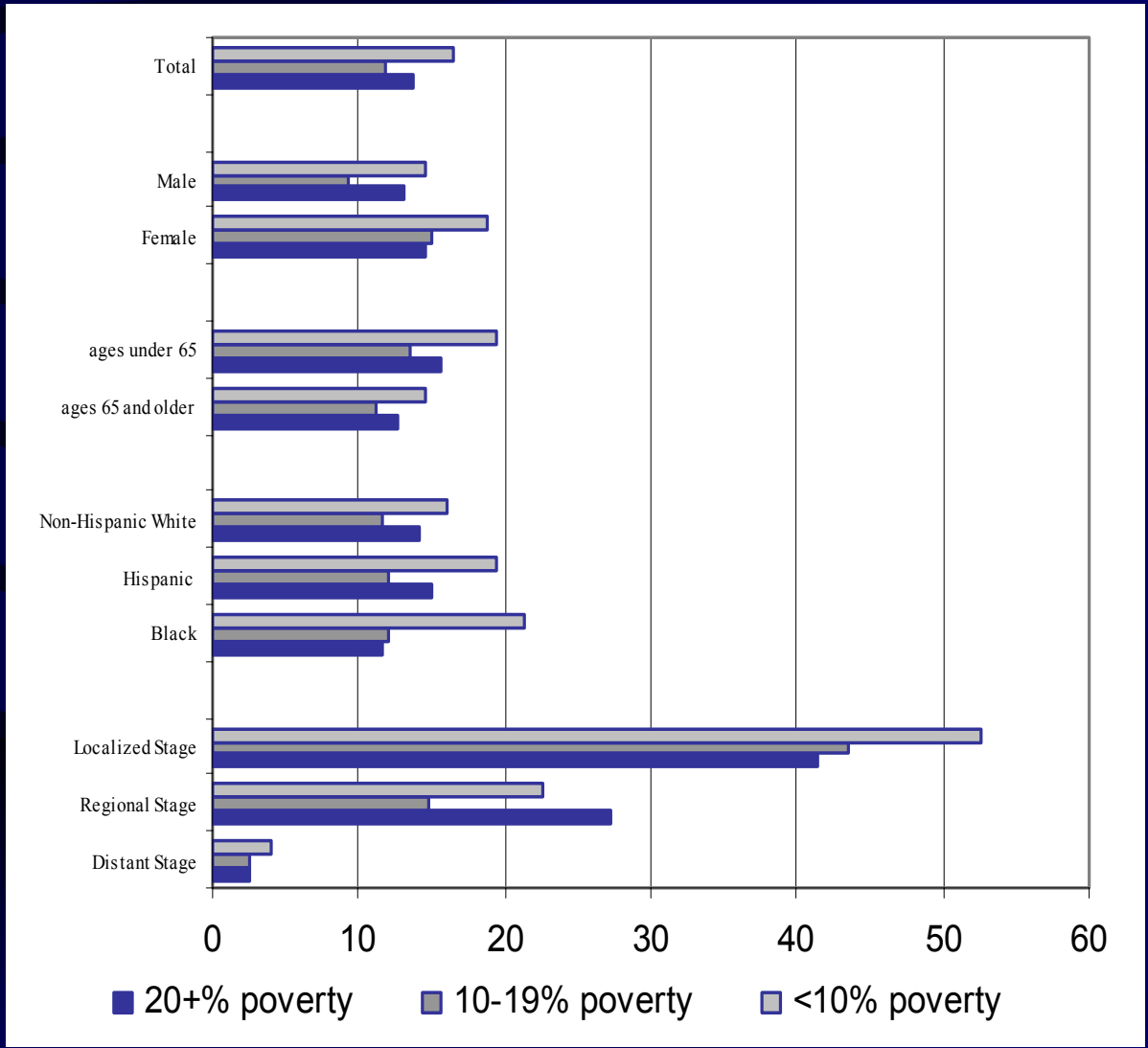


Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Melanoma and Poverty

- The most deadly form of skin cancer
- Basal and squamous cell skin cancers occur more frequently and are highly curable
- Incidence rate rising faster than most cancers
- 5th most commonly diagnosed cancer for all ages in Colorado in 1996-2000
- Lifetime risk is one in 35 for males and one in 61 for females
- An average of 750 malignant melanomas of the skin are diagnosed per year from 1995-2000.

Melanoma and Poverty – Risk Factors & Prevention

- Risk Factors
  - Overexposure to UV radiation in sunlight
  - Fair skin
  - Family History
  - Having many moles or atypical looking moles
- Prevention
  - Sunscreen/wearing protective clothing
  - Limiting time in sun
  - Routine total body skin exams

Melanoma and Poverty – Findings

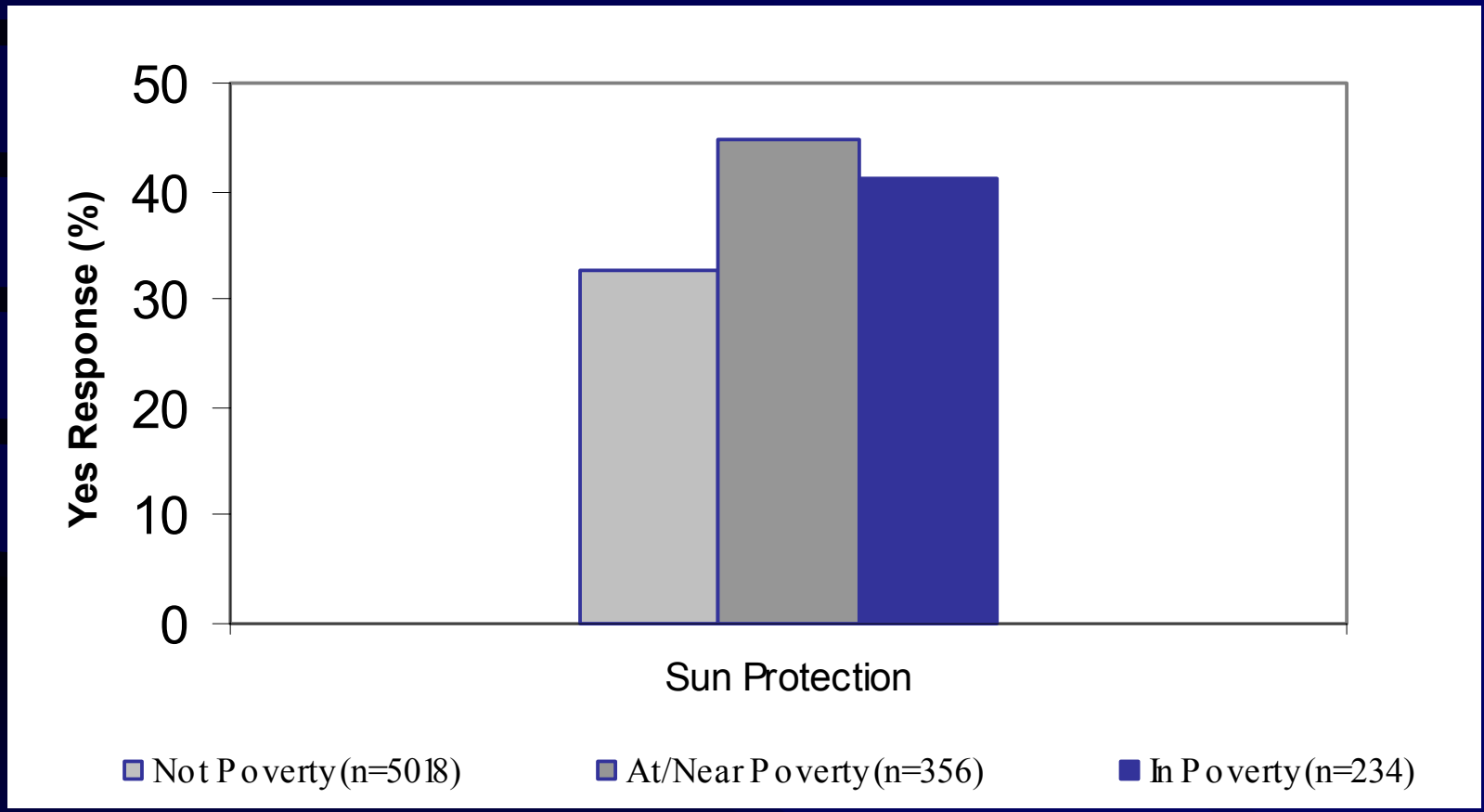
Since melanoma is primarily a disease of fair skinned persons, only statistics for NHW are displayed in this report

