

# **COMMUNITY HEALTH RISK ASSESSMENT**

**An Assessment of Risk Related to the Natural Gas  
Industry in Garfield County  
Part II: Health Study**

# Tonight's presentation

- ▶ Overview of report content, conclusions, and recommendations
  - ▶ Technical review process
  - ▶ Citizen access and comment
- 

# Acknowledgements

- ▶ Saccomanno Research Institute
  - Kathy Petefish
  - Susan Keizer
  - Mary Nichols
  - Teara Carr
- ▶ Garfield County
  - Garfield County Public Health
  - Grand River Hospital District
  - Citizens and organizations
- ▶ Colorado Department of Public Health and Environment

# “Take-Home Message”

- ▶ At the present time – based on our data sources – there is not a health crisis in Garfield County.
  - ▶ That is not to say that some people don't have health problems (unusually susceptible individuals) and there are trends that should be monitored.
  - ▶ Data are largely population-based (limitations for identifying rare and individual health events)
  - ▶ Can make recommendations for protection of public health into the future
- 



"THERE COULD BE ANY NUMBER OF CAUSES FOR THIS CONDITION. PERHAPS HE BROKE A MIRROR OR WALKED UNDER A LADDER OR SPILLED SOME SALT..."



## The Question: Our Dilemma

Was "Mr. Jones' health condition caused by exposure to a toxic material introduced into the environment by natural gas industry operations?

# Study Methodology

## ▶ Questions

- Is the health of residents of Garfield County different than the health of residents of Delta, Mesa or Montrose counties?
- Is the health of residents of areas of Garfield County that are heavily impacted by the natural gas industry different from the health of residents of less impacted areas of Garfield County?

## ▶ “Snapshot in time” / Baseline

- Descriptive study (correlation study)
- Not possible to make definitive causal conclusions

# Study Limitations

- ▶ Funding: Issues or areas that need more in-depth research than can be performed with existing funding
  - ▶ Lack of baseline health data with which to determine trends or changes
  - ▶ Relatively new presence of the industry in the region: health outcomes may not yet be apparent
  - ▶ Both risk and causation involve probability statements: may never be able to say with certainty that a particular health condition is caused by an exposure to a potentially toxic material.
- 

# Data Collection: Four Ways to Answer the Questions

- Public Experience (Perceptions and Concerns)
  - Focus groups, public meetings, interviews, complaint logs
  - Sample size of ~500 individuals and comments
- State Health Measures
  - Colorado Department of Public Health and Environment
  - County-based data for Delta, Garfield, Mesa and Montrose counties
  - Sample size – entire population of each county

# Data Collection (continued)

- Hospital and Medical Insurance data
  - Colorado Hospital Association discharge data
  - Grand River Medical Center and St. Mary's Hospital ER data
  - "Careflight" data
  - Rocky Mountain Health Plans member data (In-patient, out-patient, and ER)
  - Four-county comparison
  - Sample size dependent on data source – user population
- Self-reported Health Status
  - Household survey
  - Randomly selected households from all zip code areas within Garfield County
  - Sample size: Comprehensive health and risk factor information for 1048 individuals

# How comparable are residents of Garfield, Mesa, Delta and Montrose counties?

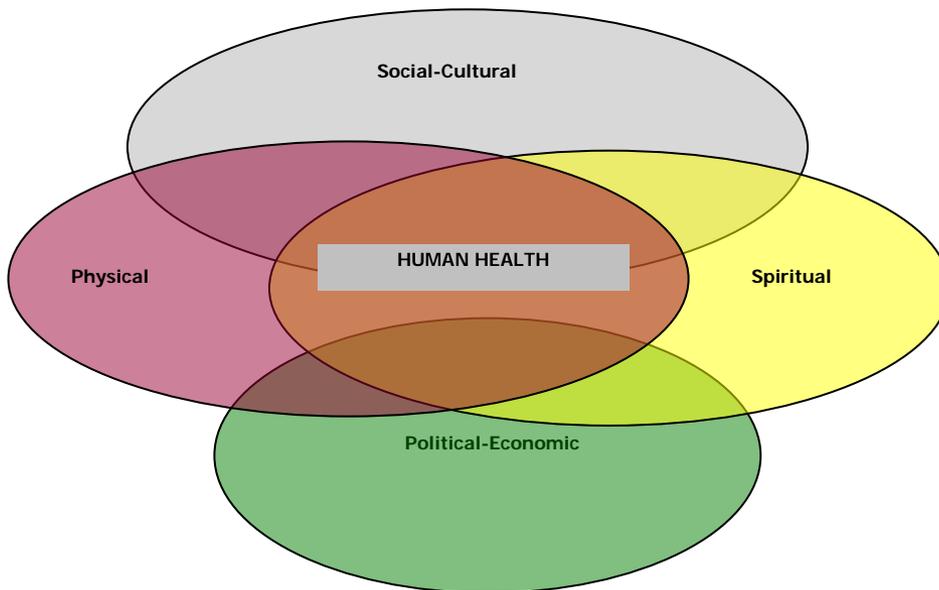
Comparison counties were selected for the following reasons:

- ▶ All four counties are located on the Western Slope of Colorado, and thus, share similar social and political cultures.
- ▶ All four counties have experienced energy and mining activities, although to different degrees
  - Have experienced similar economic cycles of growth and recession (“boom and bust”)
  - Have experienced accompanying environmental and social impacts.
- ▶ Somewhat overlapping healthcare networks and service areas allowed us to acquire comparative health data for residents of the four counties.

Demographic data:

<http://dola.colorado.gov>

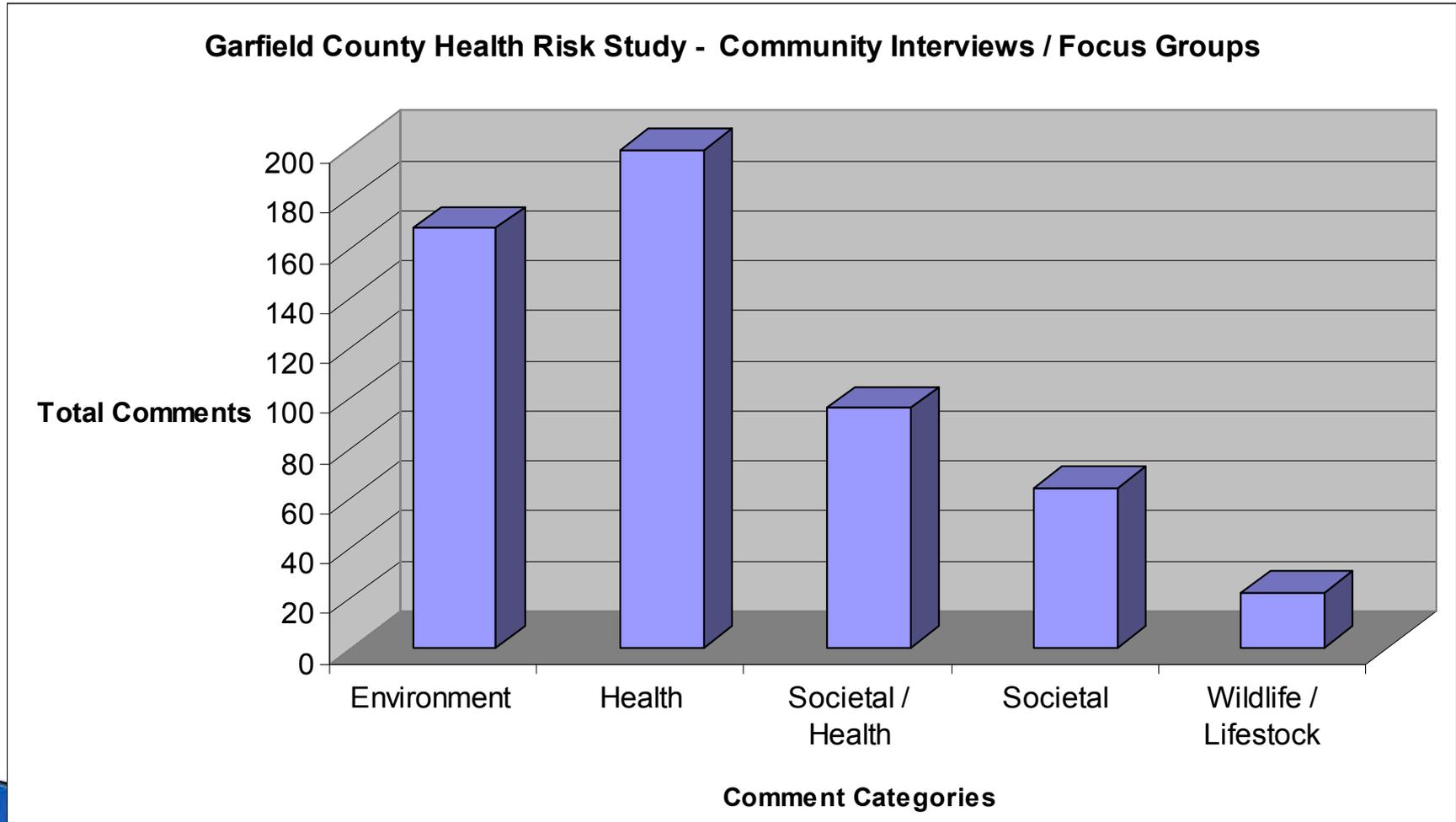
World Health Organization definition of “human health”



Why look at disease presumably not related to exposures from natural gas industry operations?

- Many health conditions have symptoms that are similar and/or have multiple causes.
- A person's general health can influence susceptibility to toxins or disease agents.

# “Perceptions and Concerns”



# Physical Health Issues / Concerns

Increase in or exacerbations  
of allergies and asthma

- Related concerns: coughing,  
wheezing, other respiratory  
complaints

Mental health issues  
such as stress,  
depression, anger,  
inability to sleep

Generalized chemical  
sensitivities

Burning/itching skin

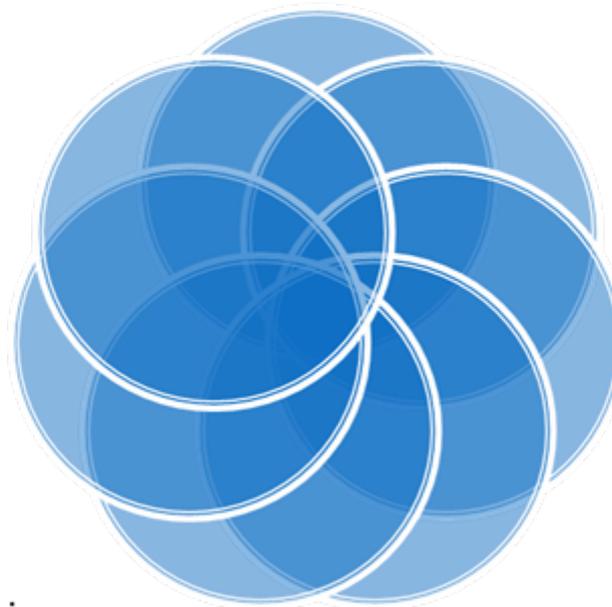
Fibromyalgia/chronic  
pain

- Related concern: chronic  
fatigue, lethargy

Headaches, dizziness,  
burning/itching eyes,  
nausea/vomiting, sinus problems –  
most often attributed to odors

Chronic colds

- Related concerns: concern  
about compromised immune  
systems



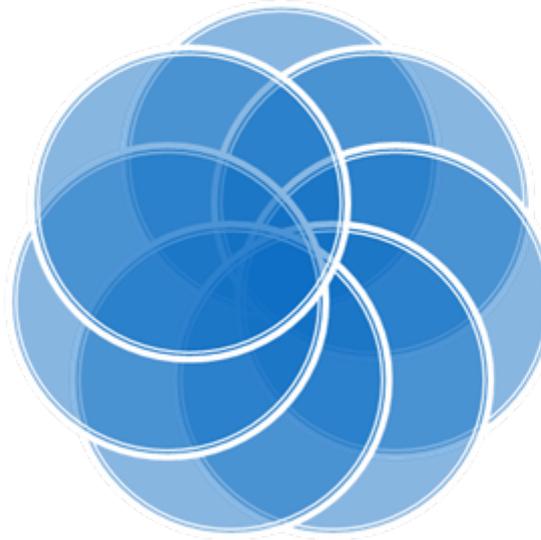
# Physical Health Issues/Concerns

Cancer (adrenal cancer, brain tumors, unknown/presumed cancers or “fear of developing cancer”)

Obesity

Loss of voice or speech problems

Pre-existing health conditions have been exacerbated; “feeling worse” than in the past



Trauma/work-related injuries

Diabetes

Age-related illnesses

# Social/Community Issues and Concerns

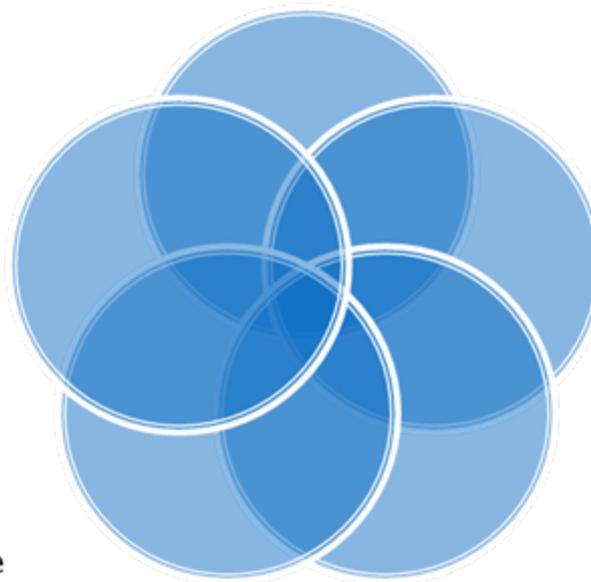
Increase in child and spousal abuse; child neglect; stressed family relationships

Increase in sexually transmitted diseases related to increase in temporary workers

Alcohol abuse (especially among high school students)

High suicide rate

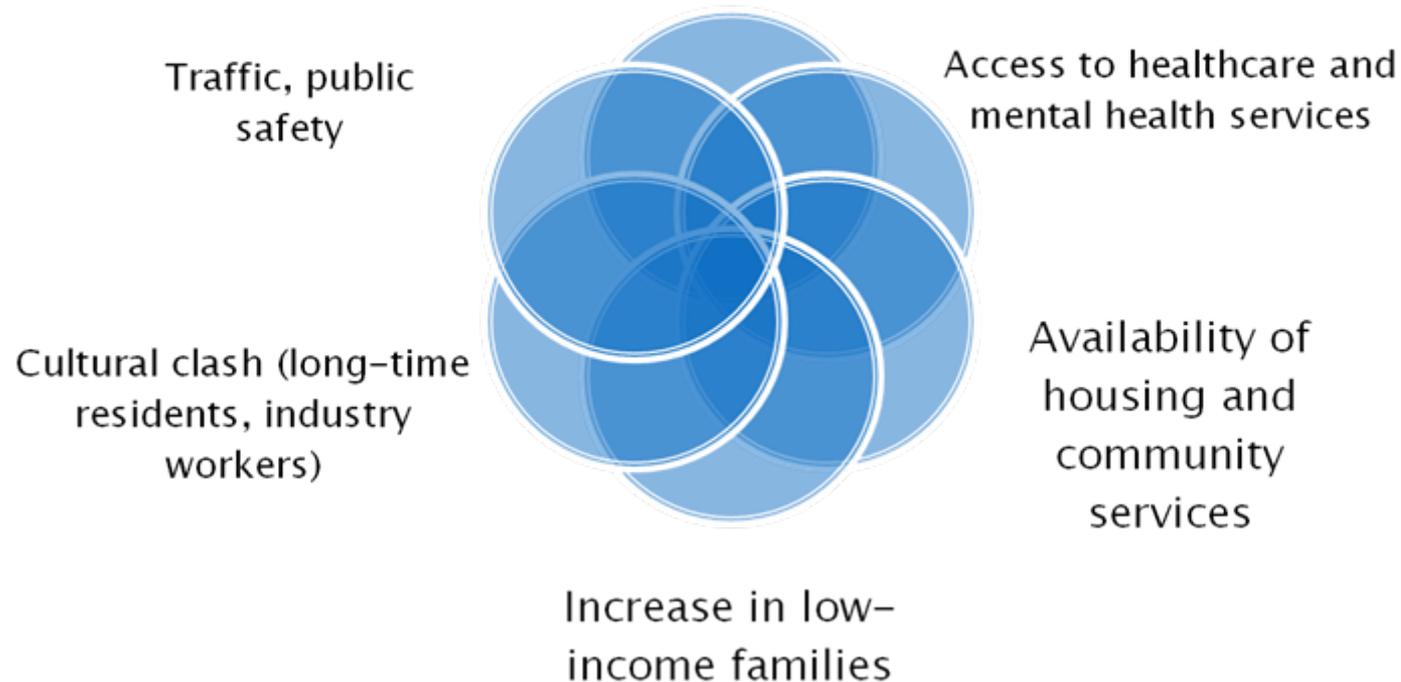
Drug abuse (especially methamphetamine use)