- BRFSS – Adults with lower incomes were more likely to report regular use of sun protection than higher income respondents
- Incidence rates – 22.7 cases per 100,000 persons in 1998-2002
  - Wealthier areas – 23 / 100,000 persons
  - Pooreest areas – 15.7 / 100,000 persons

Melanoma and Poverty – Findings

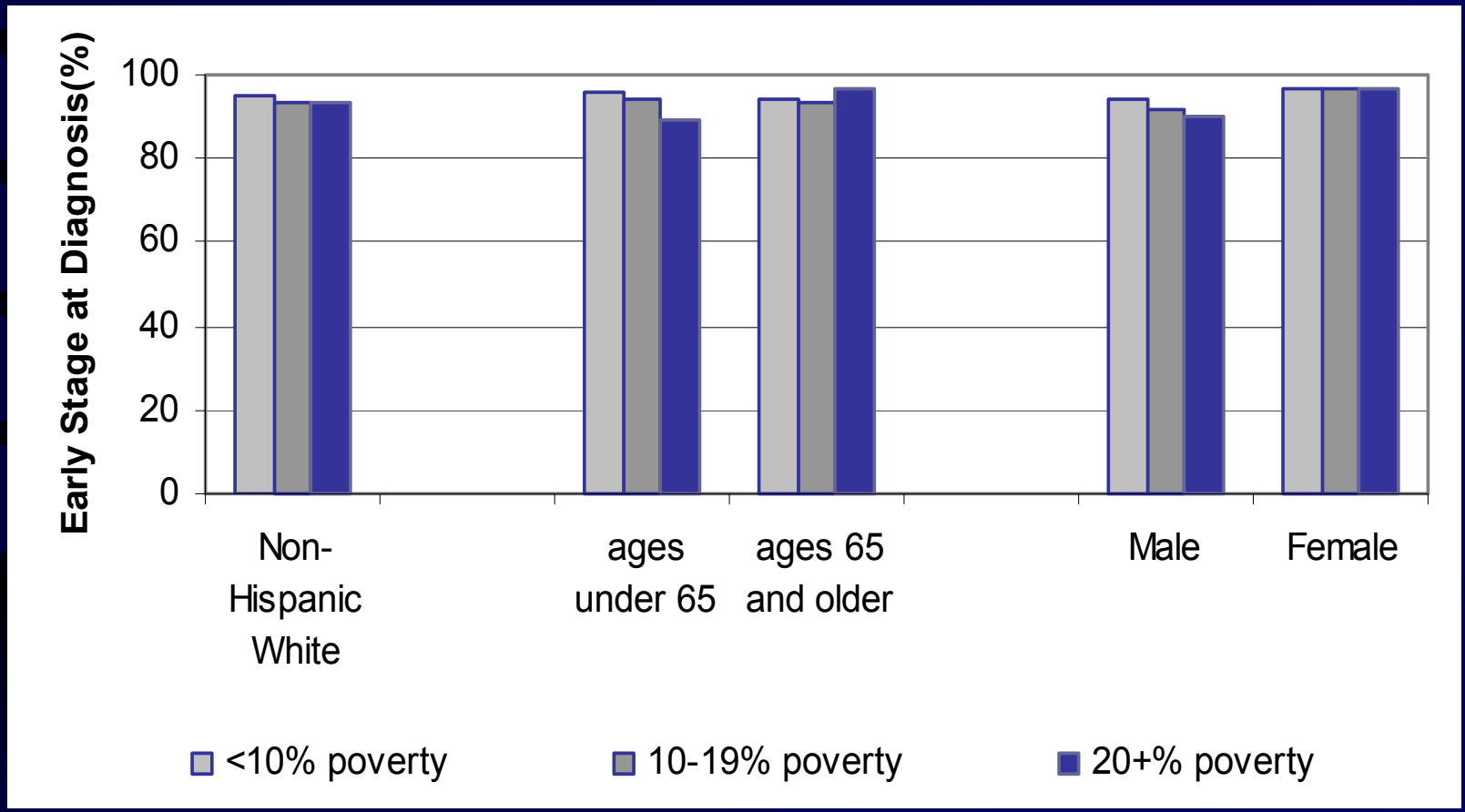
- Early Detection - ≈ 95% of melanomas in NHW were classified as "early" (*in-situ* or localized) stage at detection regardless of poverty level
- Survival – for all stages combined, survival declined as poverty worsened.
  - Rates were lowest in the poorest areas regardless of age or sex
  - Rates by age or sex were from 11-13 percentage points lower in the poorest areas compared to the wealthier areas
  - Within the localized stage, survival rates were significantly lower for the poorest areas (84%) compared to the wealthier areas (94%).

Percent of Coloradans who use sun protection by Poverty Level, 1995-2000



Source: Health Statistics Section, Colorado Department of Public Health and Environment, June 2004.

Early Stage at Diagnosis for Melanoma for Non-Hispanic Whites by Area Poverty Level, Age, and Gender, 1995-2000, Colorado



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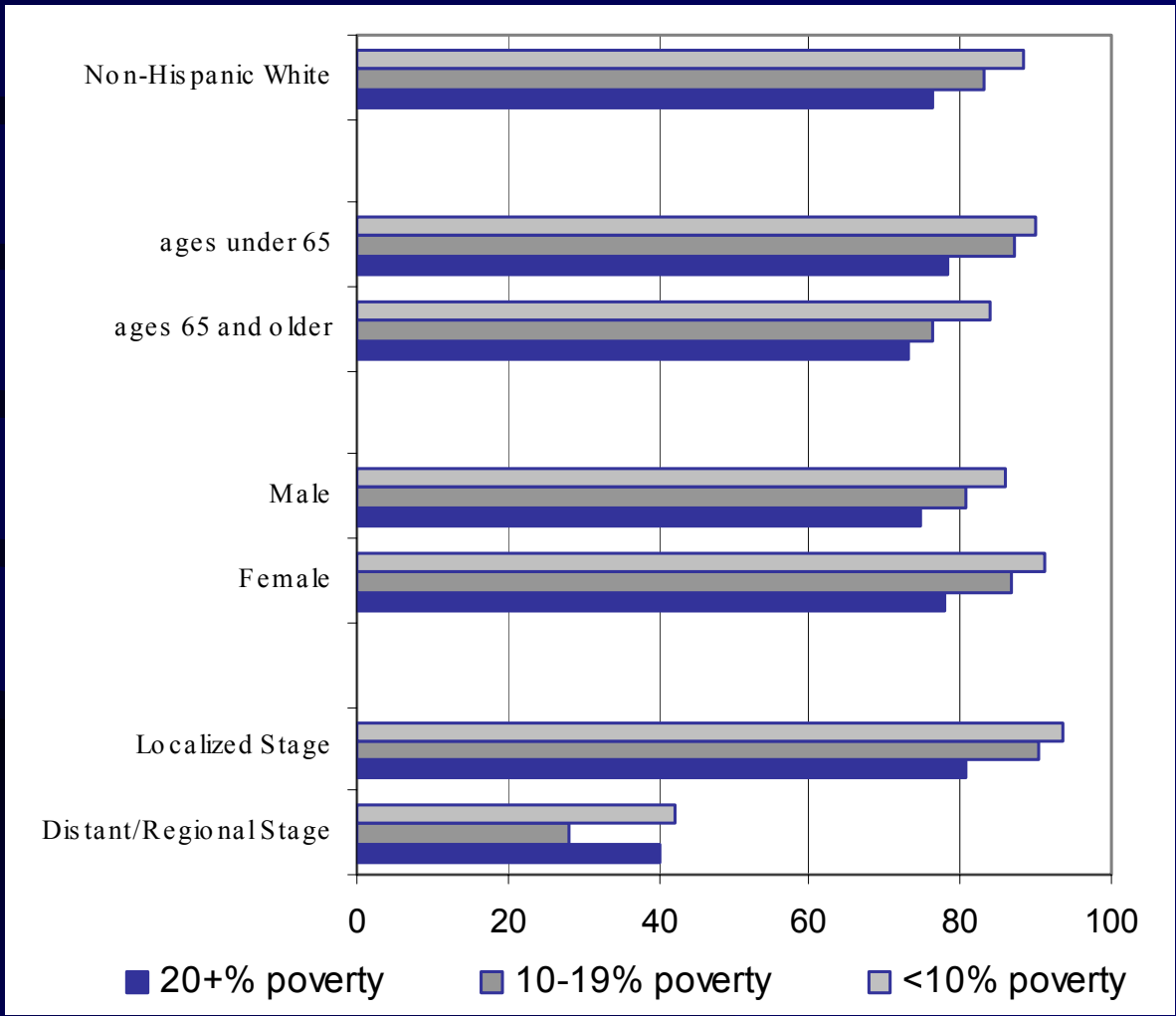


Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Prostate Cancer and Poverty

- Most common cancer diagnosed in Colorado males
- Second most common cause of cancer death
- Lifetime risk is one in five
- An average of 2,360 cases per year were diagnosed in Colorado in 1995-2000

Prostate Cancer and Poverty-Risk Factors and Prevention

- Risk Factors
  - Age (more than 75% of prostate cancers in the US are diagnosed in men older than 65)
  - Black race
  - Family History
  - High fat diet
- Prevention
  - UPSTF – insufficient evidence exists to recommend for or against routine screening using PSA or DRE

Prostate Cancer and Poverty-Findings

- BRFSS – No behavioral data was presented in this report due to incomplete data in 1995-2000
- Incidence – 159.7 cases per 100,000 men in 1998-2002
  - Wealthier areas –161.2 / 100,000 men
  - Poorest areas – 129.3 / 100,000 men