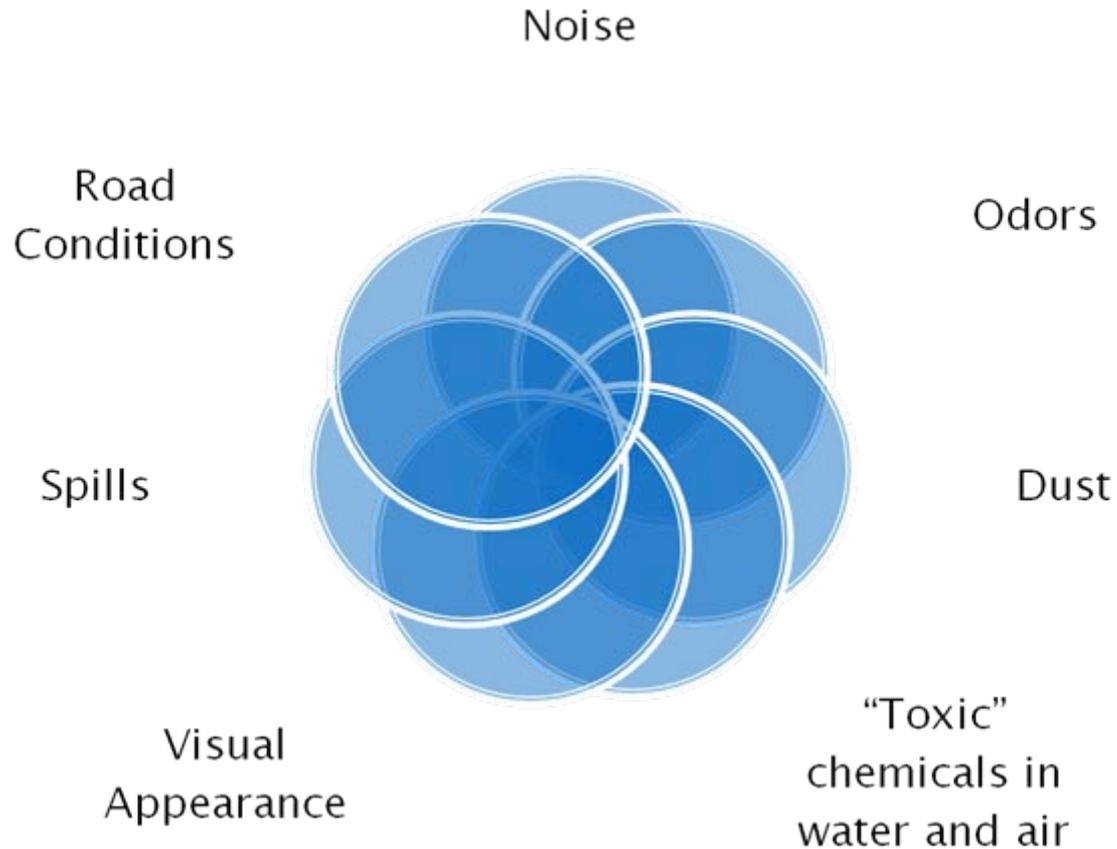
# Social/Community Issues and Concerns

## Lack of health insurance

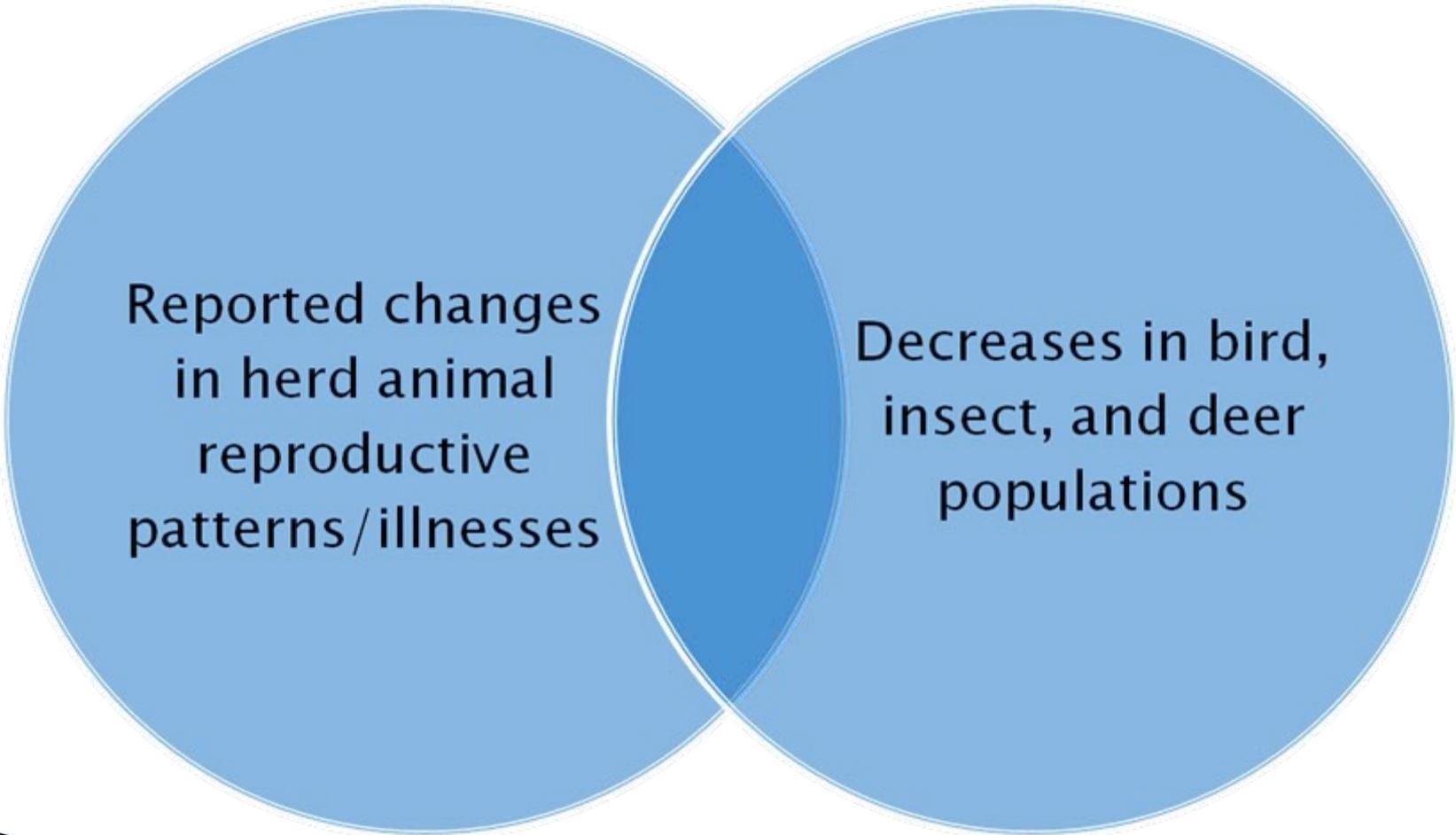
- Related concerns: lack of dental care for children and preventive care



# Environmental Concerns



# Wildlife/Domestic Animals



Reported changes  
in herd animal  
reproductive  
patterns/illnesses

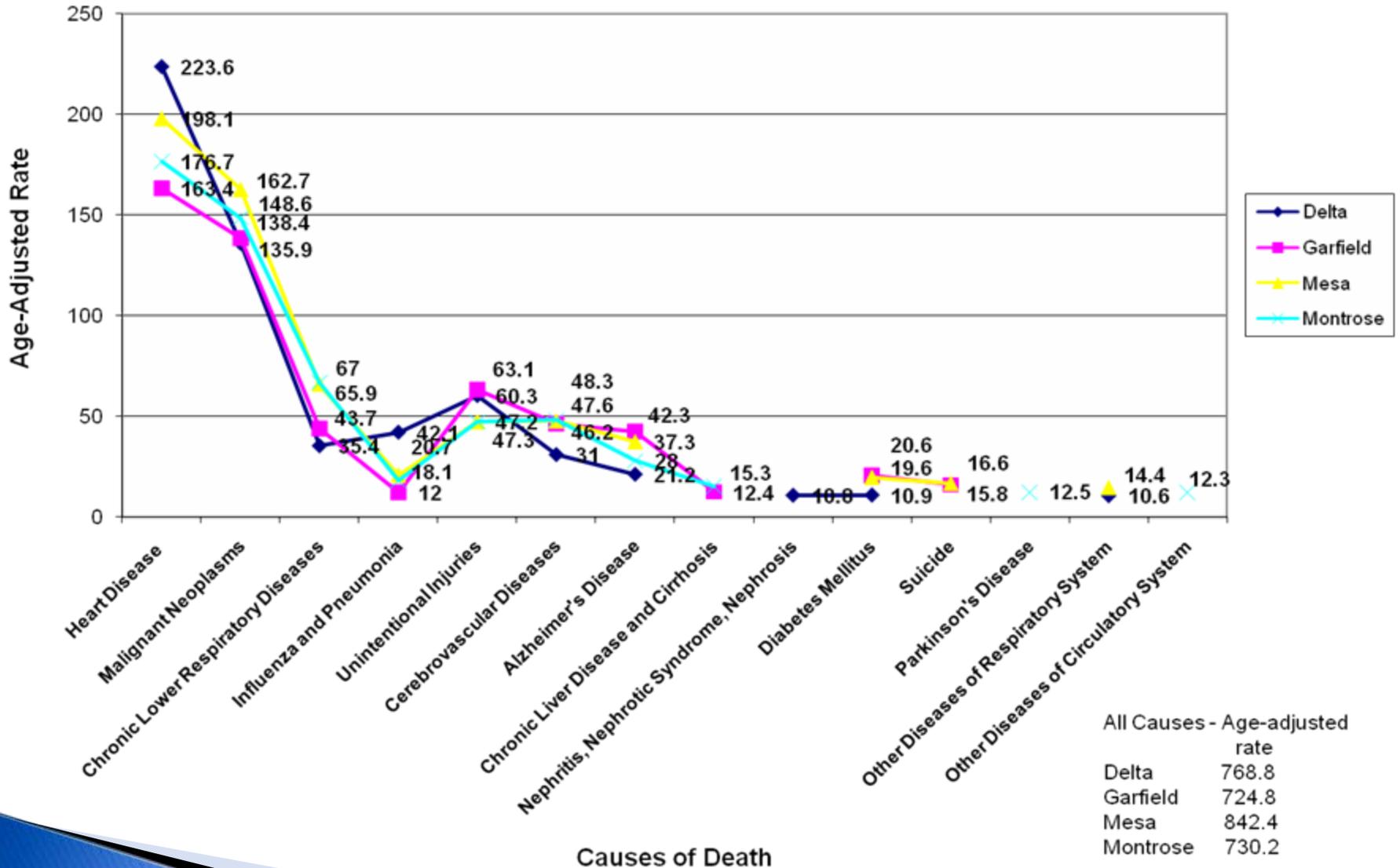
Decreases in bird,  
insect, and deer  
populations

# Qualitative Data:

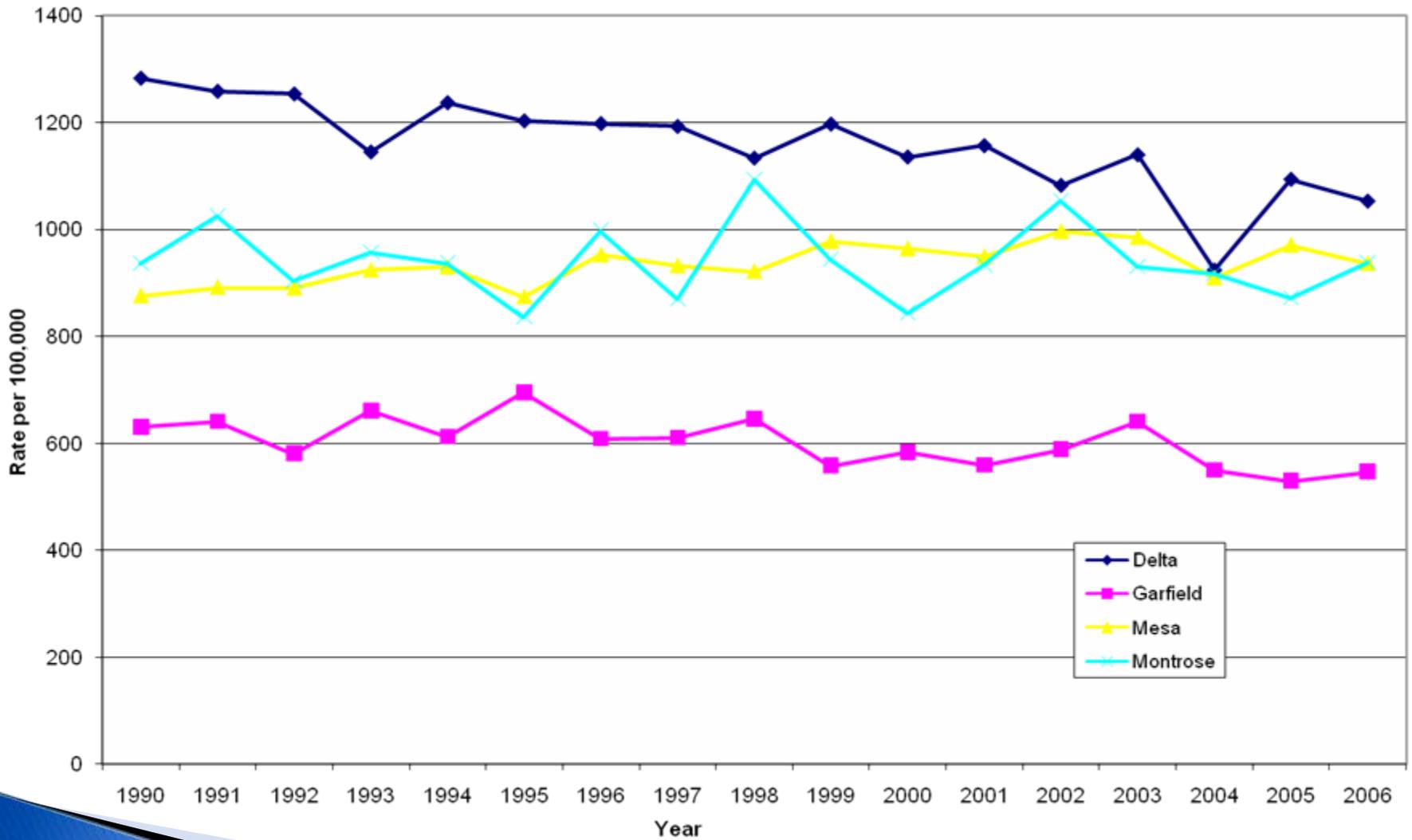
## Four-county comparison

- ▶ Birth statistics: (2002–2006)
- ▶ Death statistics: rates and leading causes of death (1990–2006)
- ▶ Birth defects: types and rates (2000–2005)
- ▶ Adolescent health measures (2007)
- ▶ Reportable conditions (1998–2006)
- ▶ West Nile virus (2002–2007)
- ▶ Cancer statistics (1992–2005)

## 2006 Leading Causes of Death - Delta, Garfield, Mesa, Montrose Counties



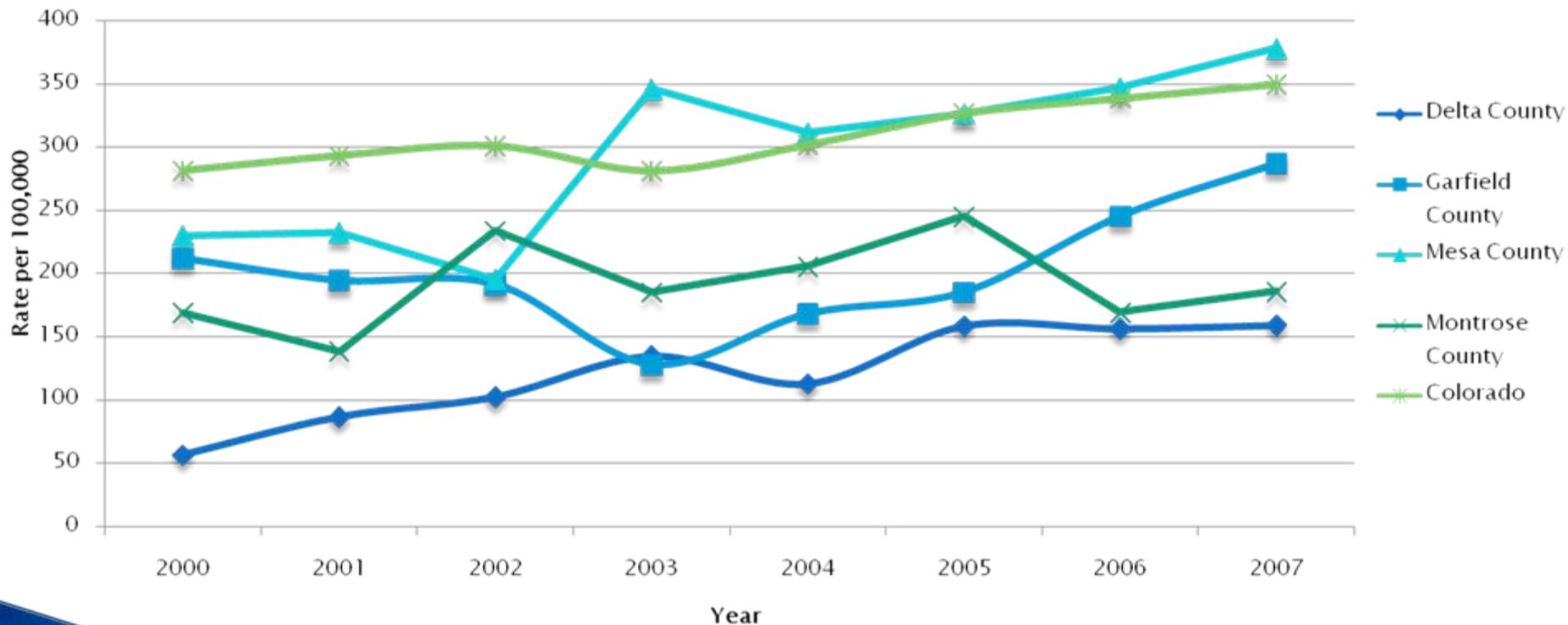
Death Rates - Delta, Garfield, Mesa, Montrose Counties



# Sexually Transmitted Diseases

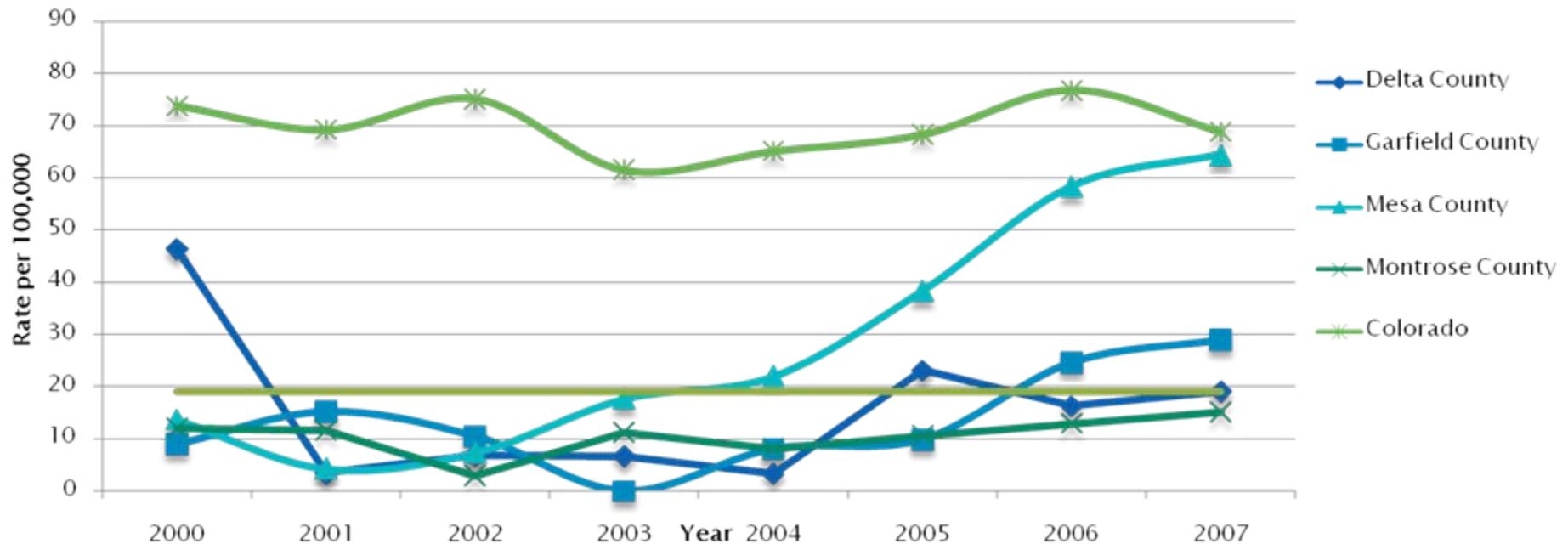
Rate per 100,000 population of reported Chlamydia cases in Delta, Garfield, Mesa and Montrose counties compared to Colorado

Chlamydia case rate per 100,000 (2000–2007)



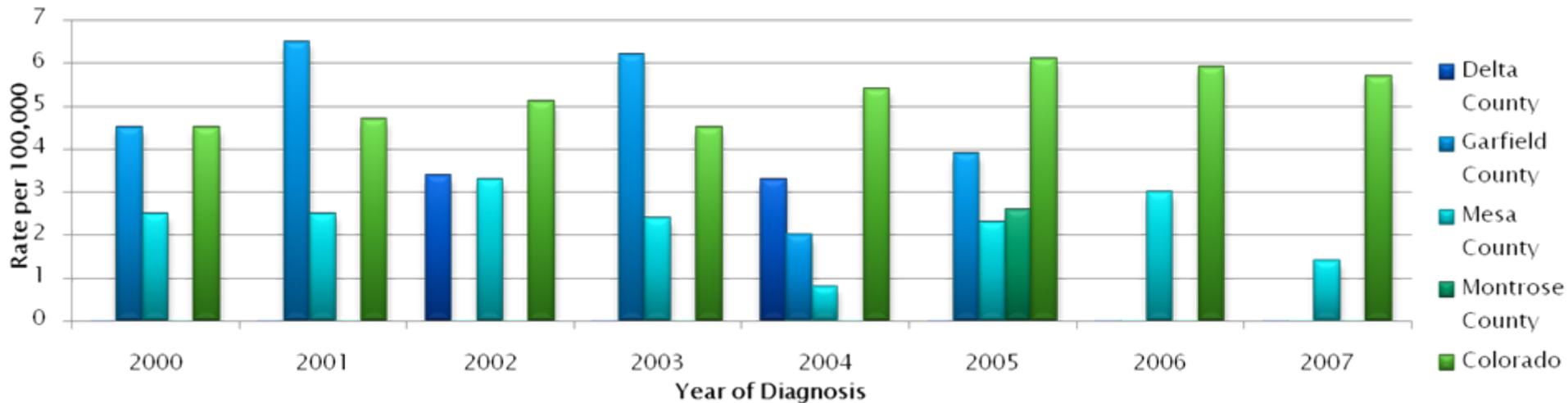
# Sexually Transmitted Diseases

Rate per 100,000 of reported Gonorrhea cases in Delta, Garfield, Mesa and Montrose counties compared to Colorado Gonorrhea case rate per 100,000 and Healthy People 2010 Goal (2000–2007)



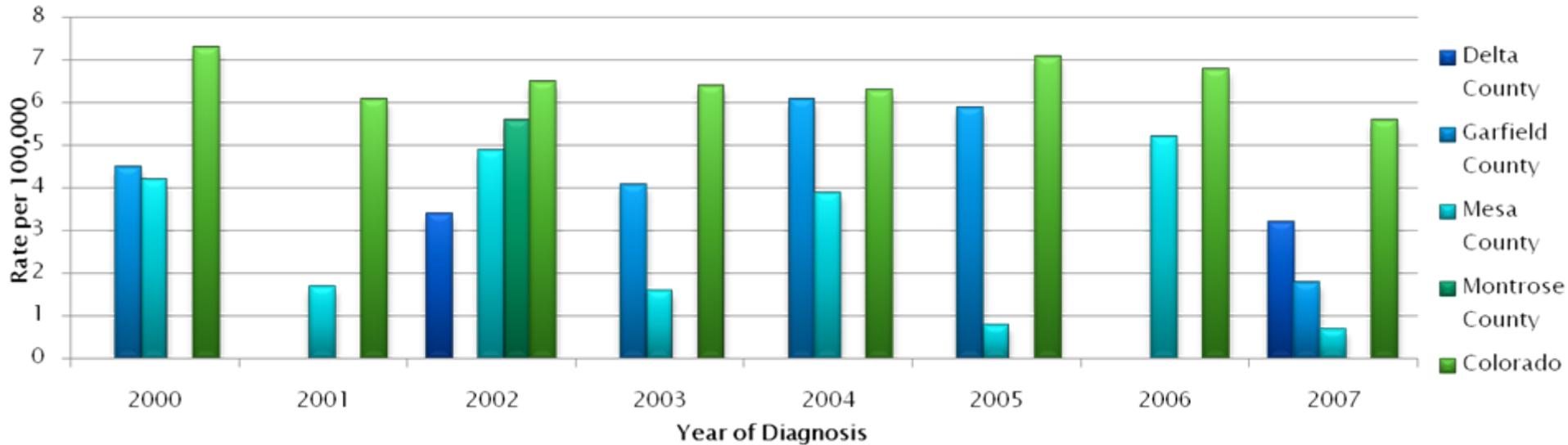
# Sexually Transmitted Diseases

Rate per 100,000 population of reported HIV cases for Delta, Garfield, Mesa and Montrose counties compared to Colorado HIV case rate (2000–2007)



# Sexually Transmitted Diseases

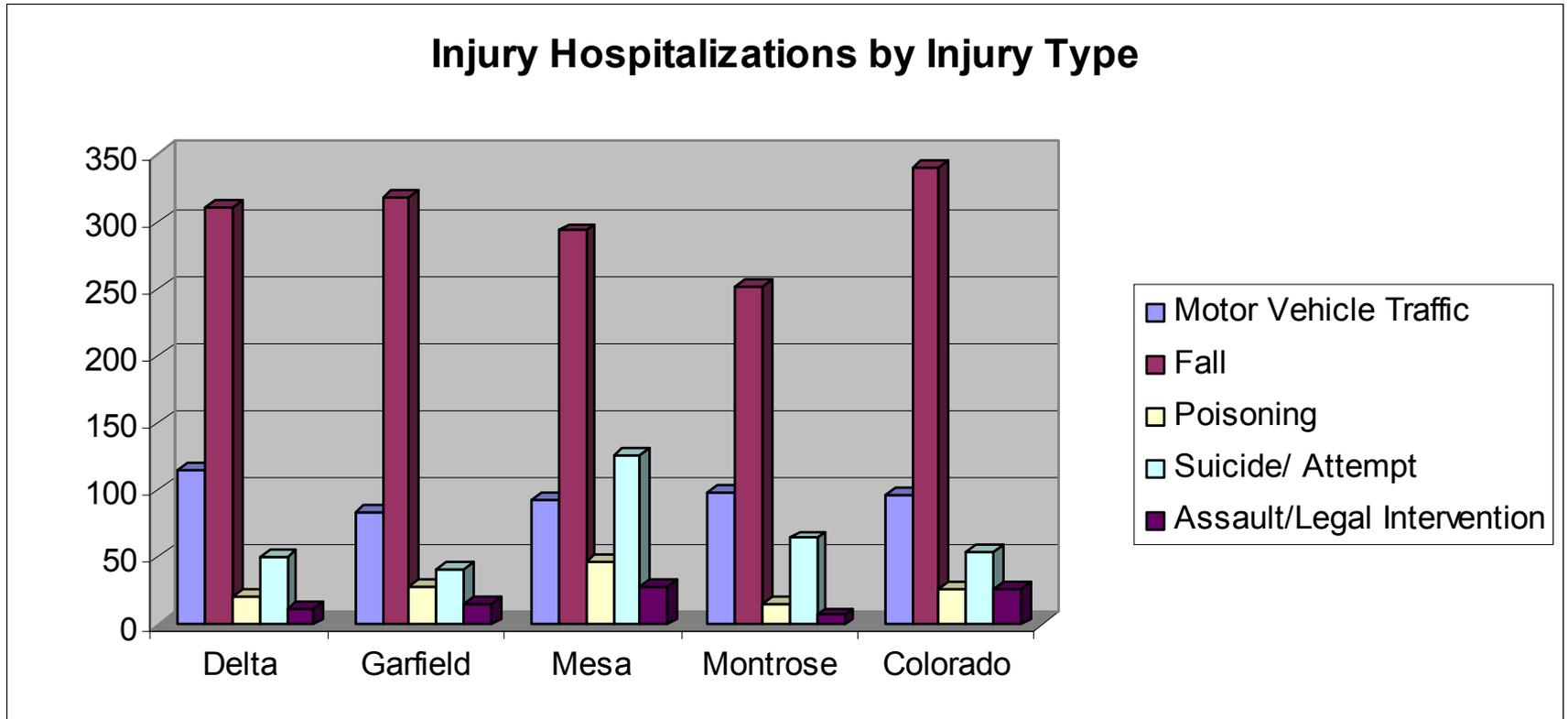
Rate per 100,000 population of reported AIDS cases for Delta, Garfield, Mesa and Montrose counties compared to Colorado AIDS case rate (2000–2007)



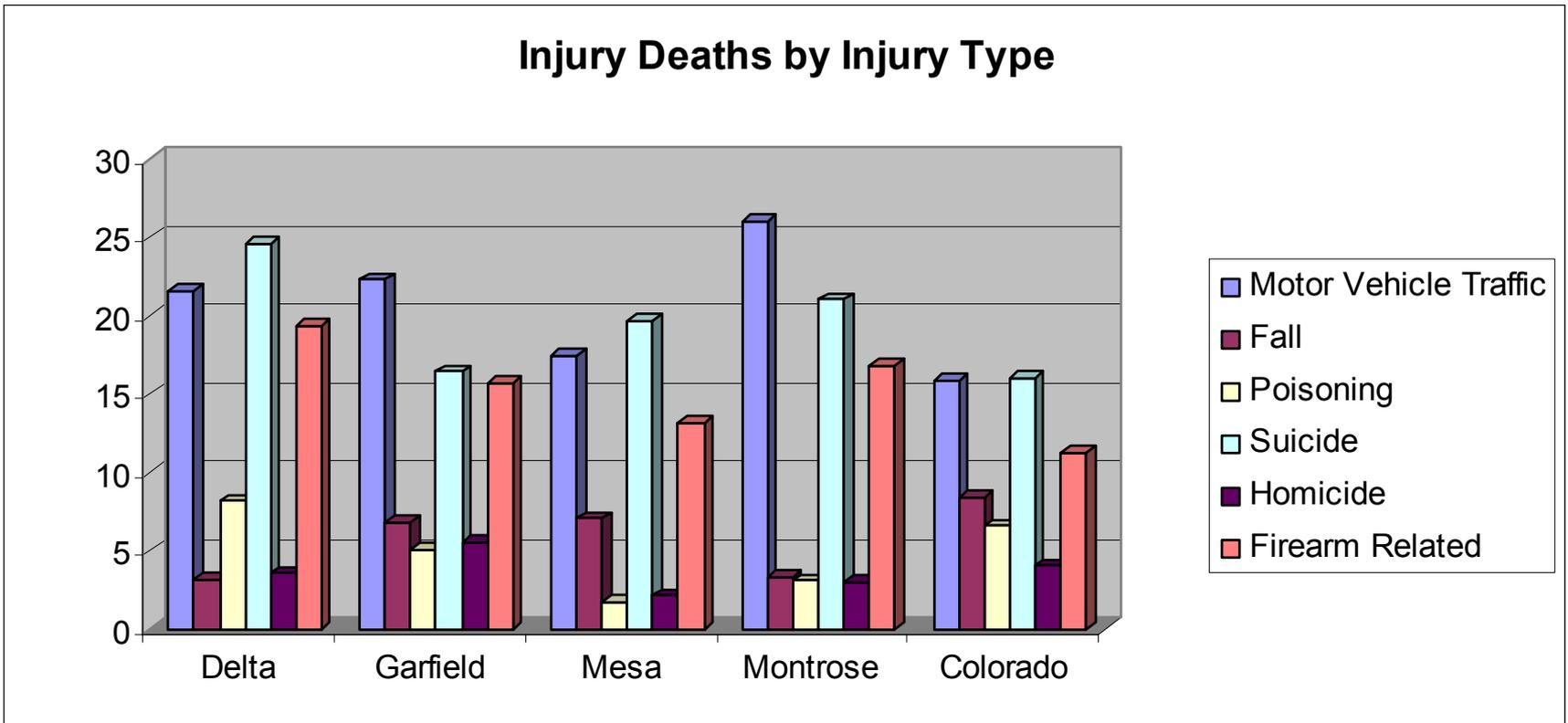
# Qualitative Data (Continued): Four-county comparison

- ▶ Behavioral Risk Factor Study Survey (BRFSS) data (2000–2005)
  - General health status (physical & mental)
  - Diabetes, asthma
  - Smoking, weight
  - Health insurance
- ▶ Injury hospitalization and death: causes and rates (2001–2003)

# Injury Hospitalizations & Deaths

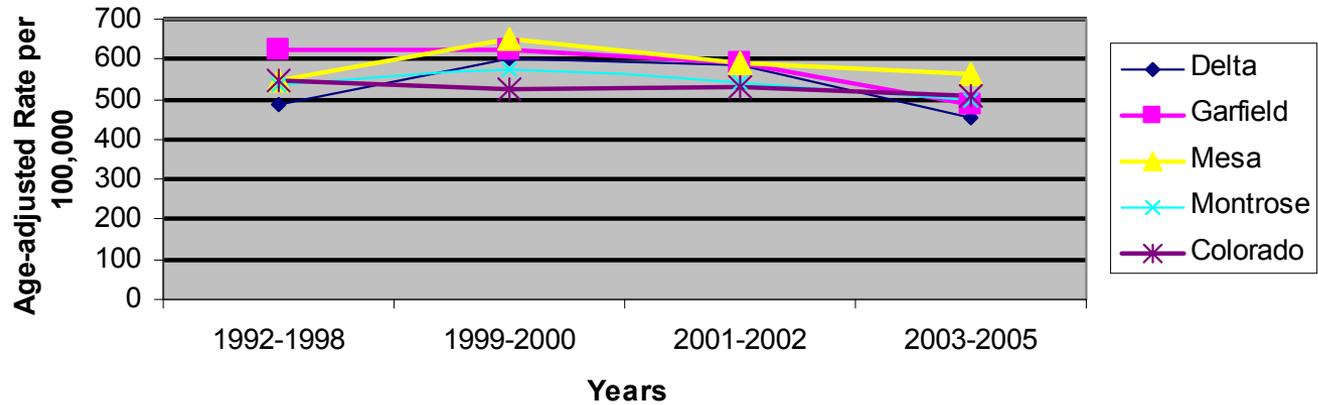


# Injury Hospitalizations & Deaths

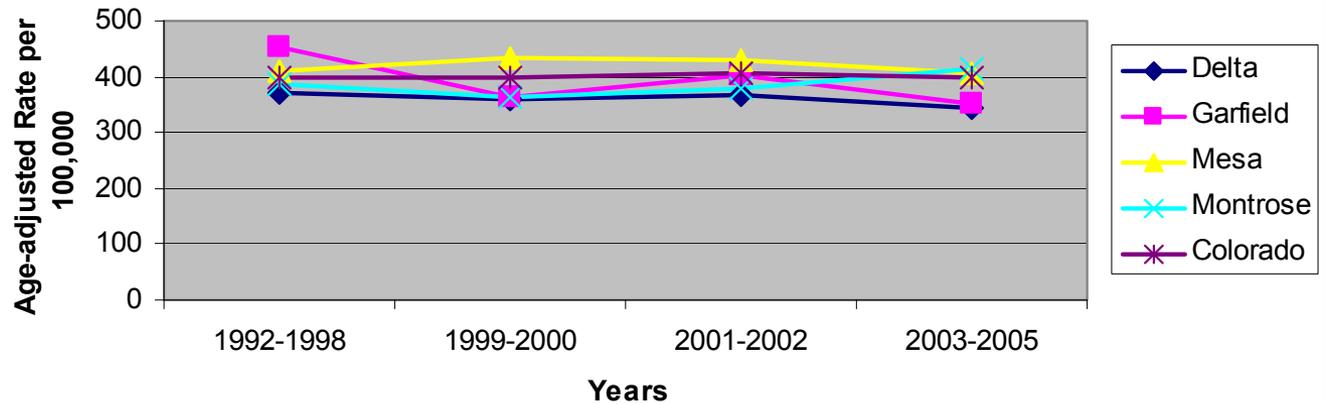


# Cancer

**All Cancers Incidence Trend  
Average Annual Rate - Males**

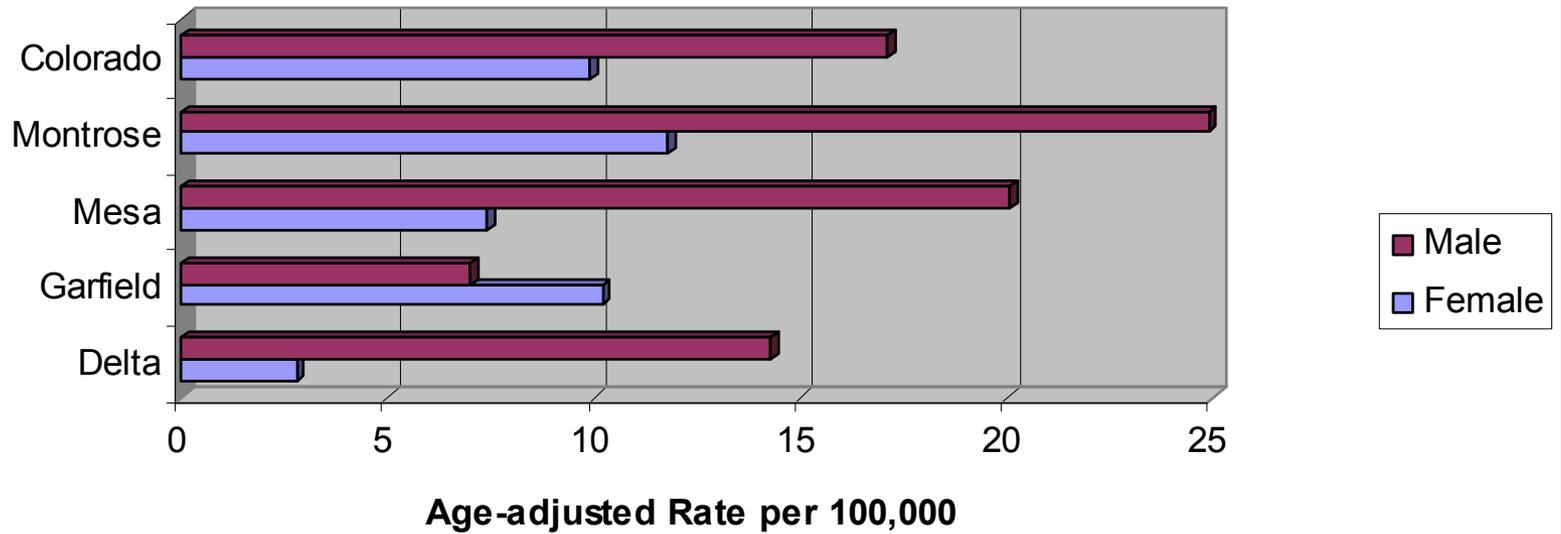


**All Cancers Incidence Trend  
Average Annual Rate - Females**



# Cancer

**Leukemia Incidence by County for 2003-2005  
Average Annual Rates**



# Hospital and Medical Insurance Data

- Diagnosis Related Group (DRG)–based hospital discharge data (2000 through 1<sup>st</sup> quarter 2006)
- Emergency room data
  - Grand River Medical Center
  - RMHP – member data for 4 counties
  - St. Mary’s Hospital CareFlight data
- Rocky Mountain Health Plans (RMHP) member data – 4 county comparison
  - By DRG category
  - Focus on respiratory conditions

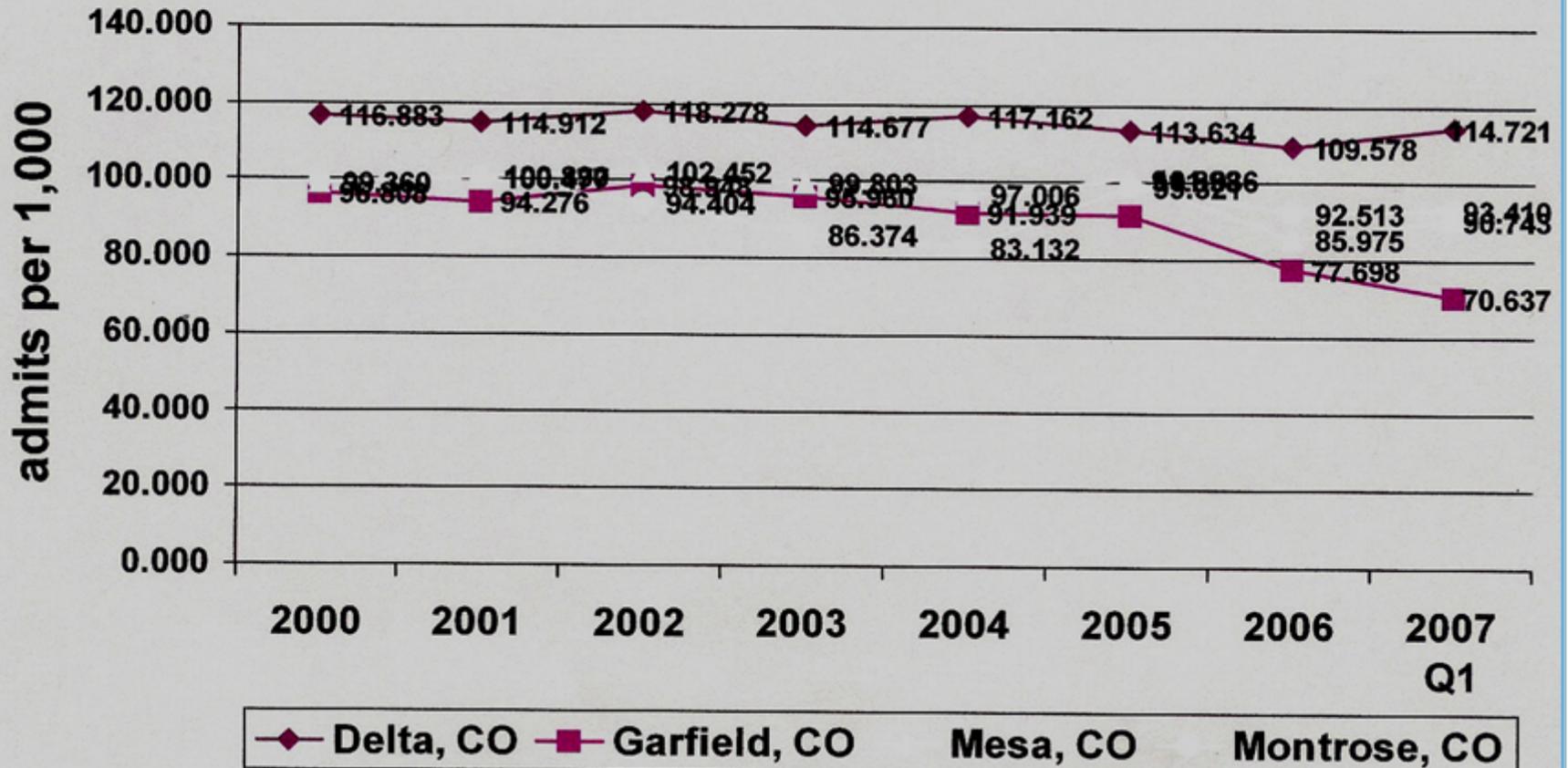
# DRG-based hospital discharge data

(Garfield County: 2000 through 1<sup>st</sup> quarter 2007)

- ▶ During six-year period -- with exception of 2003 -- circulation and bone and joint disorders were either the first or second most common reasons for hospitalization
  - In 2003, birthing and pregnancy disorders was number one, and circulation disorders was third.
- ▶ Digestive disorders ranked third in four out of the six year.
- ▶ Respiratory disorders were either the fourth or fifth most common reason for hospitalization in all years.
- ▶ Neonatal disorders were sixth in frequency during the entire six-year period.
- ▶ Nervous system disorders were either seventh or eighth each year.