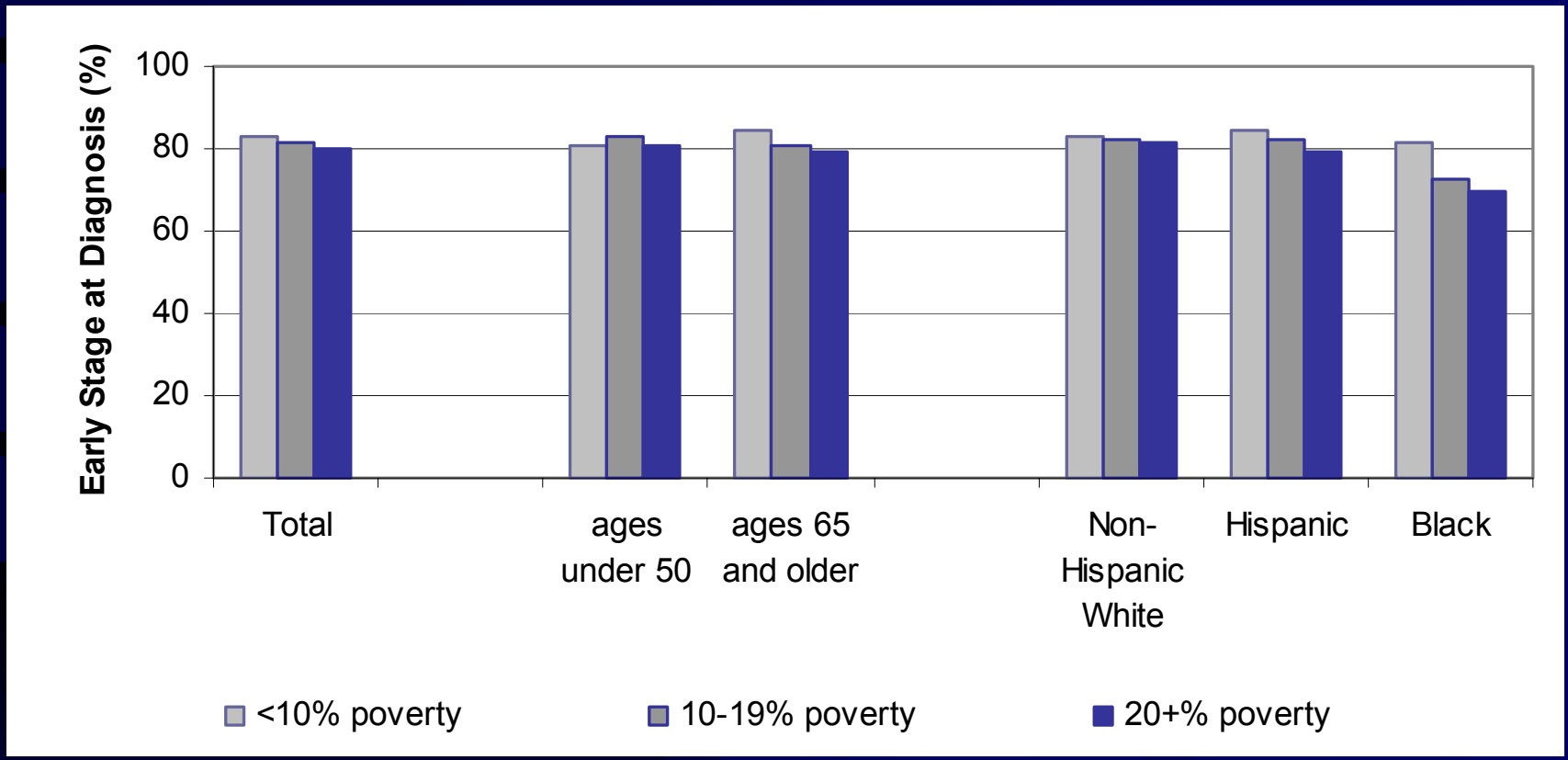
Prostate Cancer and Poverty-Findings

- Early Detection – during 1995-1999 in Colorado, more than 8 in 10 prostate cancers were diagnosed at an early, more curable stage
  - Among NHW, the proportion of cancers diagnosed early were similar regardless of poverty level
  - Early stage detection for Hispanics and Blacks varied by poverty. Among Hispanics, the proportion of cancers diagnosed early was 7% lower in the poorest areas versus the wealthier areas. Among Blacks, the greatest disparity by poverty was apparent. The proportion of cancers diagnosed early was 12% lower in the poorest areas compared to the wealthier areas.

Prostate Cancer and Poverty-Findings

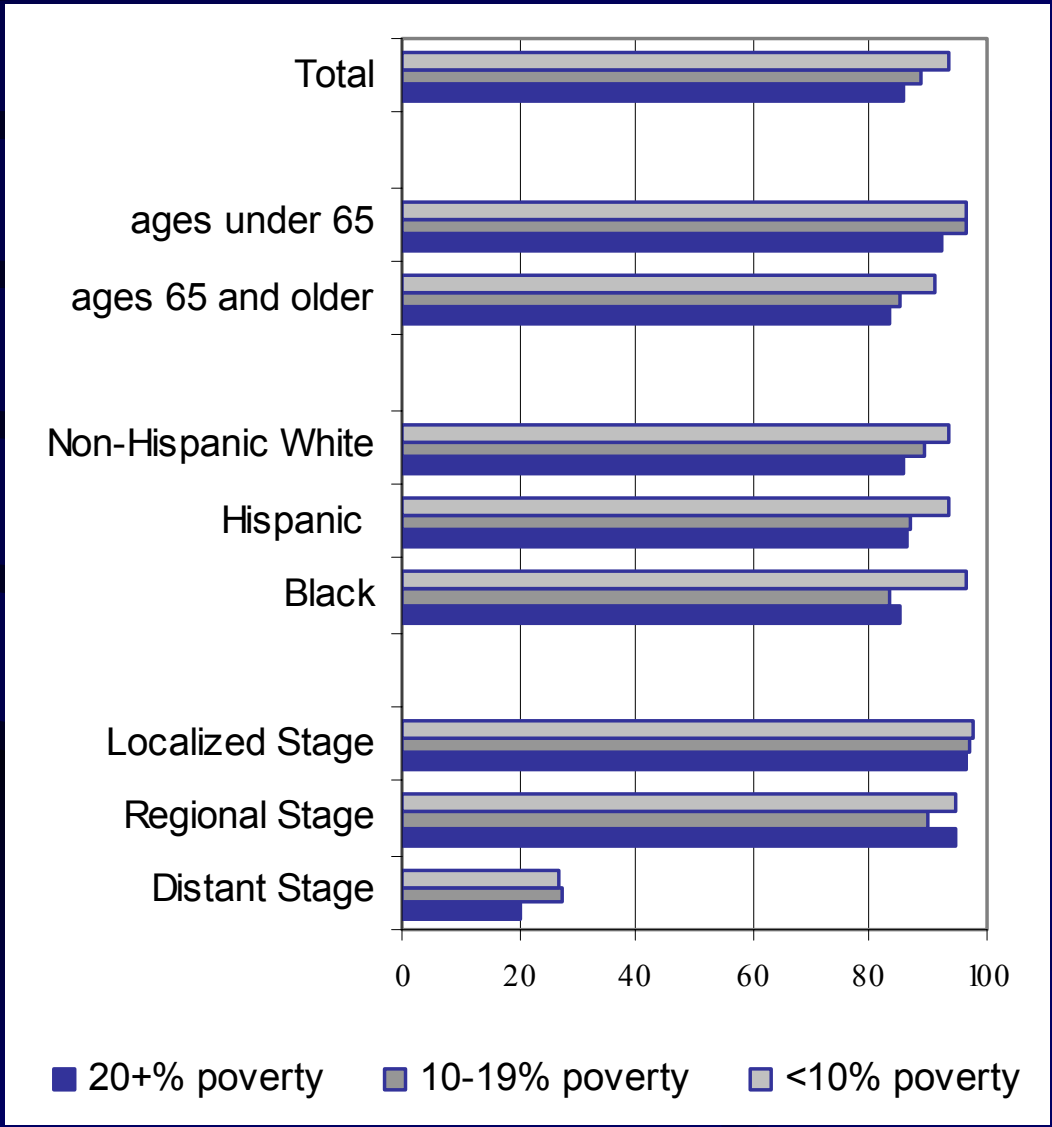
- Survival – for all stages combined, a gradient of declining survival with worsening poverty was noted.
  - Men in the two poorer areas had lower survival rates than men in the wealthier areas
  - The survival disparity was worst among black men, whose survival rates were an absolute 12-14 percentage points lower in the two poorer areas versus the wealthier area.

Early Stage at Diagnosis for Prostate Cancer by Area Poverty Level, Age, and Race, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

Five-Year Survival for Prostate Cancer By Area Poverty Level, Age, Race, and Stage, 1995-2000, Colorado



Source: Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, June 2004.

U.S. Public Health Service Report - 1916

Although the investigations & observations of those familiar with conditions among low-paid wage earners go to show that economic conditions have marked effects upon the health of wage-earners & their families, there is a general lack of statistical data indicating these effects.

–Edgar Sydenstricker, PHS Surgeon

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Health Statistics Section
Survey Research Unit

Disparities in Breast, Colorectal, and Prostate Cancer Mortality Among Hispanic and Black Coloradans: How Much is Due to Poverty?