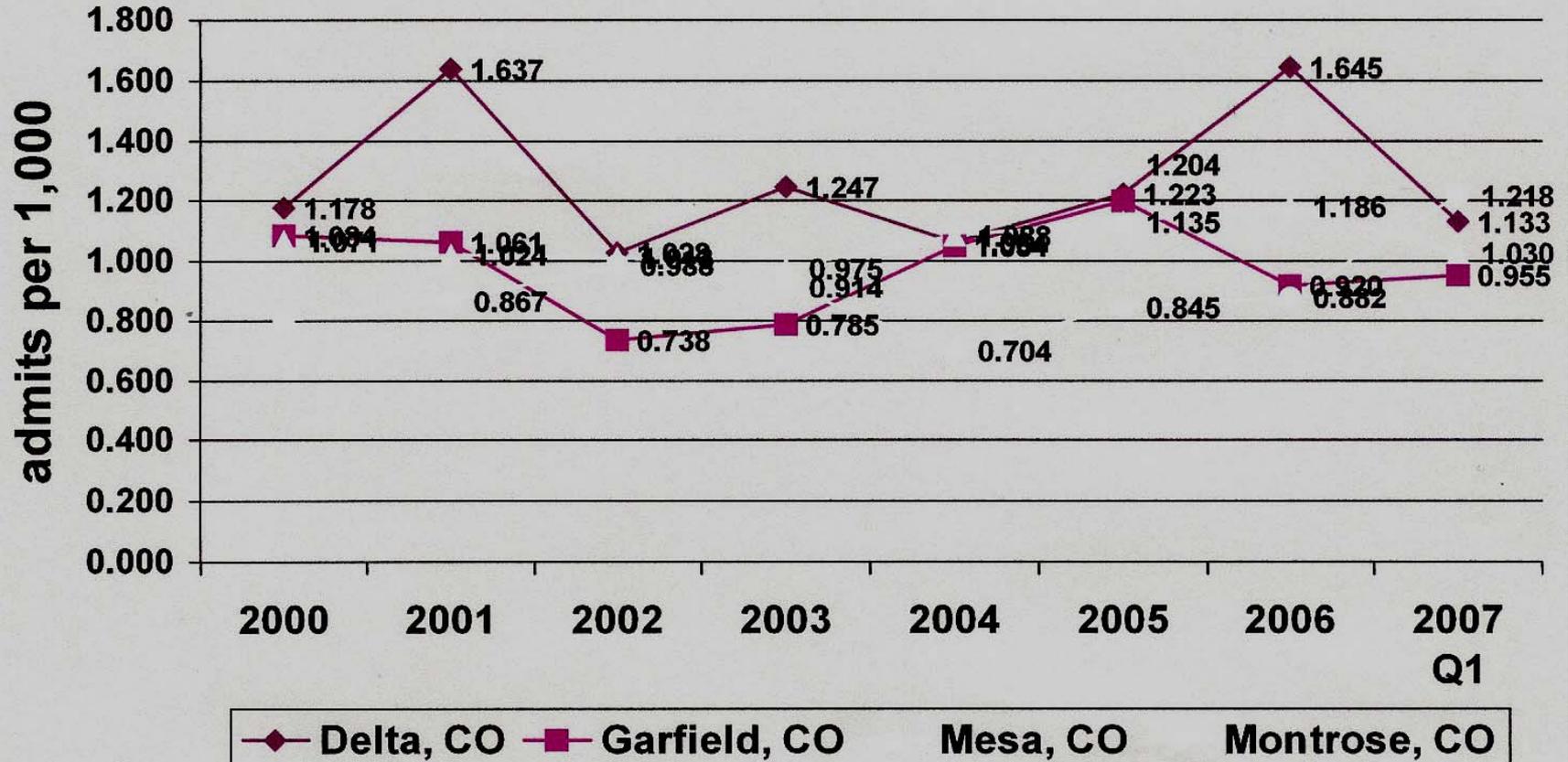
# Combined Categories

## All Hospitalizations

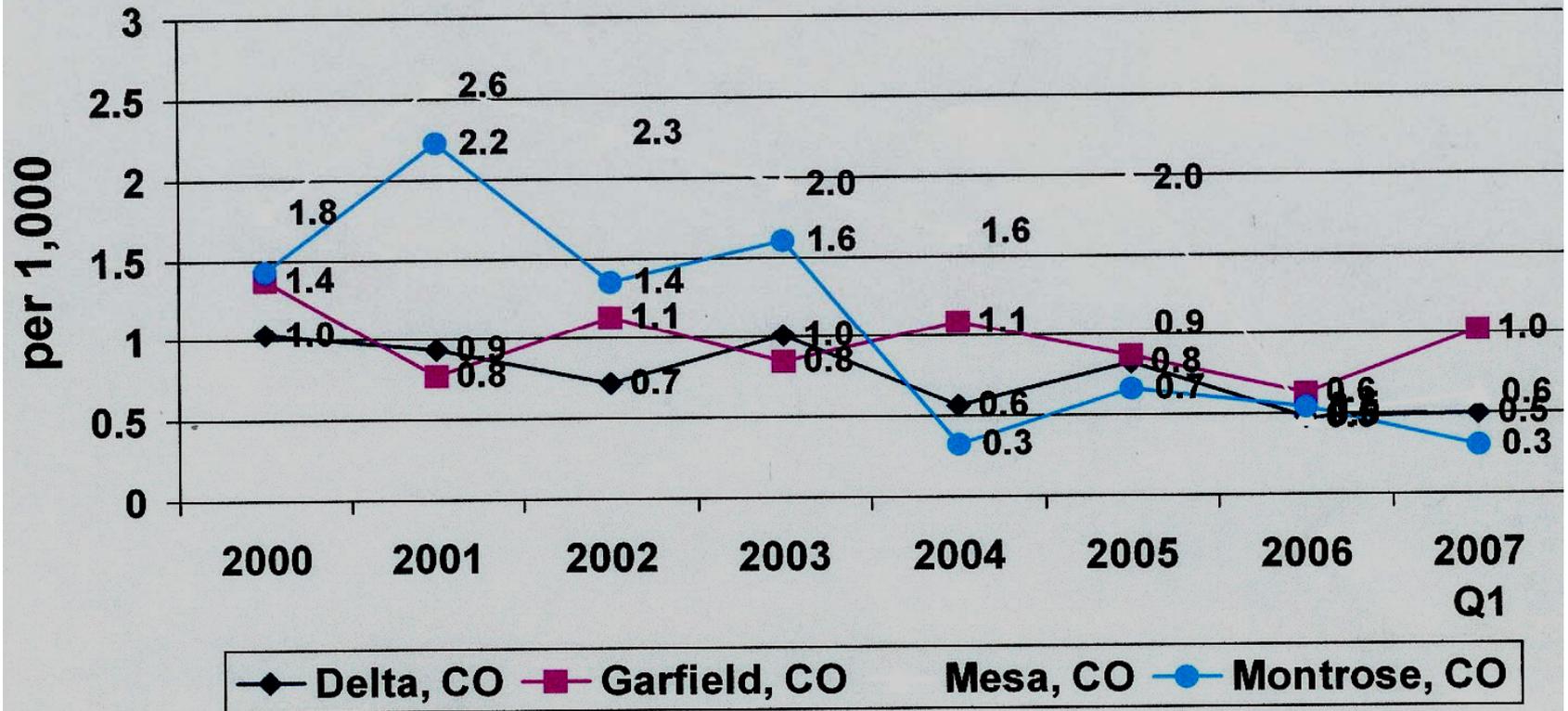


# Combined Categories

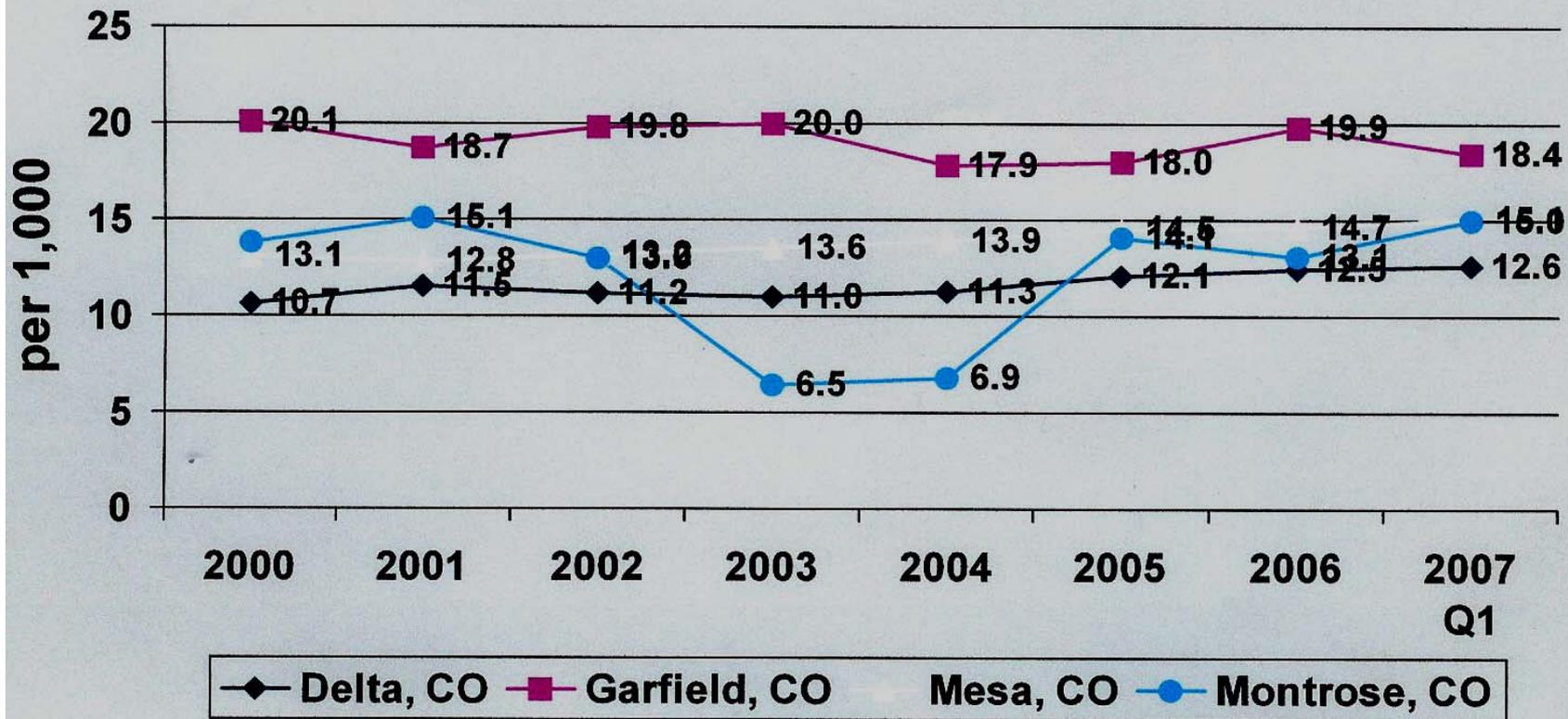
## All Trauma DRGs



### Alcohol and Drug Disorders

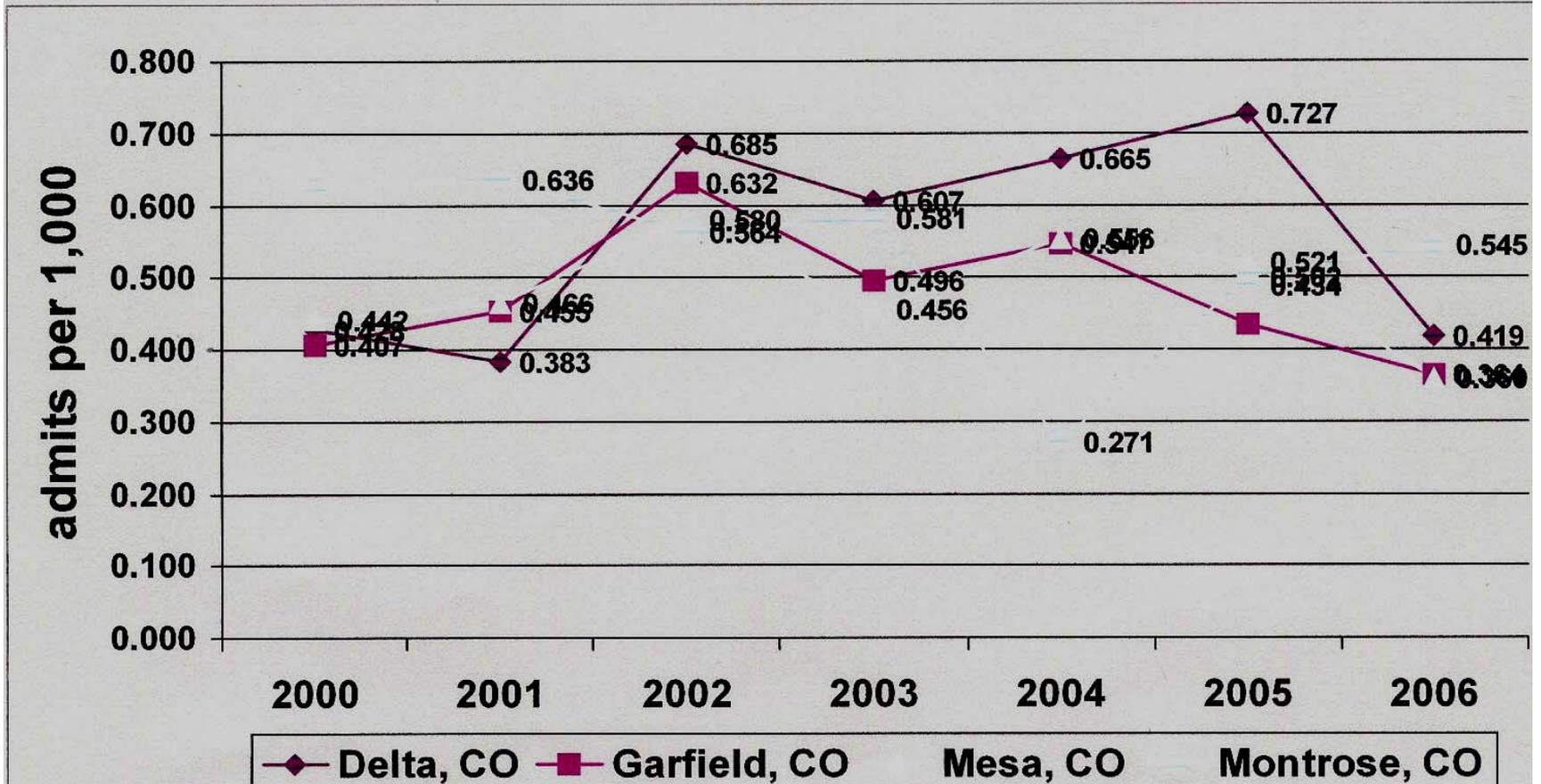


### Birthing and Pregnancy Disorders



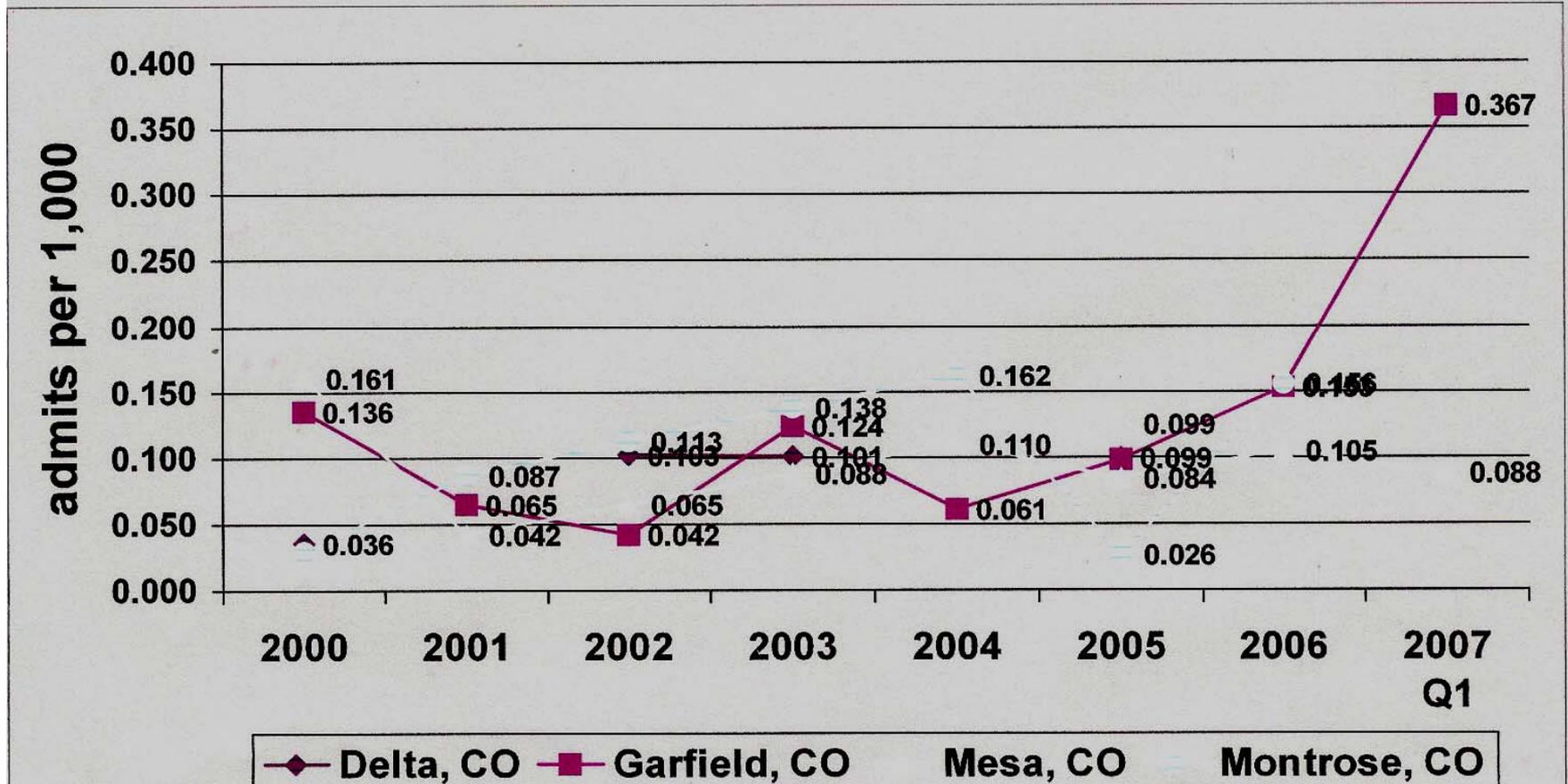
# Nervous System Disorders

## Seizure & Headache Age >17



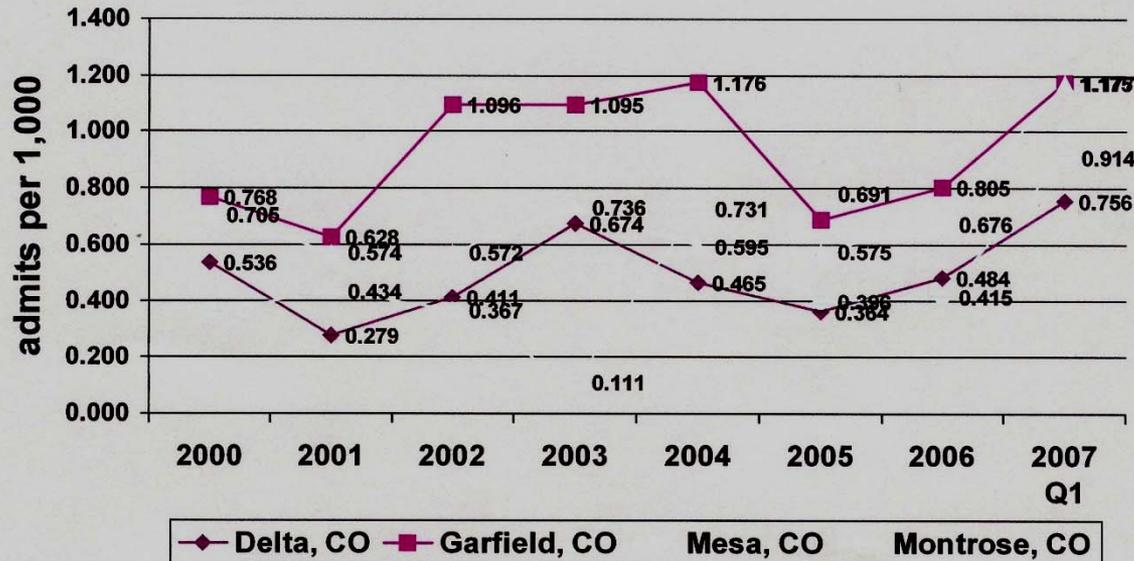
# Nervous System Disorders

## Seizure & Headache Age 0-17

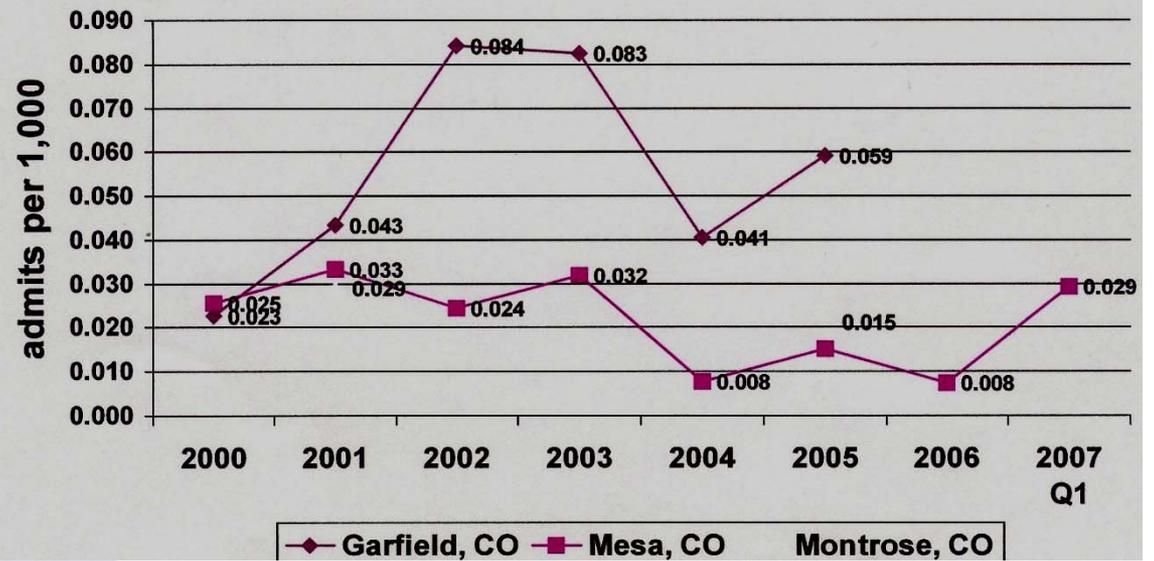


## Respiratory Disorders

### Bronchitis & Asthma Age 0-17

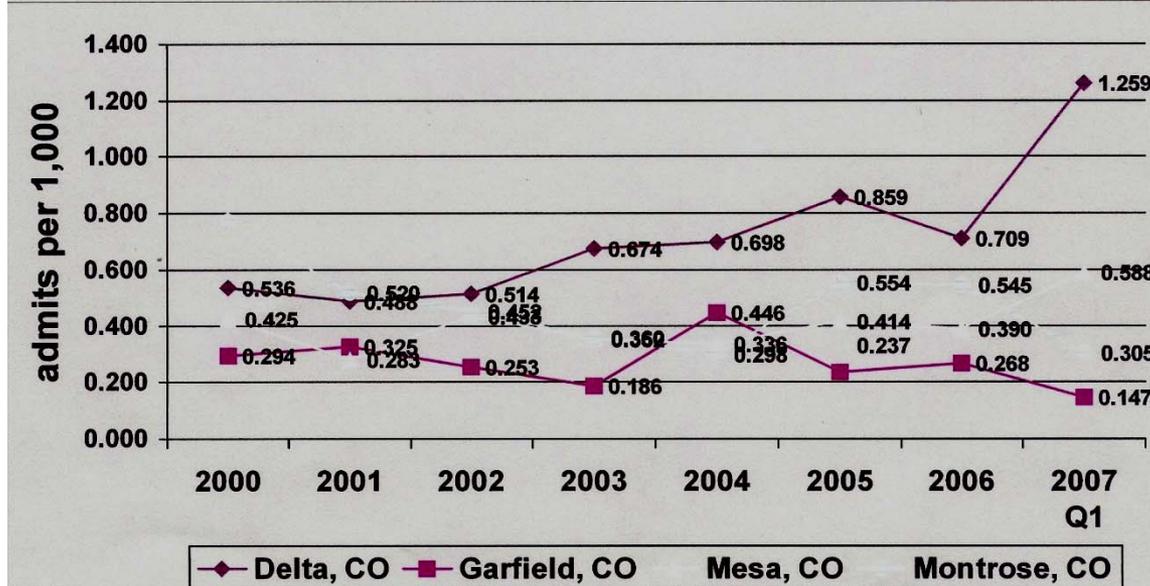


### Respiratory Infections & Inflammations Age 0-17

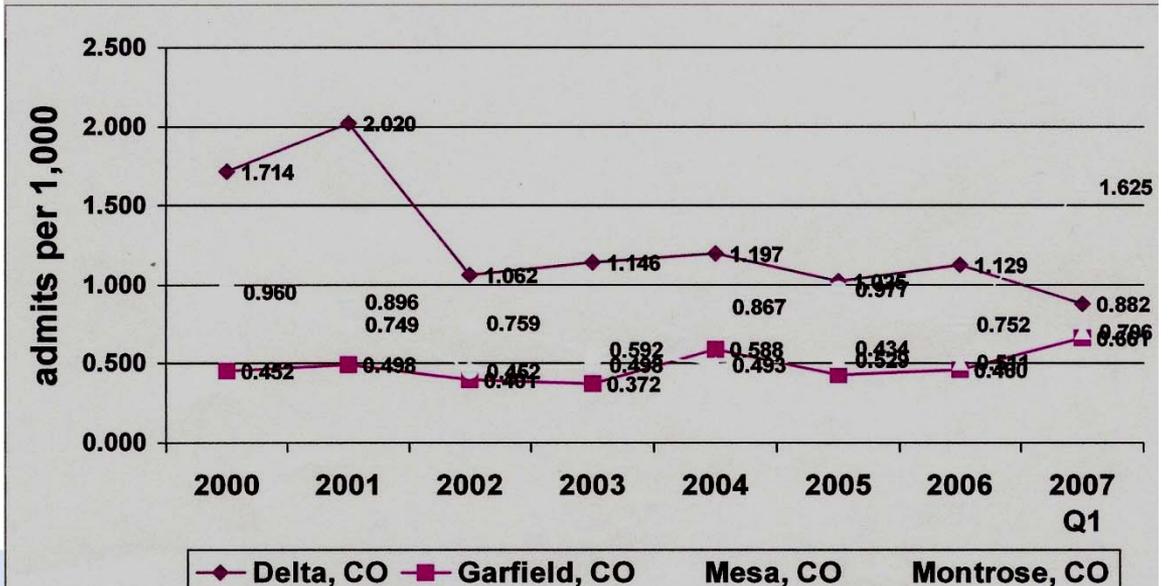


## Respiratory Disorders

### Bronchitis & Asthma Age >17

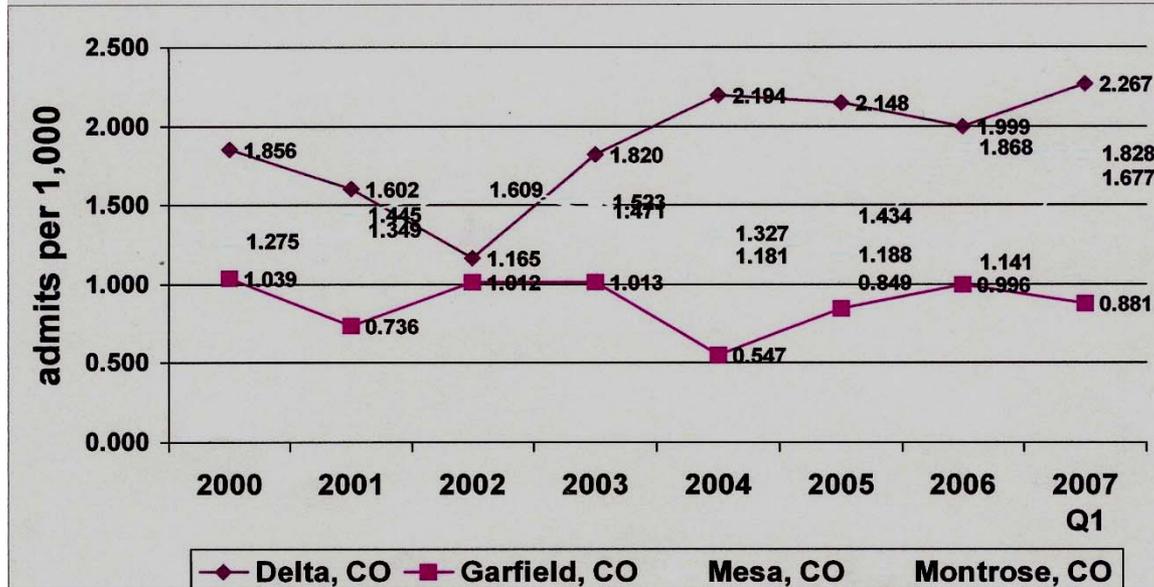


### Respiratory Infections & Inflammations Age >17

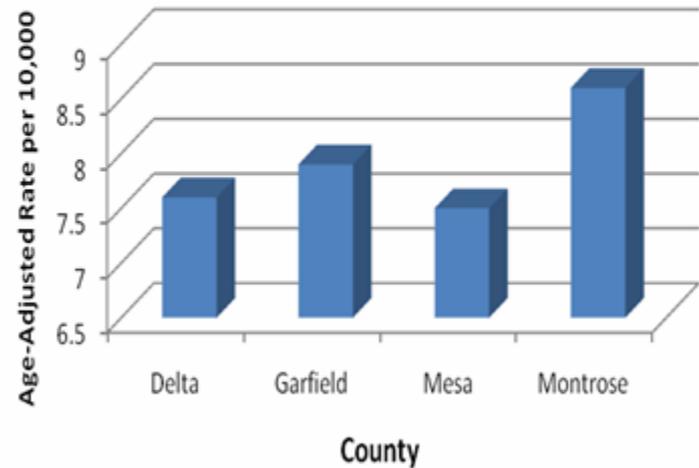


## Respiratory Disorders

### Chronic Obstructive Pulmonary Disease



### Hospital Discharges: Asthma as Principal Diagnosis by County



# RMHP Member Data: Ambulatory Visits 2000–2007

↓ GarCo rates generally lower than other counties

↑ GarCo rates higher than other counties

= GarCo rates neither higher or lower than other counties

N/A: less than 200 visits per member months

Rates per 1,000 member months

DRG Category	Adults (≥18)	Children (<18)
Accident, Injury, Trauma	↓ Until 2005	↓
Annual Physicals & Well-Child Exams	↓	↓
Cardiac	↓	↓
Ear, Nose & Throat	↓	N/A
Endocrine	↓	=
Eye	↓	↓
GI & Urinary	↓	=
Infection	=	↑
Mental Health	↓	=

# RMHP Member Data: Ambulatory Visits 2000–2007 (continued)

↓ GarCo rates generally lower than other counties

↑ GarCo rates higher than other counties

= GarCo rates neither higher or lower than other counties

N/A: less than 200 visits per member months

Rates per 1,000 member months

DRG Category	Adults (≥18)	Children (<18)
Musculoskeletal	↓	=
Neurological	↓	N/A
Pregnancy & Ob/Gyn	↓	=
Respiratory Conditions	↓	=
Skin/Allergy	↓	↓

# RMHP Member (2000–2007) and Grand River Hospital District (2004–2006) Data: Emergency Room Visits

↓ GarCo rates generally lower than other counties

↑ GarCo rates higher than other counties

= GarCo rates neither higher or lower than other counties

N/A: less than 200 visits per member months

RNHP rates per 1,000 member months; GR rates per 1,000 visits

DRG Category	Adults (≥18)	Children (<18)	Grand River (all ages)
Accident, Injury, Trauma	↓ Until 2005	↓	Increasing
Cardiac	↓	N/A	Increasing except Silt
Drug & Alcohol			Increasing
Ear, Nose & Throat	↓	=	Increasing except Silt
Endocrine	↓	=	Increasing
Eye	↓	↓	Silt increasing; Parachute/Rifle variable
GI & Urinary	↓	=	Increasing
Infection	=	↑	Variable over period

# RMHP Member (2000–2007) and Grand River Hospital District (2004–2006) Data: Emergency Room Visits

↓ GarCo rates generally lower than other counties

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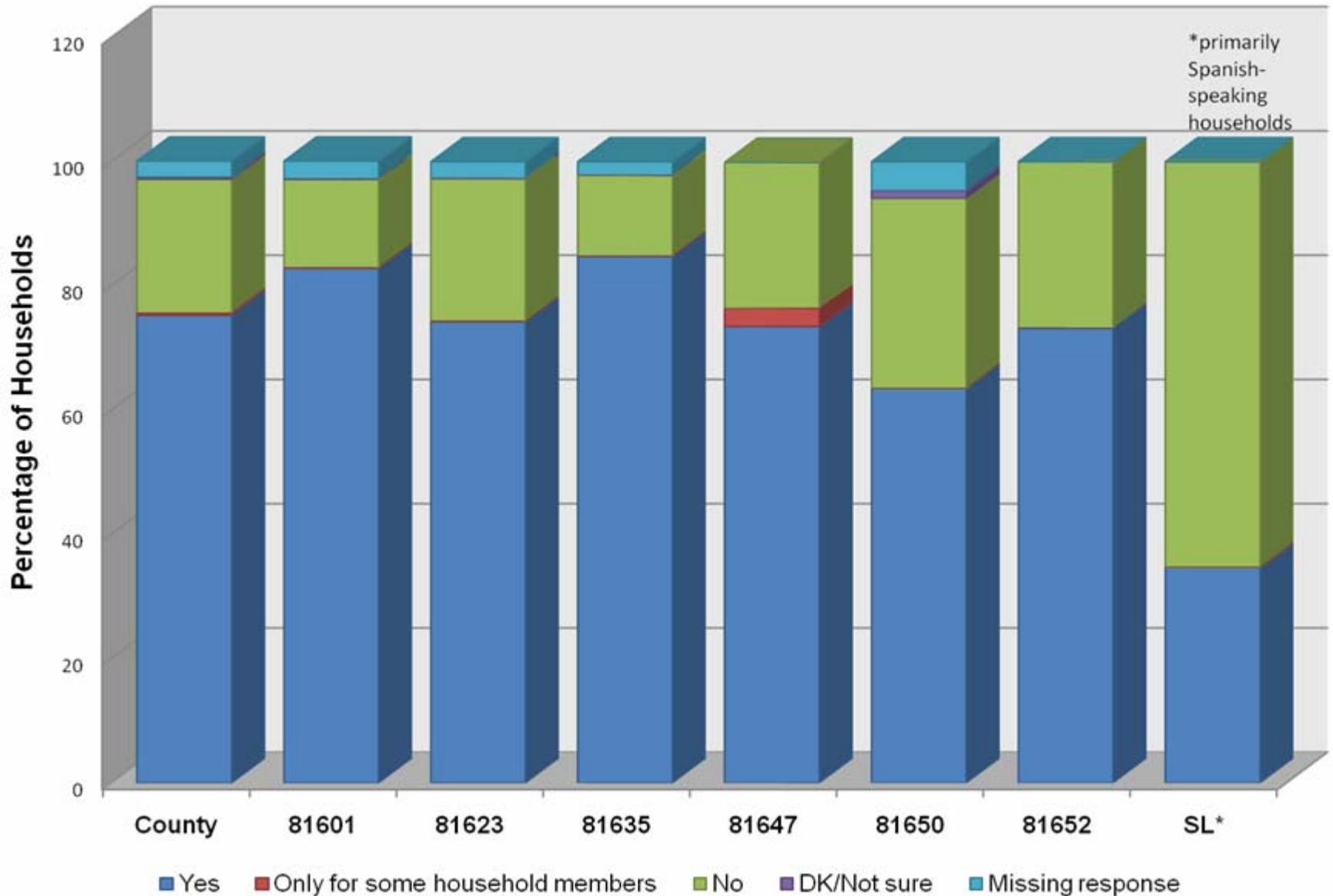
= GarCo rates neither higher or lower than other counties

N/A: less than 200 visits per member months

RNHP rates per 1,000 member months; GR rates per 1,000 visits

DRG Category	Adults (≥18)	Children (<18)	Grand River (all ages)
Mental Health	↓	=	Increasing
Neurological	↓	N/A	Increasing
Pregnancy & Ob/Gyn	↓	N/A	Increasing since 2005
Respiratory	↓	=	Variable over period
Skin/Allergy	↓	↓	Increasing

## Percentage of Households with Health Insurance by Zip Code



# Self-reported Health Status: Household Survey

Zip Code	Census pop.	Households (with "land lines")	Sample		Surveys Completed	% of households completed	Individuals "surveyed"	% of population surveyed
81601	12,768	4,680	Mail	440	49	1.05	135	1.06
			Phone	438				
81623	13,008	4,784	Mail	362	26	0.54	63	0.48
			Phone	355				
81635	5,041	1,947	Mail	186	24	1.23	52	1.03
			Phone	186				
81647	4,410	1,672	Mail	170	11	0.66	25	0.57
			Phone	170				
81650	10,319	3,752	Mail	401	35	0.93	87	0.84
			Phone	401				
81652	3,107	1,632	Mail	172	21	1.29	54	1.74
			Phone	169				
<b>Total</b>	<b>48,653</b>	<b>18,467</b>		<b>3,450</b>	<b>385</b>	<b>2.08</b>	<b>1,048</b>	<b>2.15</b>

# Survey facts

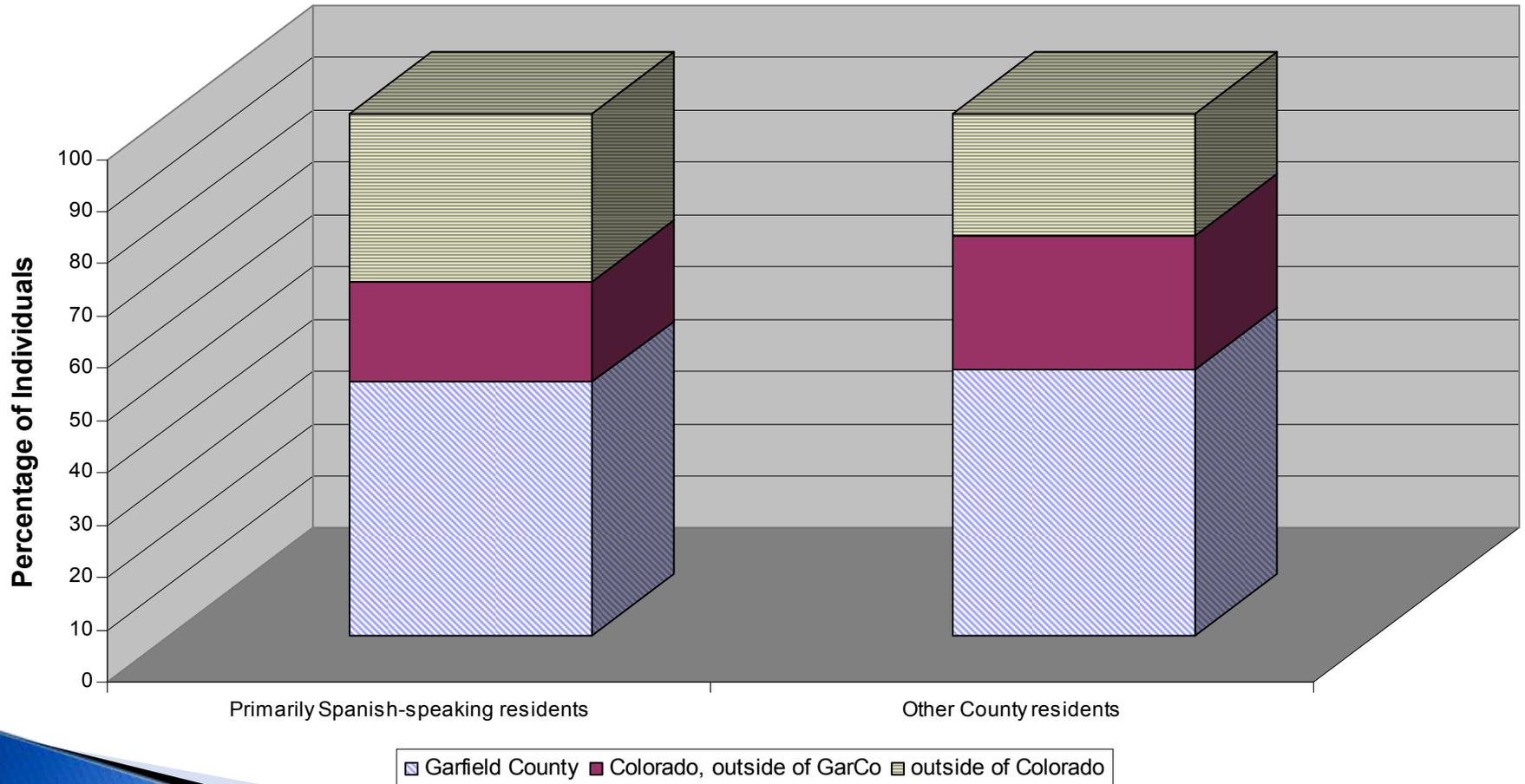
- ▶ 2.08% of Garfield County households with listed phone numbers (USA Info listings) were surveyed
- ▶ Obtained information on 2.15% of 2004 census population
- ▶ Survey completion rate = 18% of randomly selected population
- ▶ Total calls made = 2,511
  - 219 calls completed
  - 2,336 refusals or no contact (no answer, answering machine, out of service, etc.)
- ▶ Total surveys mailed = 1,731
  - 166 returned (9.6% of total mailed)
- ▶ Interviews completed in Spanish = 49 out of 125 households identified