Wendi Dick, Tim Byers, Dennis Lezotte, Kendra Vehik:
University of Colorado Health Sciences Center

Jillian Jacobellis, Jack Finch:
Colorado Department of Public Health and Environment

Background

- Previous research has shown that cancer disparities in the US exist by race/ethnicity and by socioeconomic status (SES)

Cancer-Specific Mortality Rate (per 1,000 population) =

[Total # deaths from specific cancer in 1 yr/Total # persons in pop. at mid-yr] * 1,000

Trends in Mortality Rates by Race/Ethnicity, 1975-2000

(Ward et al. Cancer disparities by Race/Ethnicity and SES. *Cancer J Clin* 2004;54:78-93.

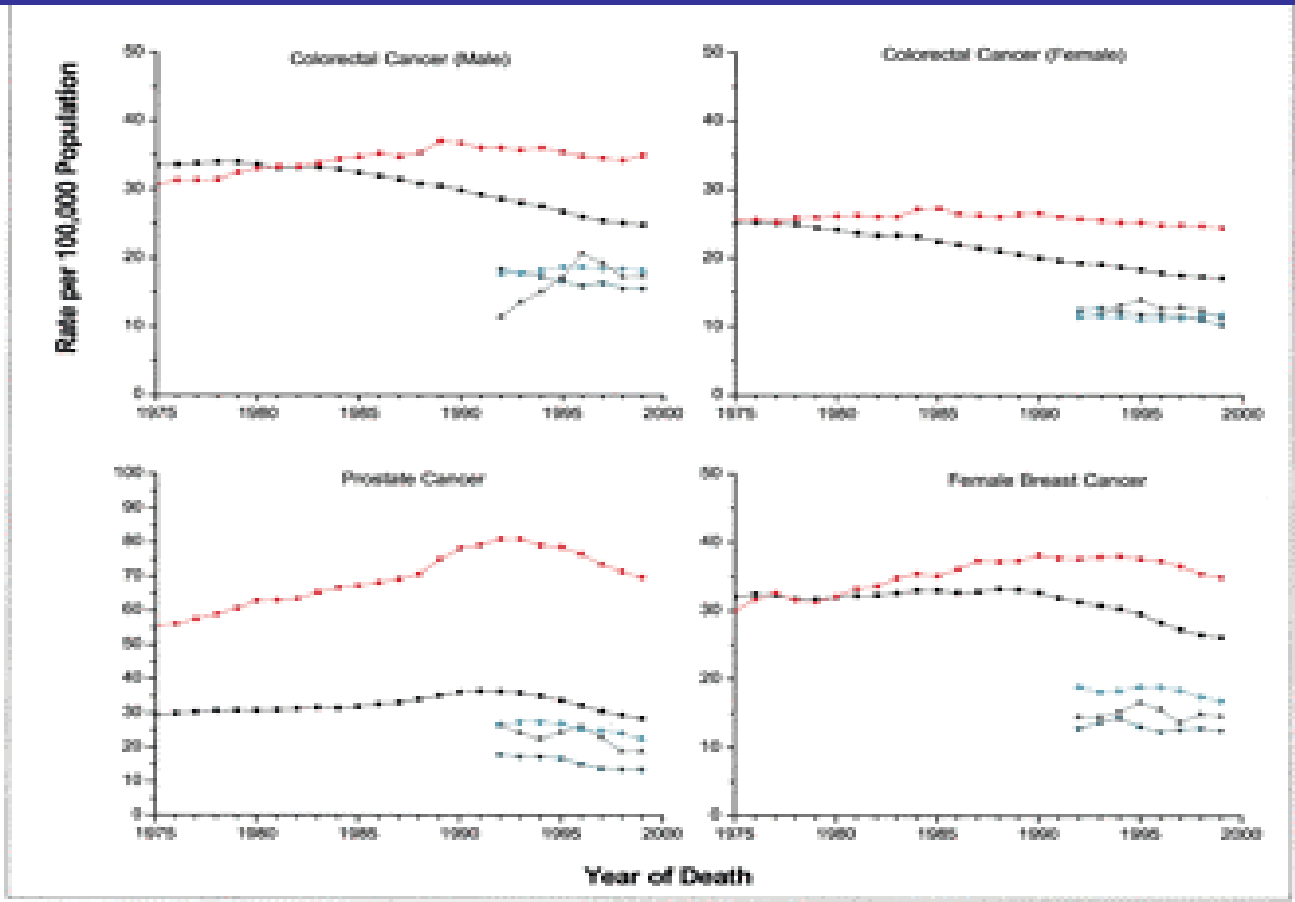


FIGURE 3 Trends in Mortality for All Cancers Combined, Colorectal, Prostate and Female Breast, by Race and Ethnicity, 1975 to 2000.

Source: Surveillance, Epidemiology, and End Results Program (SEER), 1975 to 2000, Division of Cancer Control and Population Sciences, National Cancer Institute, 2003.

1997 Review Article on SES Differences in Cancer Survival

- Colorectal Cancer (CRCA)
  - 18 out of 23 studies on colon or rectal cancer showed survival was poorest in the low SES group(s)
- Female Breast Cancer (BRCA)
  - 19/24 studies showed survival was poorest in the low SES group(s)
- Prostate Cancer (PRCA)
  - 6/7 studies showed survival was poorest in the low SES group(s)

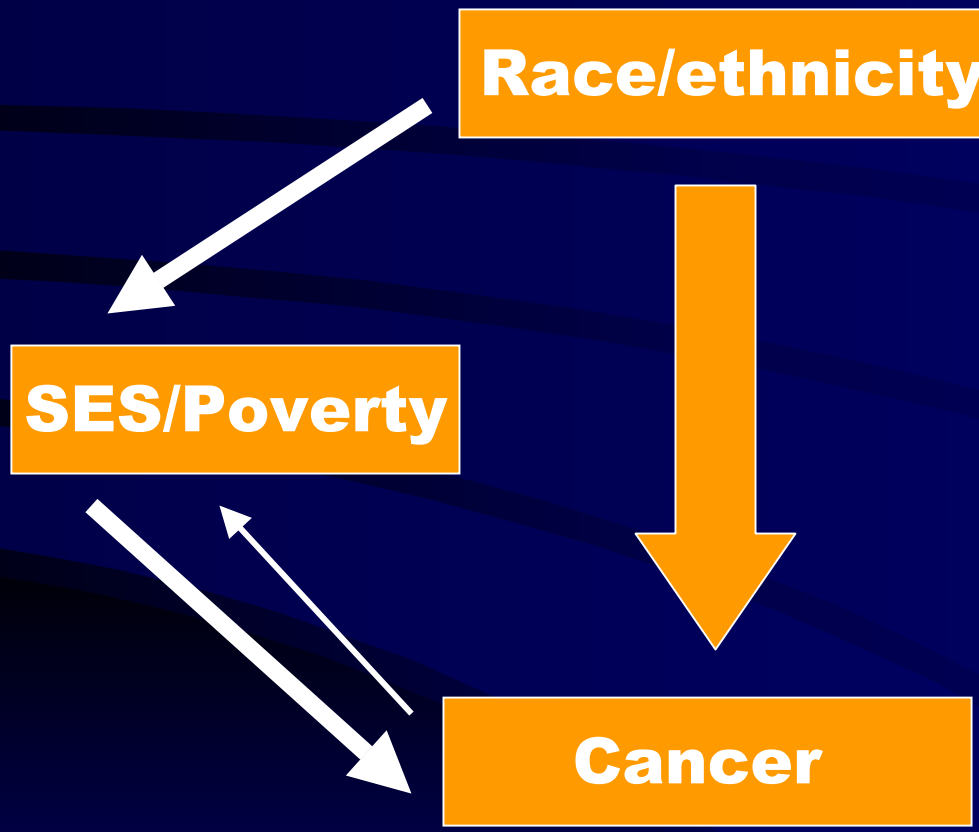
- Kogevinas M, Porta M Socioeconomic differences in cancer survival: a review of the evidence. In : Kogevinas M, Pearce N, Susser M, Boffetta P (eds) (1997) *Social inequalities and cancer*. IARC Scientific Publication No. 138, International Agency for Research on Cancer. Lyon, France.