# Survey sections

- ▶ Household demographics and environment
- ▶ Overall health status
- ▶ Diabetes
- ▶ Cardiovascular disease
- ▶ Blood pressure
- ▶ Respiratory (lung) health
- ▶ Cancer
- ▶ Neurological (nerve and muscle) symptoms
- ▶ Other health issues (skin, allergies, kidney, immune system)
- ▶ Tobacco Use
- ▶ Alcohol consumption
- ▶ Reproductive history/birth defects
- ▶ Health-related quality of life
- ▶ Occupational history
- ▶ Healthcare and income
- ▶ Concerns about environmental or chemical exposures

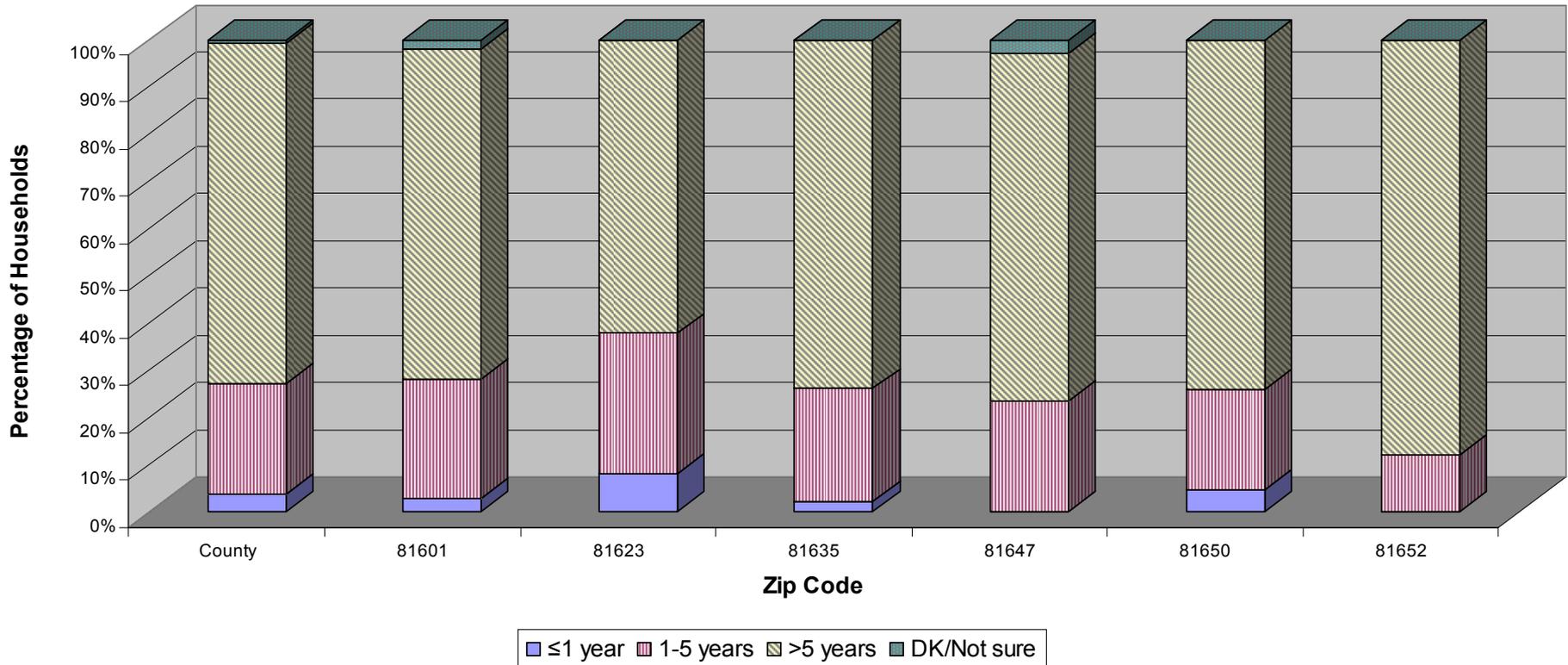
# Household Survey Demographic Data

## Longest Period of Residence



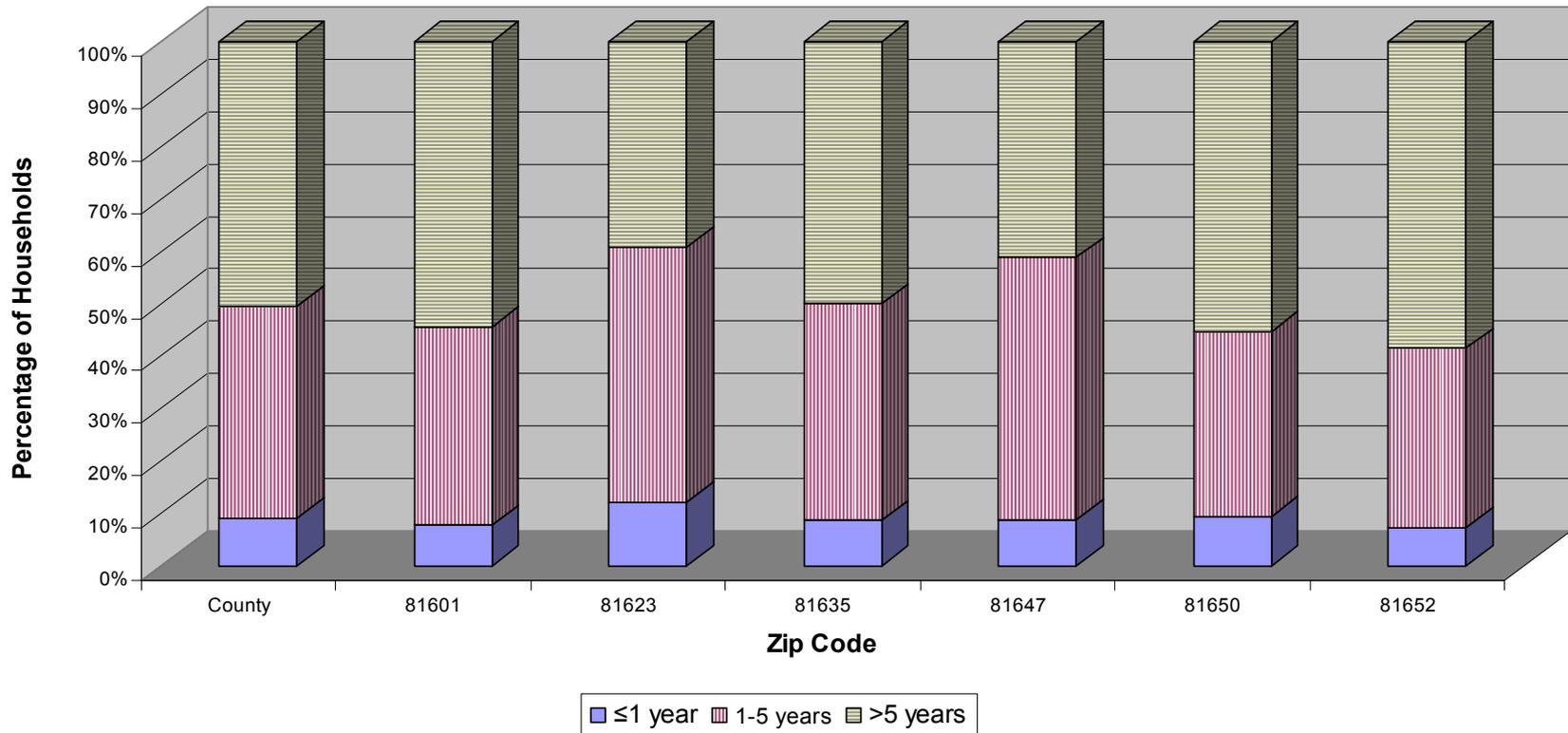
# Household Survey Demographic Data

## Length of Residence in Garfield County



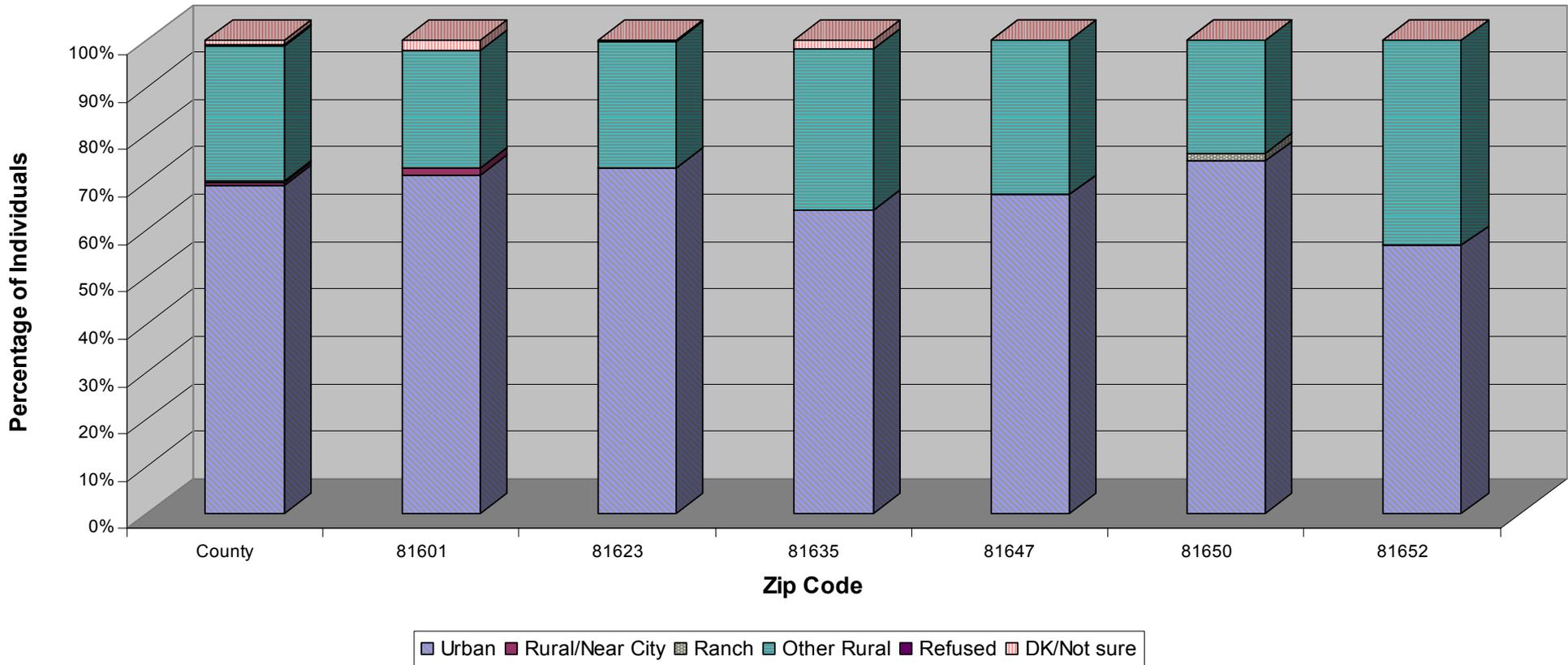
# Household Survey Demographic Data

## Length of Time in Current Residence



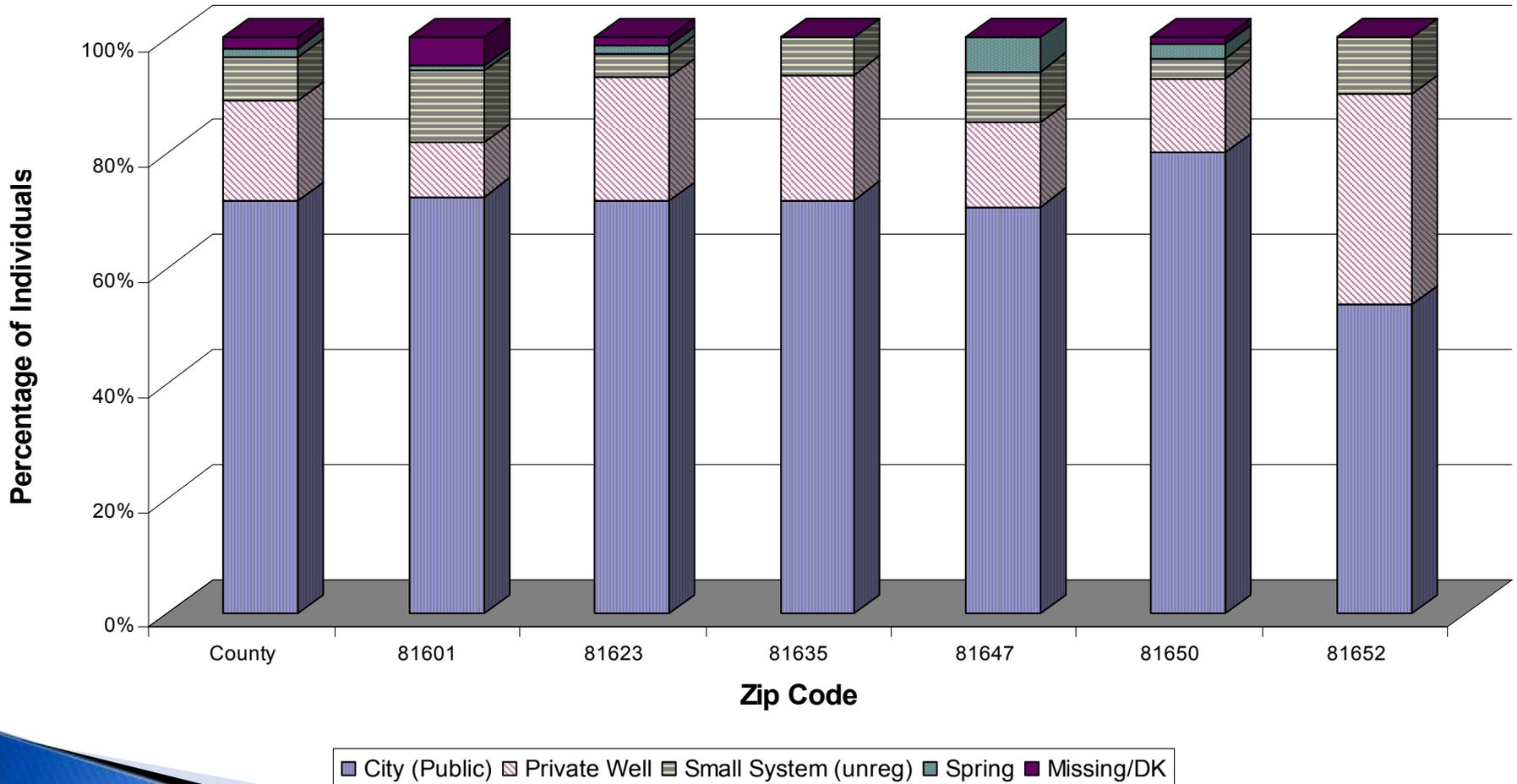
# Household Survey Demographic Data

## Location of Residence in Garfield County



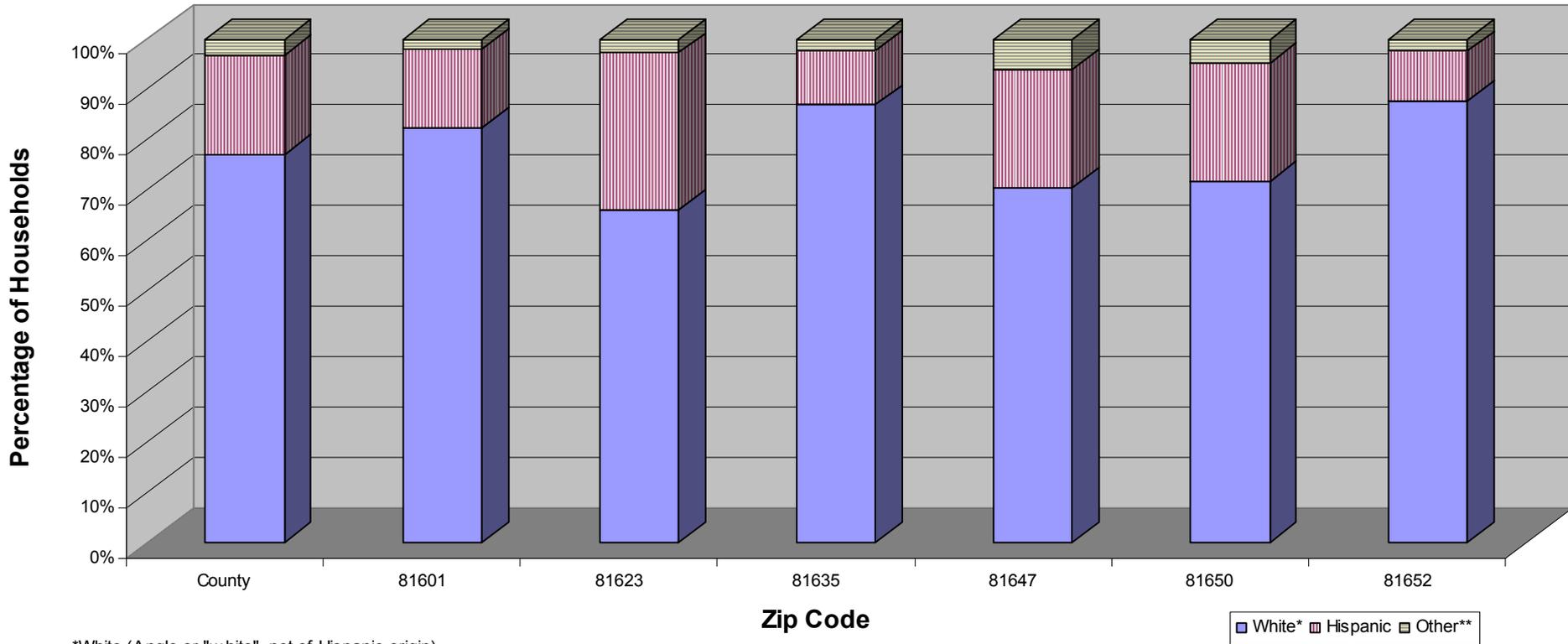
# Home Environment

## Main Source of Home Water Supply



# Household Survey Demographic Data

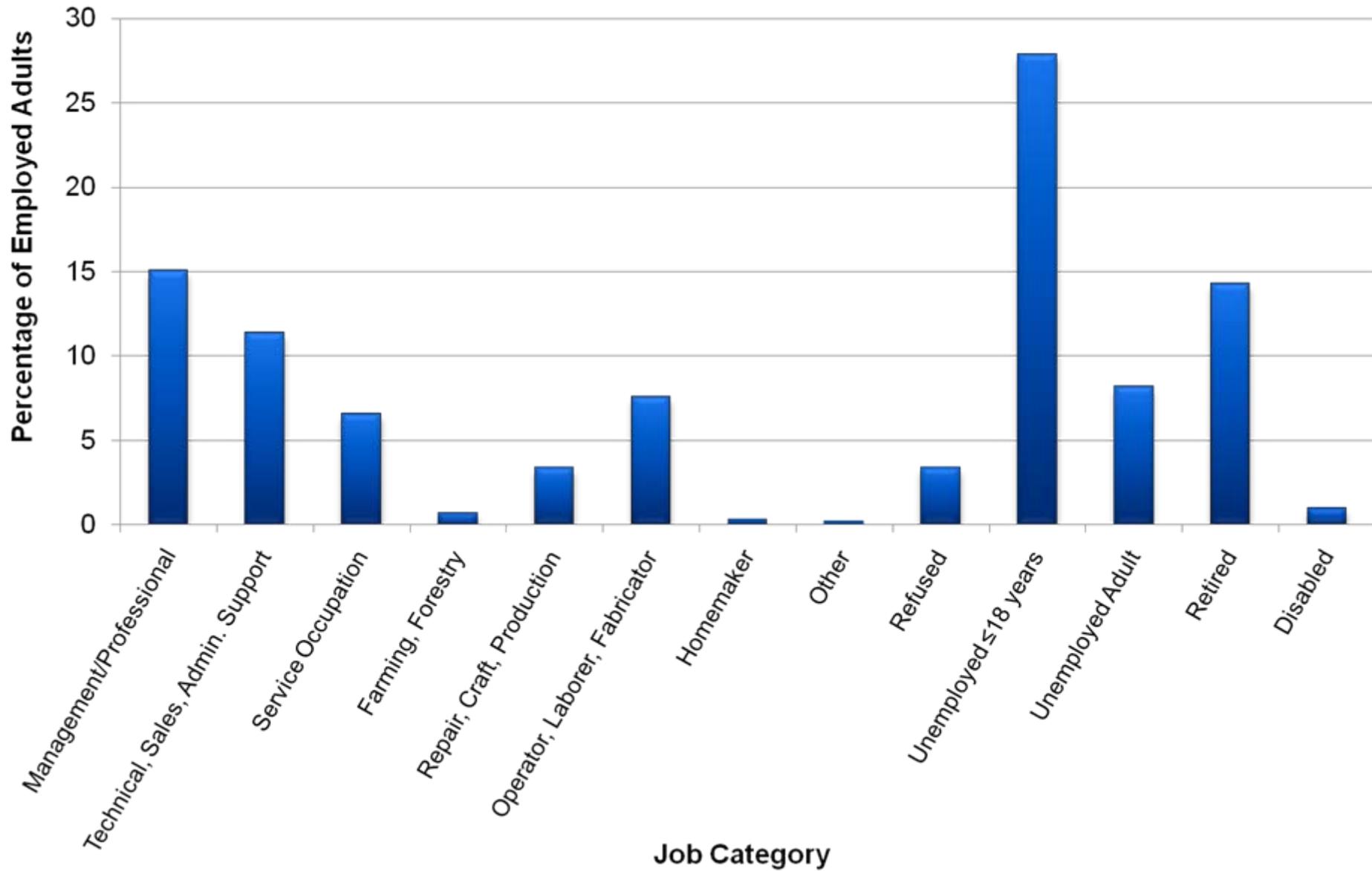
## Household Ethnicity



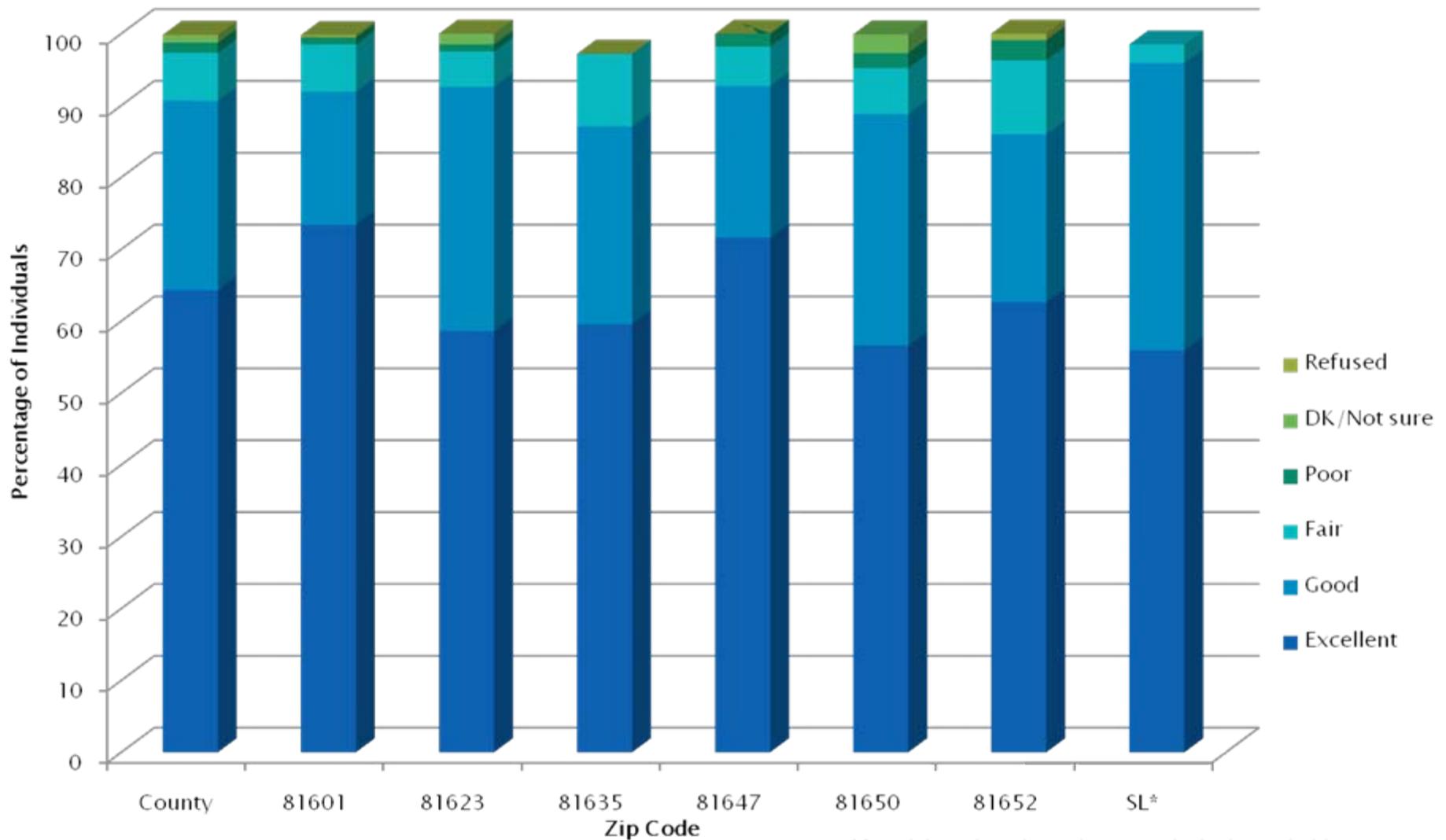
\*White (Anglo or "white", not of Hispanic origin)

\*\* Other includes Asian, African-American, Native American, or "other"

## Current Occupation - Job Title

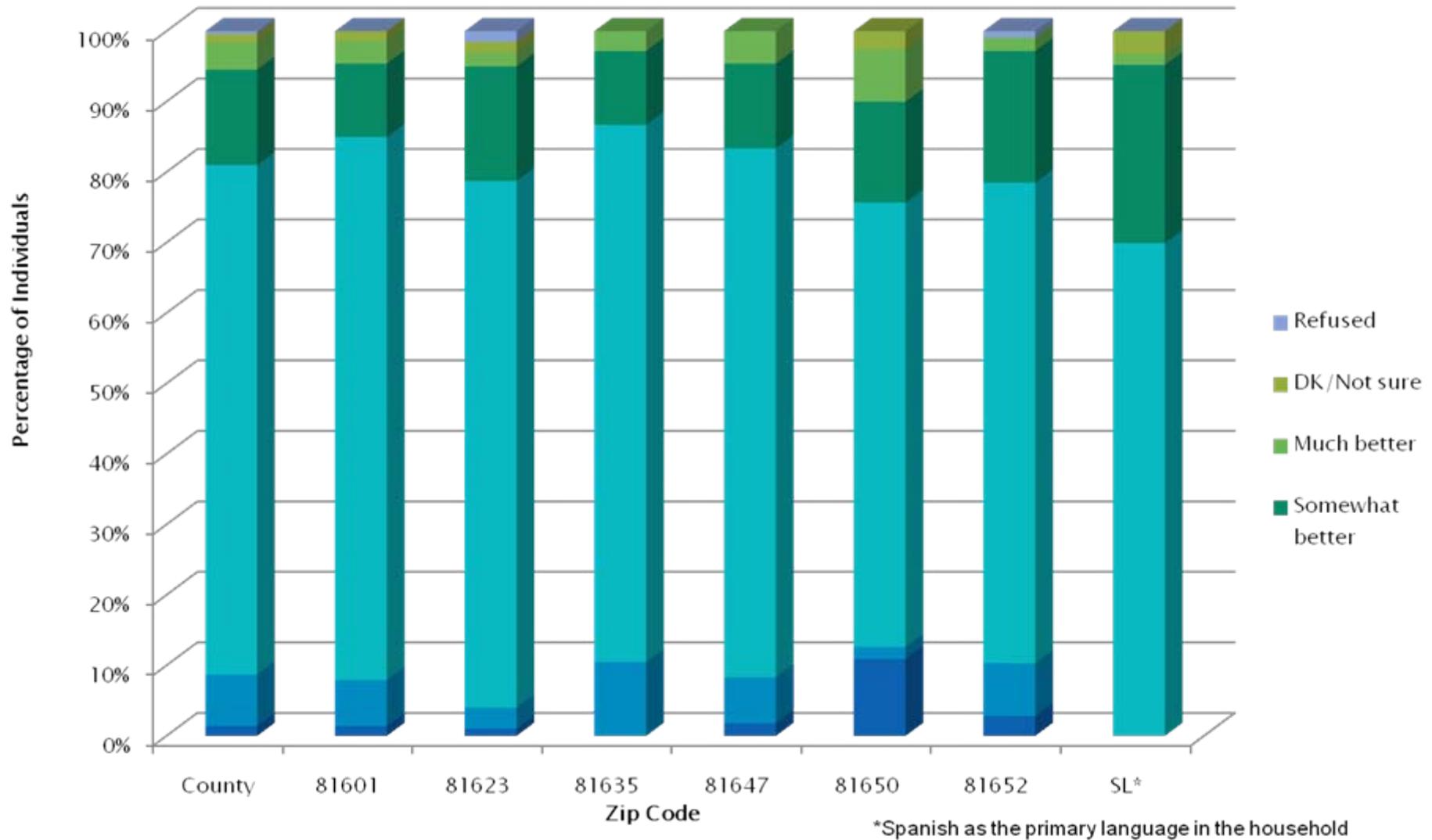


# Current Health

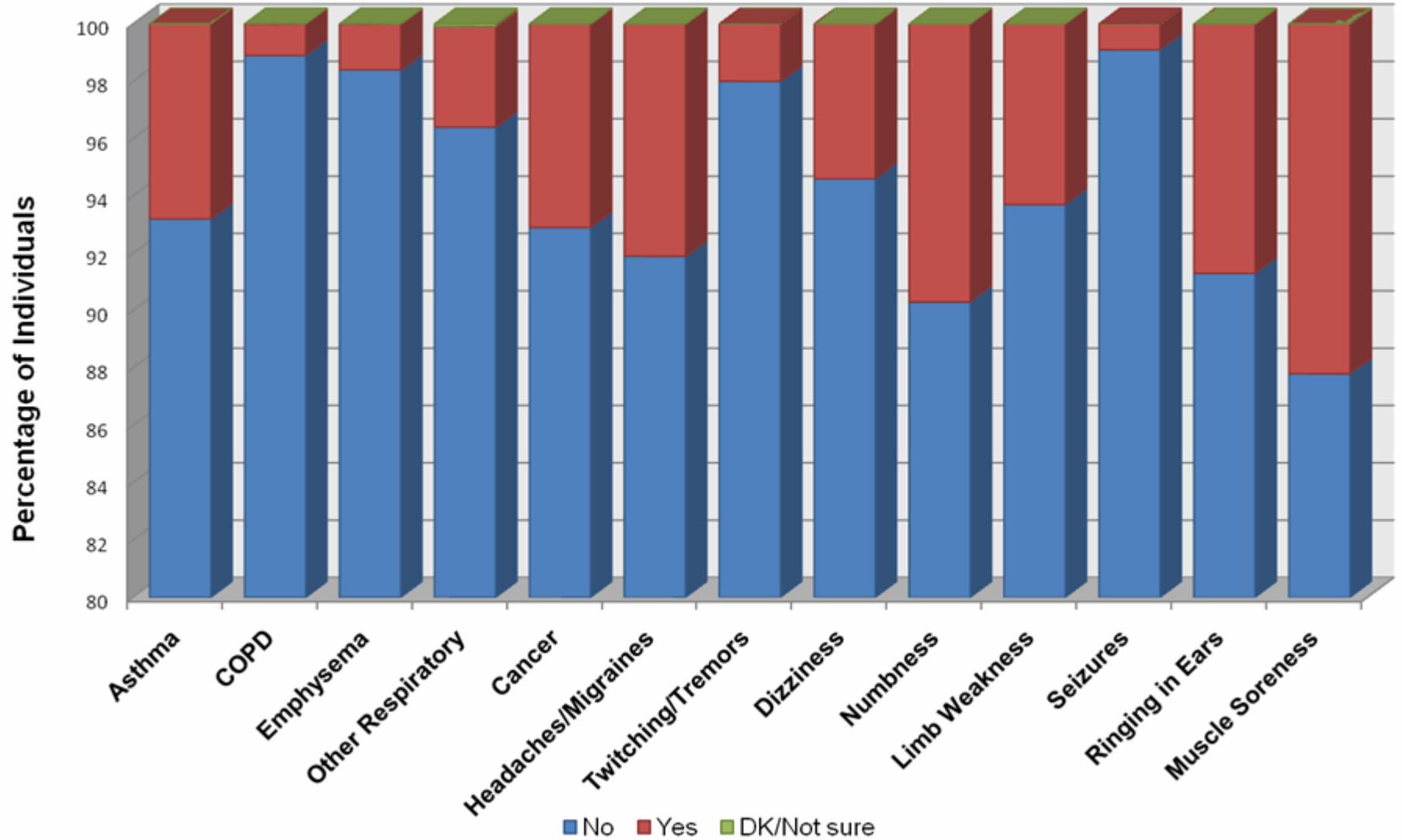


\*Spanish as the primary language in the household

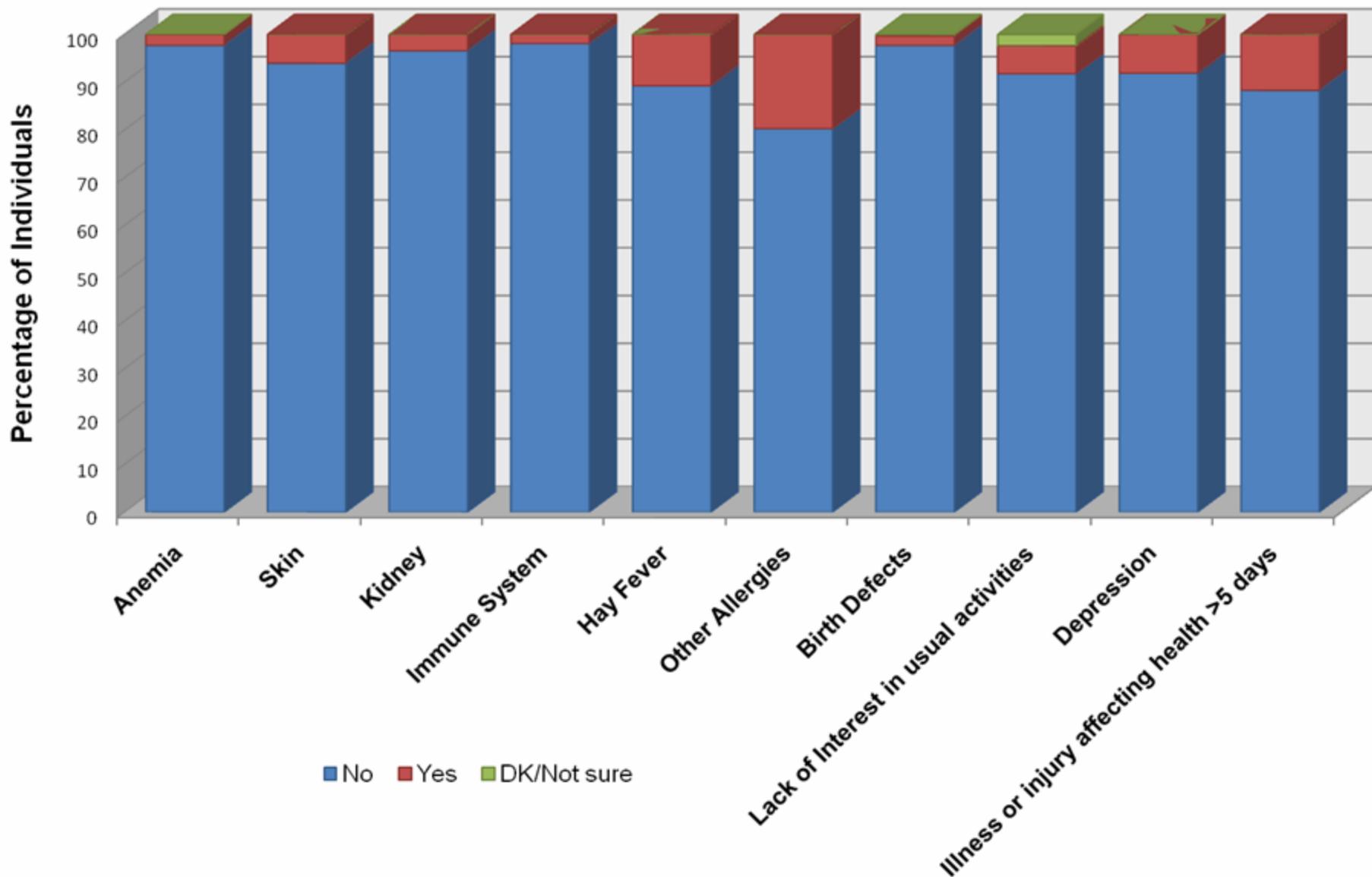
# Health One Year Ago



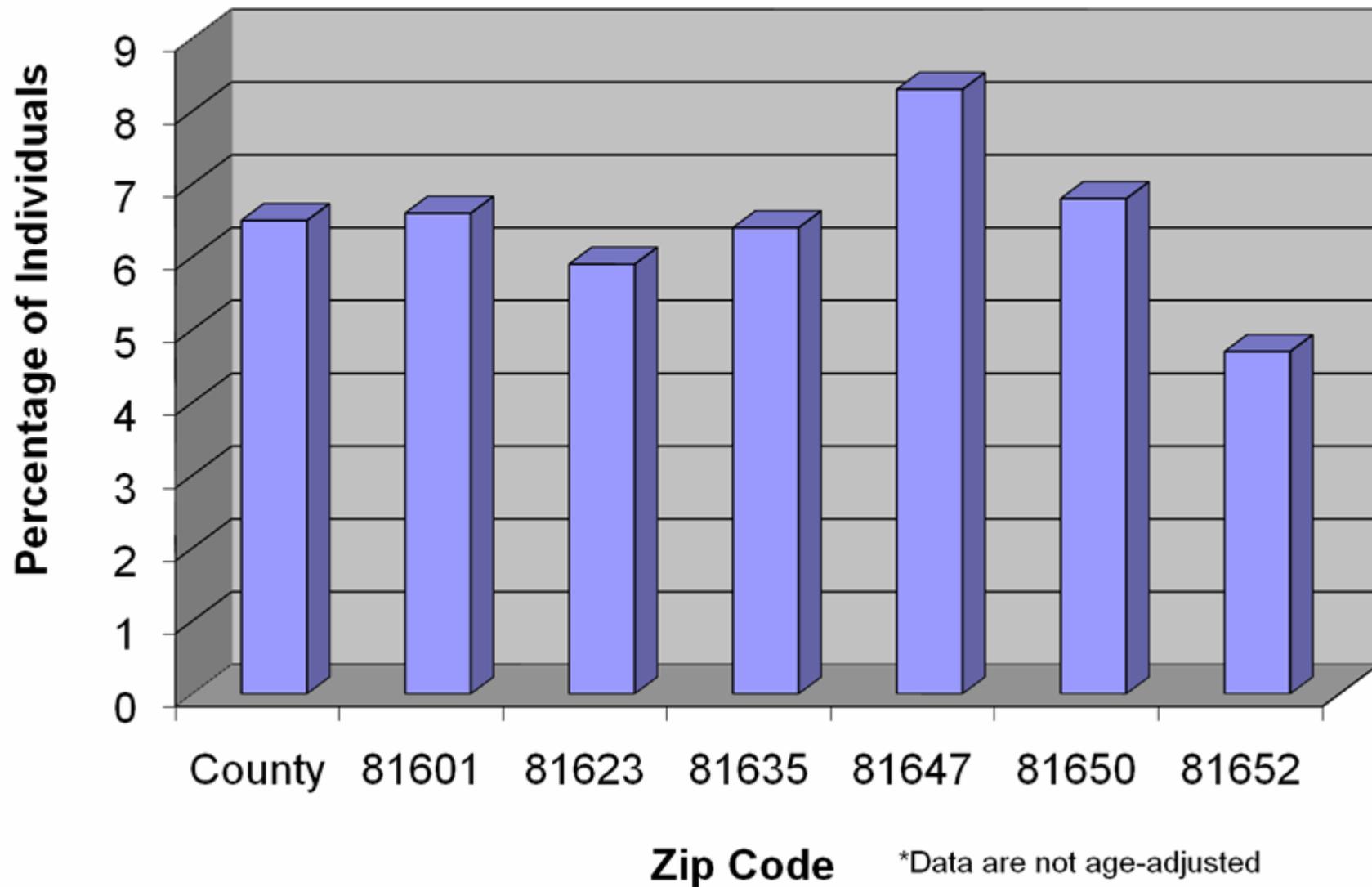
# Percentage of Individuals Reporting Selected Diseases and Symptoms County Overall