Trends by SES

- **Survival with breast cancer**
- **Survival with prostate cancer**
- **CRC mortality among US men, women**

- Singh GK, Miller BA, Hankey BF, Edwards BK (2003) *Area socioeconomic variations in US cancer incidence, mortality, stage, treatment, and survival 1975-1999*. Bethesda, MD: National Cancer Institute. NCI Cancer Surveillance Monograph Series, Number 4. NIH Publication No. 03-5417.

Outcomes by Race Can Be Confounded by SES



Research Issues

- SES:
  - Research on SES and cancer is limited by lack of data on individual SES measures such as income or education

Thesis Project Research Question

- **Where disparities in breast, colorectal, or prostate cancer mortality exist among racial/ethnic minorities in Colorado, what percentage is due to SES?**

Purpose of Thesis Project

- Investigate cancer deaths among Hispanic and Black Coloradans using *neighborhood* SES to represent individual SES

Cancer Sites Chosen for Analysis

- Female breast
- Colorectum
- Prostate

Race/Ethnicity Groups for Analysis

- Used SEER categories:
  - White (non-Hispanic)
  - Hispanic (white Hispanic)
  - Black (Hispanic or non-Hispanic)
  - # of cases among American Indians, Asians, & other groups was too small to analyze separately
- Race/ethnicity make-up for all 3 cancer sites combined:
  - About 89% white, 8% Hispanic, 3% black

Outcome Variable

- 5-year cause-specific mortality
  - Cases with ≥5 years of follow up data
  - Cases dying from breast, colorectal, or prostate cancer

Demographic Grouping Variables

- Sex
  - Colorectal cancers analyzed separately by sex
- Age
  - Colorectal and prostate cancers
    - <65, 65+ age groups
  - Breast cancers
    - <50, 50-64, 65+ age groups

Cancer Stage & Grade Grouping Variables

- Stage at diagnosis
  - In-situ, localized, regional, or distant
- Tumor grade
  - Well-, moderately-, poorly-, or un-differentiated

Poverty Level Variable

- *Poverty rate of Census Block Group* (CBG) used to define 3 poverty levels
- Validated as a single measure

Assignment of Poverty Level to Each Cancer Case

- Home address *geocoded* to its CBG to determine neighbor-hood poverty level

Poverty Groups

- Poverty rate of Census Block Group (CBG) used to define neighborhood poverty¶ levels:
  - *Poor*
    - >20% of CBG residents living in poverty
  - *Intermediate*
    - 10 to <20% of CBG residents living in poverty
  - *Wealthy*
    - <10% of CBG residents living in poverty

¶ In 1999 the poverty threshold for a single adult was ~$8.900 and for a family of 4 was ~$17,400. Any person or family living on less is considered to be living in poverty.

Validation of CBG poverty measure

- According to the Cancer Registry statistician, chi-squared tests were significant for:
  - Cases being assigned to poorest group and reporting coverage under Medicaid
  - Cases being assigned to wealthiest group and reporting private insurance coverage

Analysis

- Odds Ratios (ORs) from logistic regression in SAS with whites as reference group
  - OR for probability of death from particular cancer at 5 years for each race/ethnicity and cancer site
  - Partially adjusted OR
    - Adjusted for age, stage, grade
  - Fully adjusted OR
    - Adjusted for age, stage, grade, and poverty

Analysis

- **Percent excess mortality represents proportion by which mortality OR changes after inclusion of poverty variable**

$$\frac{\text{(Partially Adjusted RR)} - \text{(Fully Adjusted RR)}}{\text{(Partially Adjusted RR} - 1.00)} * 100\%$$

(Szklo, M and Nieto, FJ. *Epidemiology: Beyond the Basics.* Sudbury, MA: Jones and Bartlett; 2004.)

Data

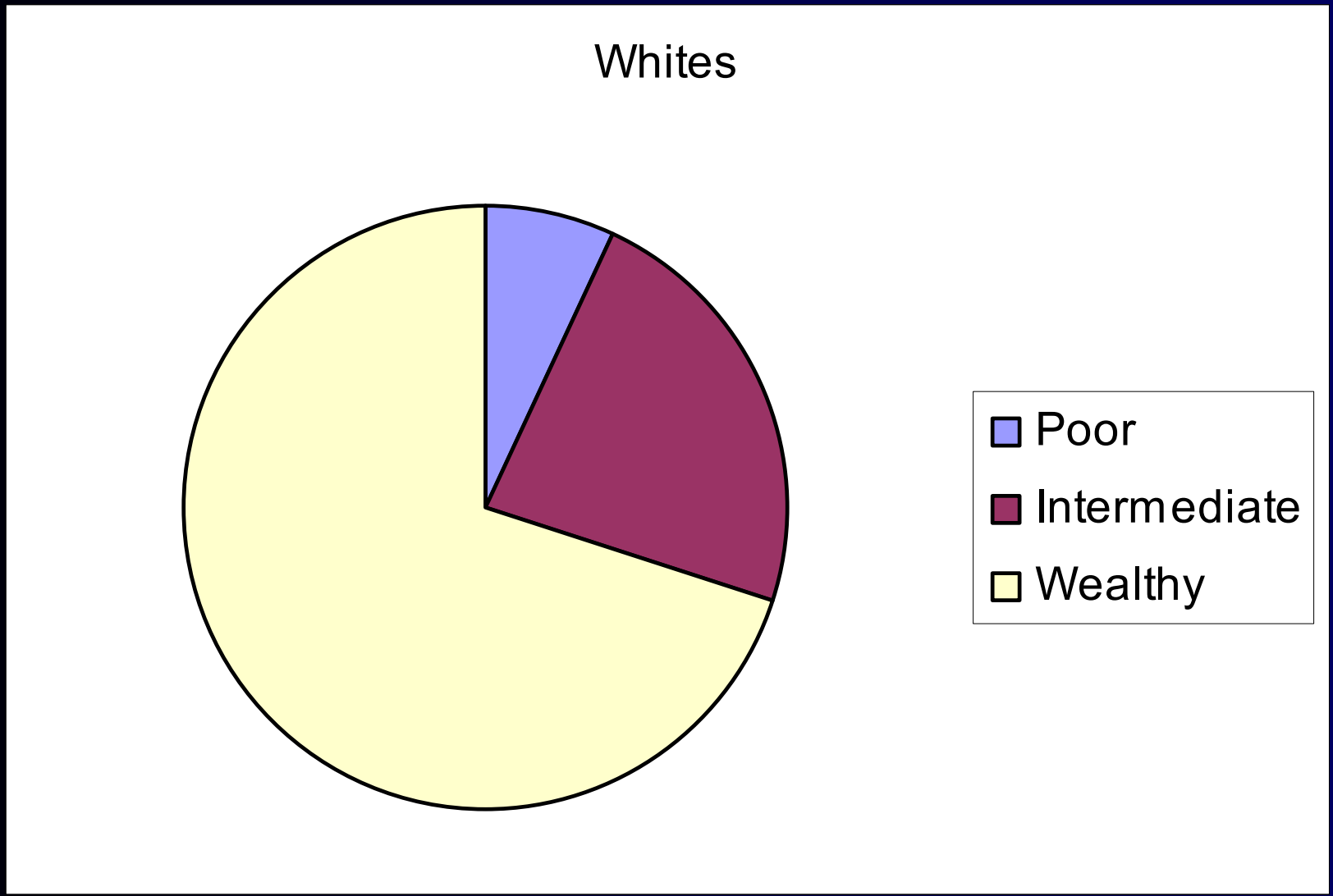
- Cancer cases from Colorado Central Cancer Registry (CCCR), 1995-1999
  - Female breast
    - ~12,400 cases
  - Colon/rectum
    - ~6,700 cases
  - Prostate
    - ~10,300 cases

Results

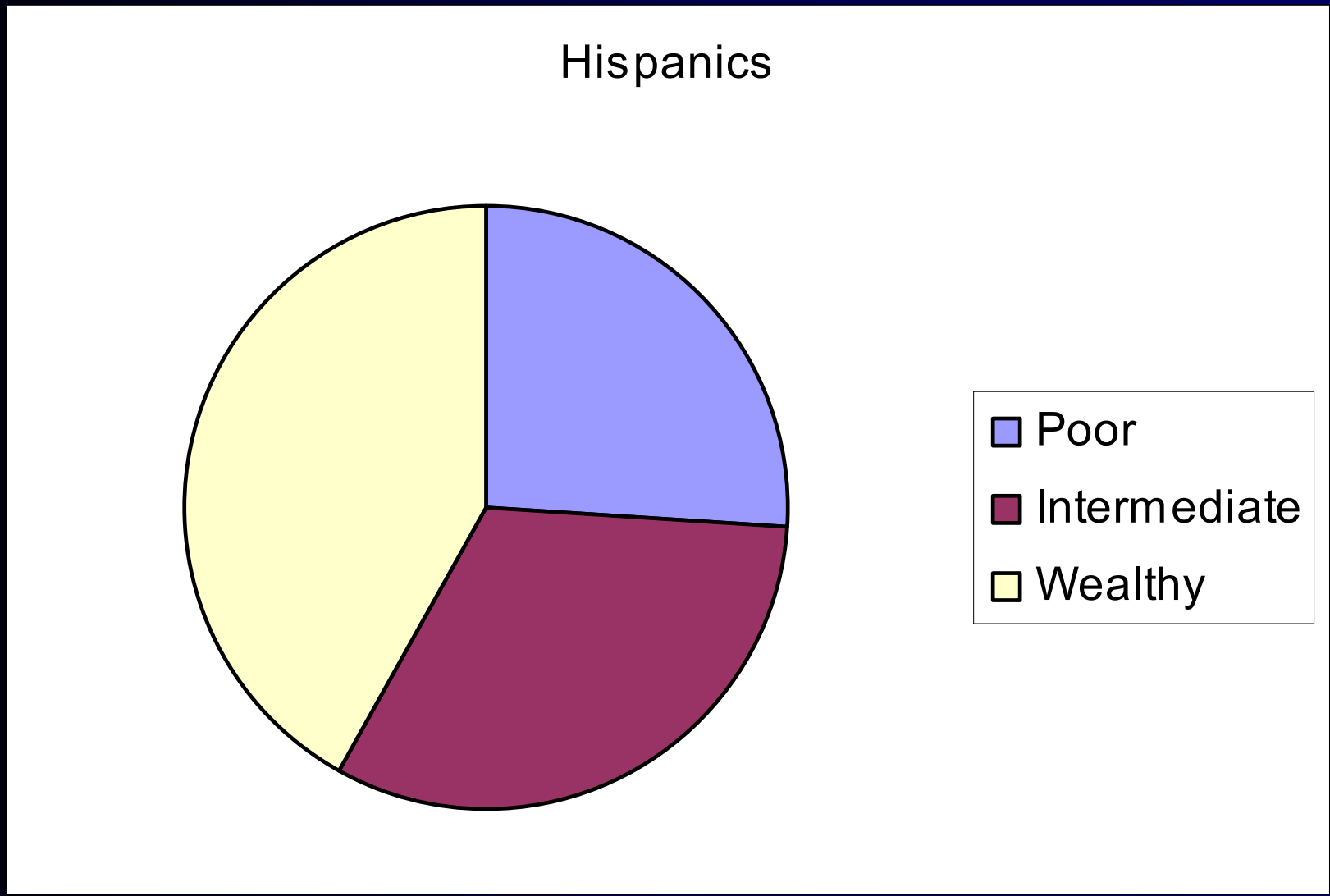
Poverty Disparities by Race/ethnicity of Cancer Cases

- Whites:
  - 7% lived in poor areas
  - 23% lived in intermediate areas
  - 70% lived in wealthy areas
- Hispanics:
  - 26% lived in poor areas
  - 32% lived in intermediate areas
  - 42% lived in wealthy areas
- Blacks:
  - 26% lived in poor areas
  - 28% lived in intermediate areas
  - 46% lived in wealthy areas

Poverty Disparities by Race/ethnicity of Cancer Cases in Colorado



Poverty Disparities by Race/ethnicity of Cancer Cases in Colorado



Poverty Disparities by Race/ethnicity of Cancer Cases in Colorado

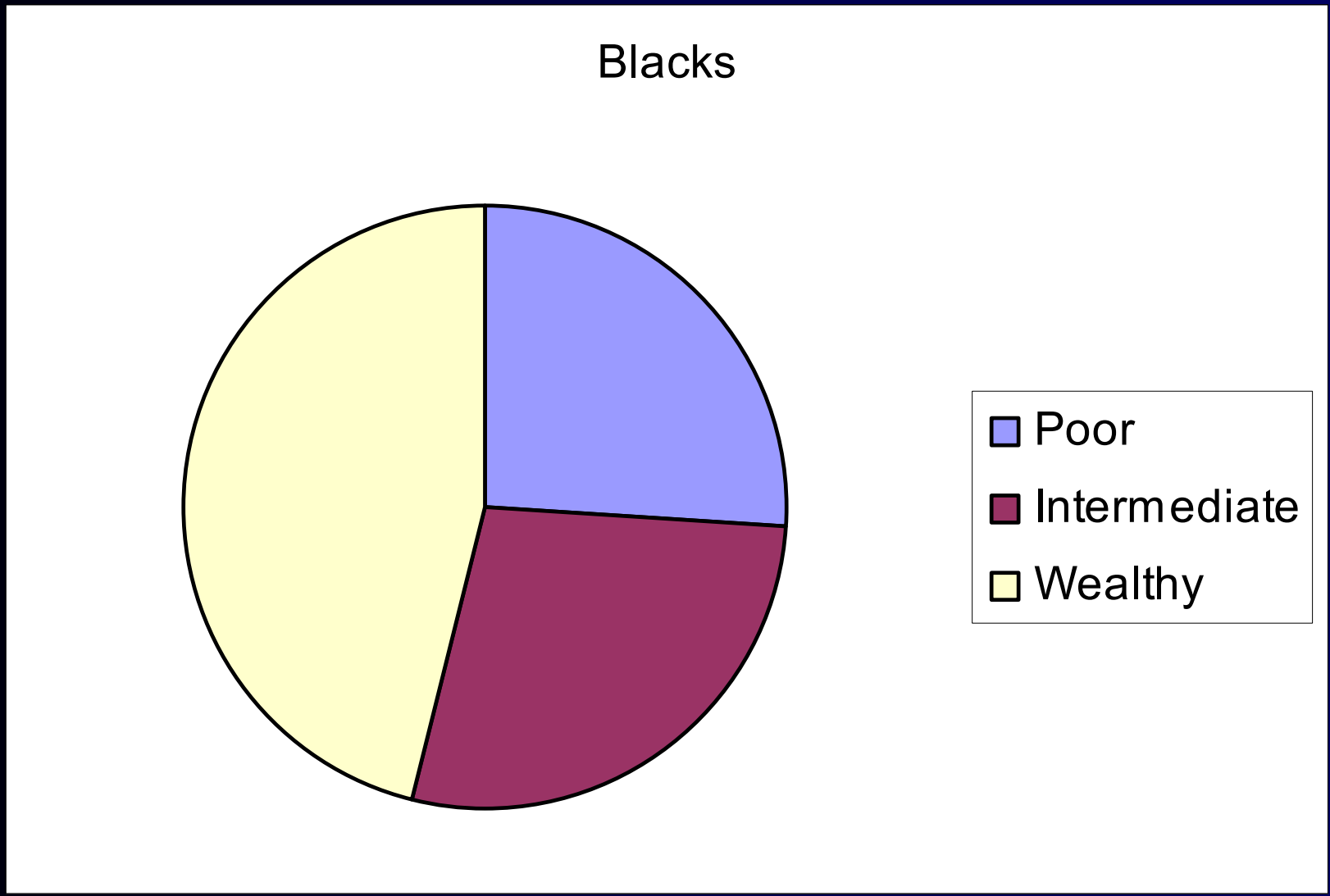


Table 1
Colorado Central Cancer Registry, 1995-1999: Distribution of Cases by Cancer Site, Demographics, and SES

								AREA	POVERTY	LEVEL
Site	**Cases**	**Sex: Male**	**Sex: Female**	**White**	**Hispanic**	**Black**	**Mean Age (SD)**	**Poor**	**Inter-mediate**	**Wealthy**
Breast	12276	NA	100%	90%	8%	3%	60 (14)	9%	23%	68%
Colo-rectum	6631	51%	49%	87%	10%	4%	68 (13)	11%	26%	62%
Prostate	10344	100%	NA	88%	8%	4%	68 (9)	9%	23%	68%

Breast Cancer Mortality

Excess risk % is calculated before ORs are rounded to 2 decimal places. † Reference Group * Significant at p<0.05	OR Adjusted for Age	OR Adjusted for Age, Stage, & Grade	OR Adjusted for Age, Stage, Grade, & Poverty	% of Excess Mortality Explained by Poverty
White Women	1.00†	1.00†	1.00†	NA
Hispanic Women	1.35*	1.25	1.15	40% ¶ ¶ $\frac{1.25-1.15}{1.25-1.00}$ (*100%)=40%
Black Women	1.84*	1.49	1.35	29%

Colorectal Cancer Mortality: Men

Excess risk % is calculated before ORs are rounded to 2 decimal places. † Reference Group * Significant at p<0.05	OR Adjusted for Age	OR Adjusted for Age, Stage, & Grade	OR Adjusted for Age, Stage, Grade, & Poverty	% of Excess Mortality Explained by Poverty
White Men	1.00†	1.00†	1.00†	NA
Hispanic Men	1.01	1.10	0.90	100%
Black Men	1.55	1.55	1.26	53%

Colorectal Cancer Mortality: Women

Excess risk % is calculated before ORs are rounded to 2 decimal places. † Reference Group * Significant at p<0.05	OR Adjusted for Age	OR Adjusted for Age, Stage, & Grade	OR Adjusted for Age, Stage, Grade, & Poverty	% of Excess Mortality Explained by Poverty
White Women	1.00†	1.00†	1.00†	NA
Hispanic Women	1.03	1.09	0.99	100%
Black Women	1.05	1.43	1.27	37%

Prostate Cancer Mortality

Excess risk % is calculated before ORs are rounded to 2 decimal places. † Reference Group * Significant at p<0.05	OR Adjusted for Age	OR Adjusted for Age, Stage, & Grade	OR Adjusted for Age, Stage, Grade, & Poverty	% of Excess Mortality Explained by Poverty
White Men	1.00†	1.00†	1.00†	NA
Hispanic Men	1.32	1.11	0.99	100%
Black Men	1.45	1.08	0.93	100%

Limitations

- Ecological fallacy
  - Each case assigned to a ‘poor’ neighborhood is not necessarily poor him/herself
- Smaller sample sizes for non-whites
- What explains the remainder of excess risk?
  - Personal risk factors, such as obesity, not available
  - Cultural factors difficult to measure
  - Did not adjust for treatment variables

Conclusions

- Neighborhood poverty data are readily available and can be used to analyze cancer outcomes
- A substantial percentage of excess risk of cancer mortality among non-whites in Colorado was explained by poverty
- SES should become the 4th demographic variable routinely collected for health outcomes, in addition to age/sex/race
  - At area level (CBG) when individual data not available
  - Insurance status at time of diagnosis also helpful
- Universal cancer screening & treatment benefits would be expected to reduce breast, colorectal, and prostate cancer disparities by race/ethnicity in Colorado

Suggestions for future research

- Validation study of CBG poverty measure:
  - Use a randomly generated sample of colorectal cancer deaths in the dataset
    - Measure correlation between assignment of CBG poverty level and occupation listed on death certificate
- Consider study of cancer outcomes and insurance status at the time of diagnosis

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Questions?