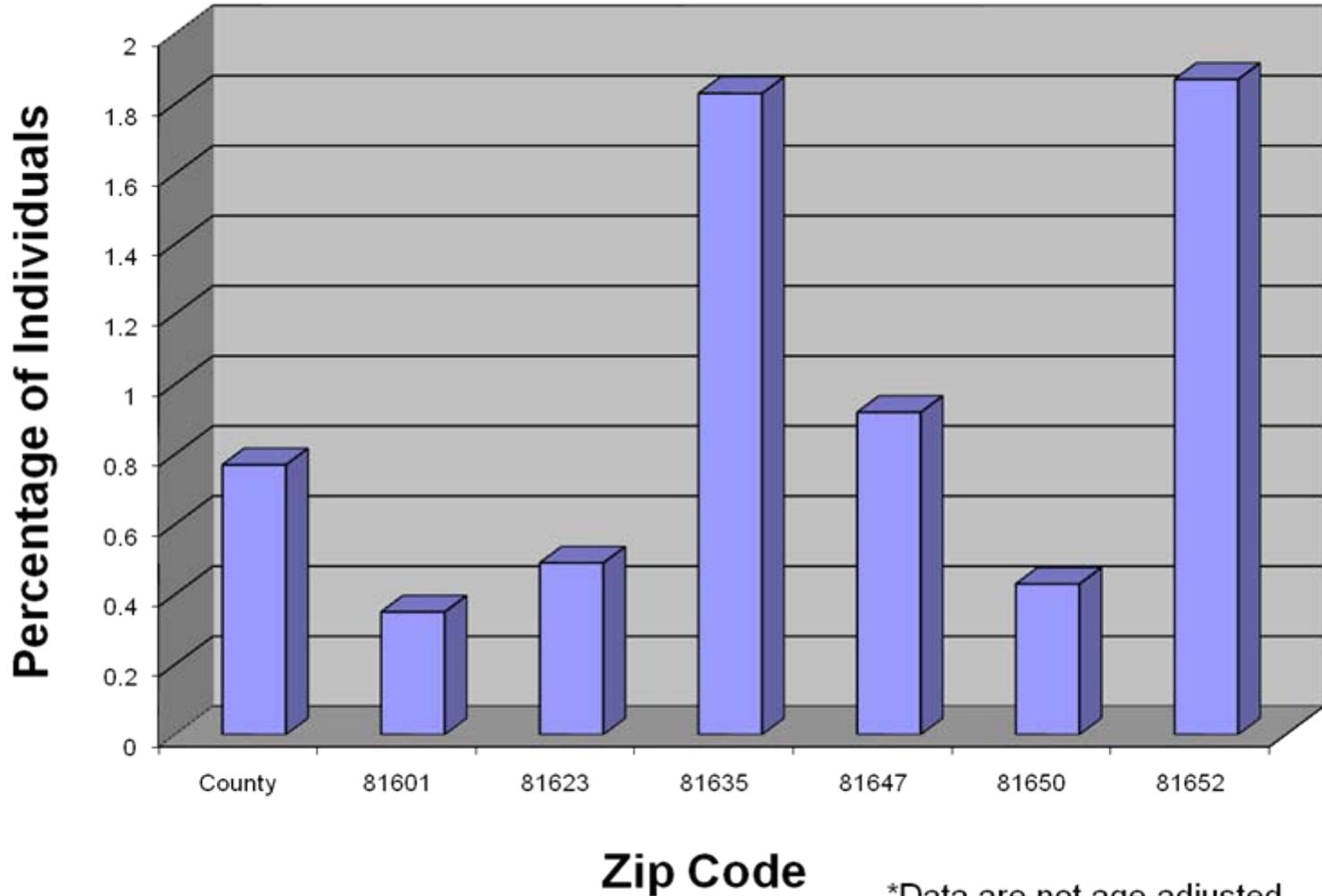
# Percentage of Individuals Reporting Selected Diseases and Symptoms County Overall



# Percentage of Household Members with Asthma\*

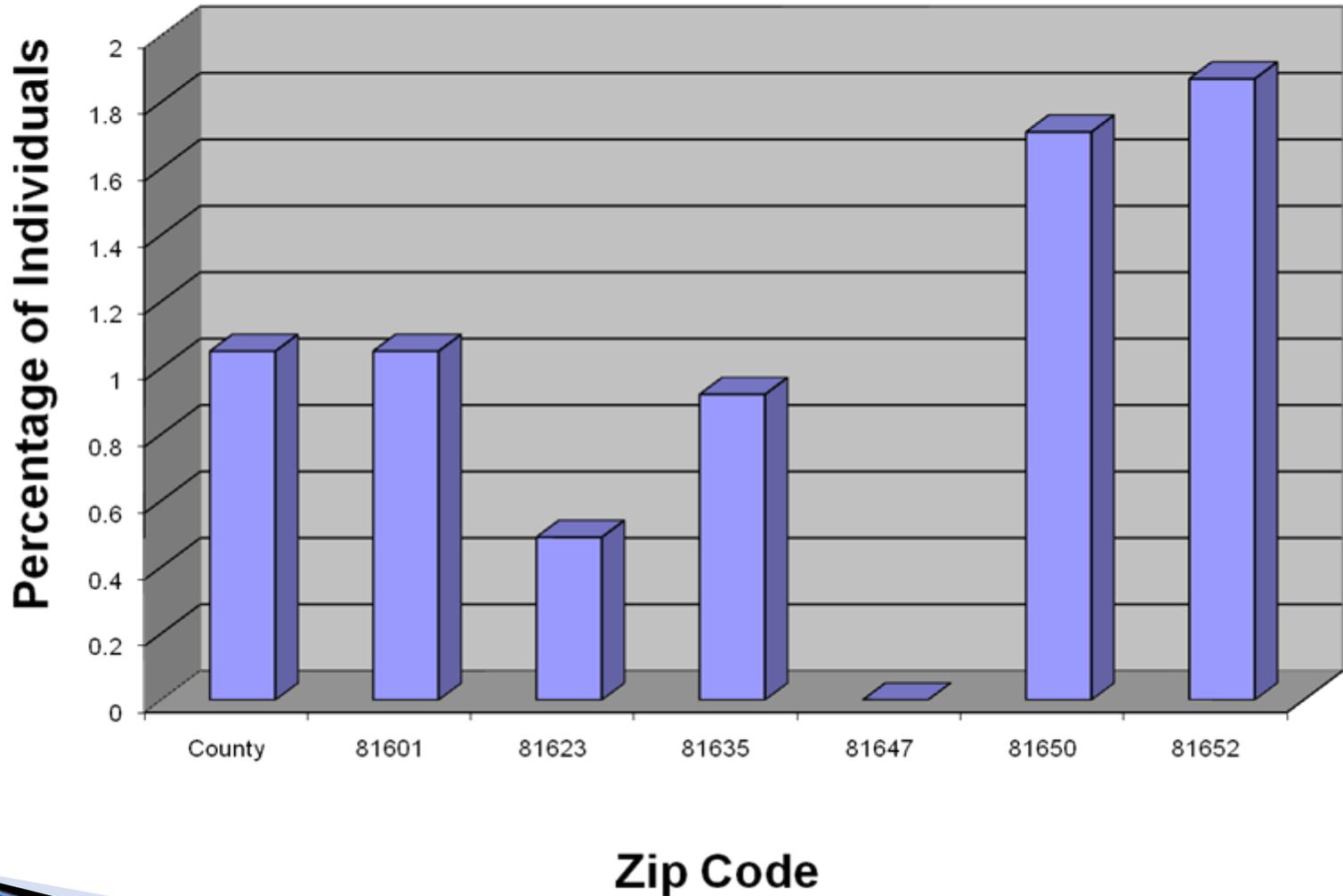


# Percentage of Household Members with COPD\*



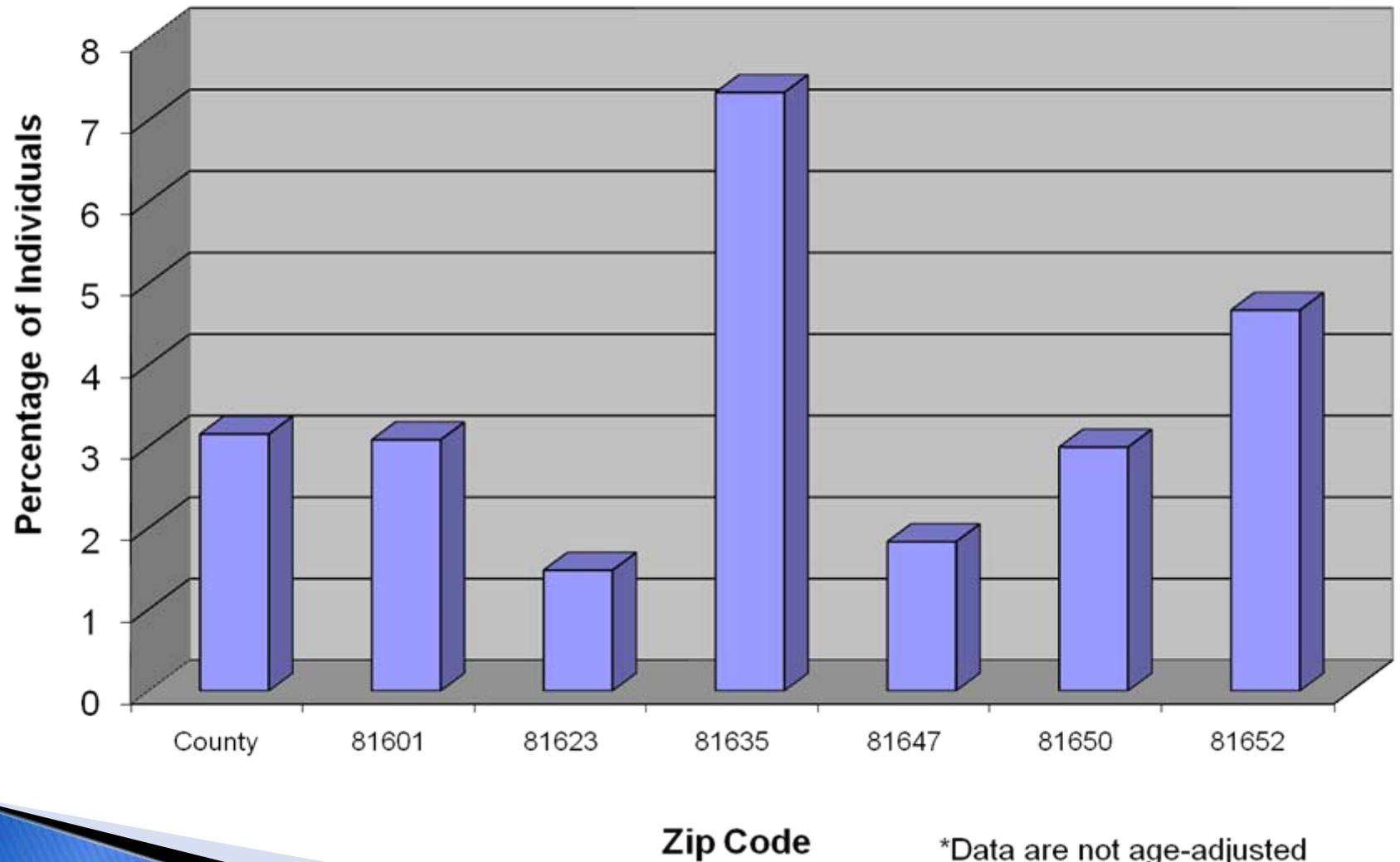
\*Data are not age-adjusted

# Percentage of Household Members with Emphysema\*

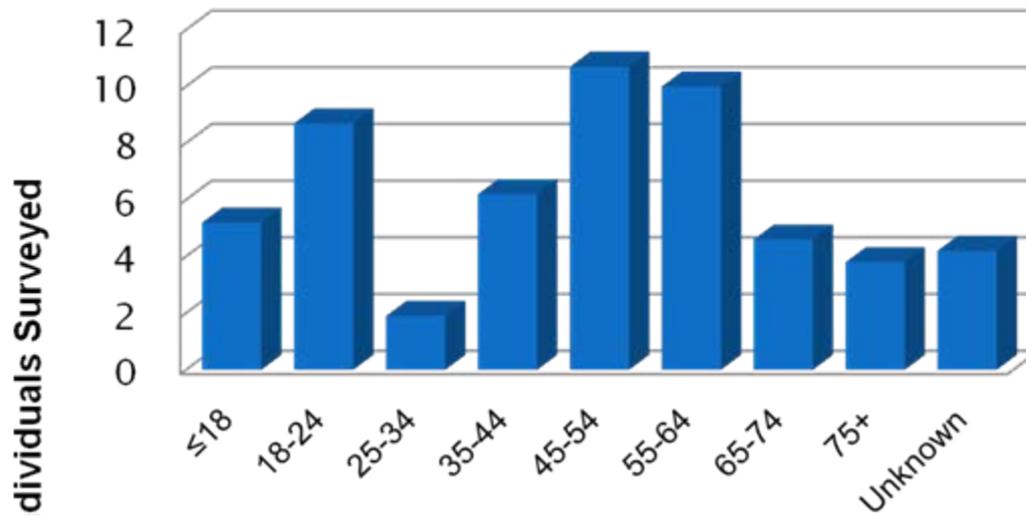


\*Data are not age-adjusted

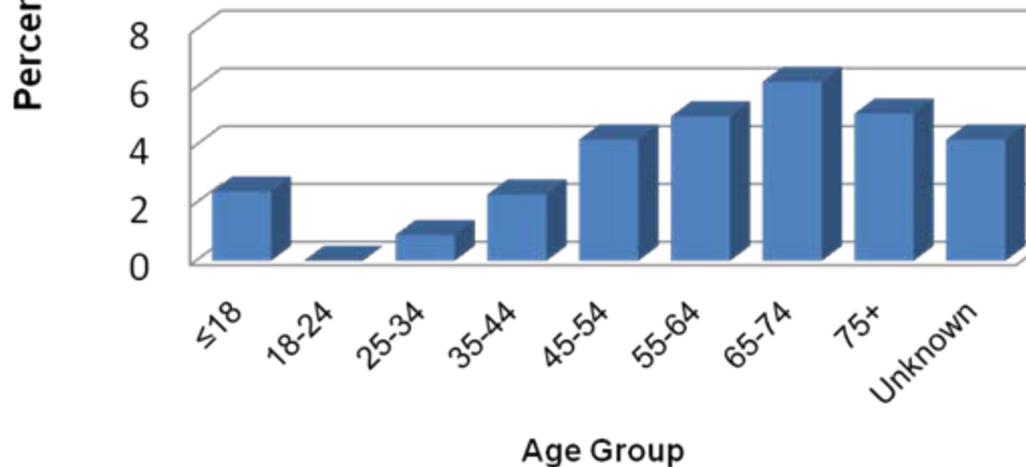
## Percentage of Household Members with Other Lung Problems\*



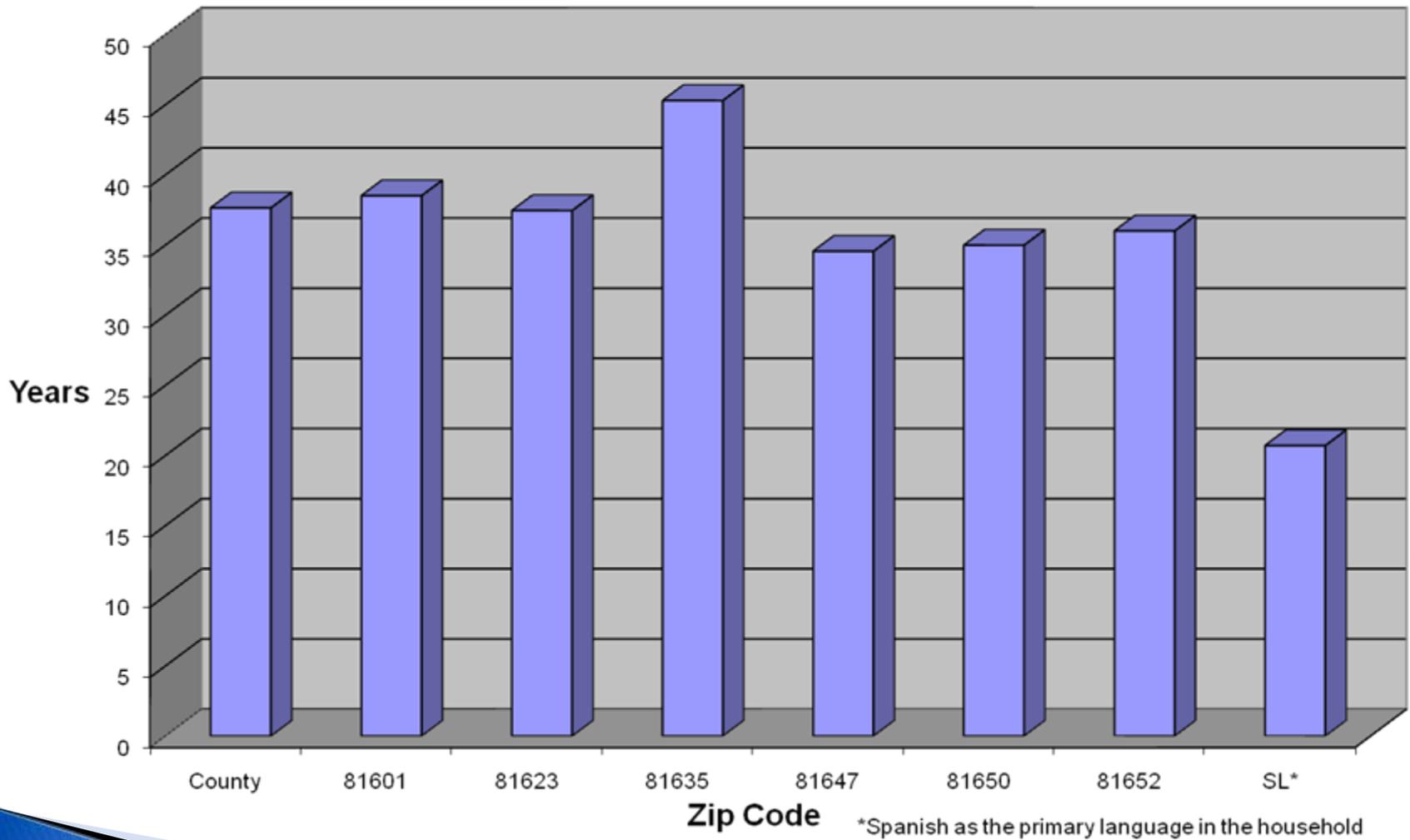
**Percentage of Individuals in each Age Group With Asthma**



**Percentage of Individuals in each Age Group with Other Respiratory Conditions**

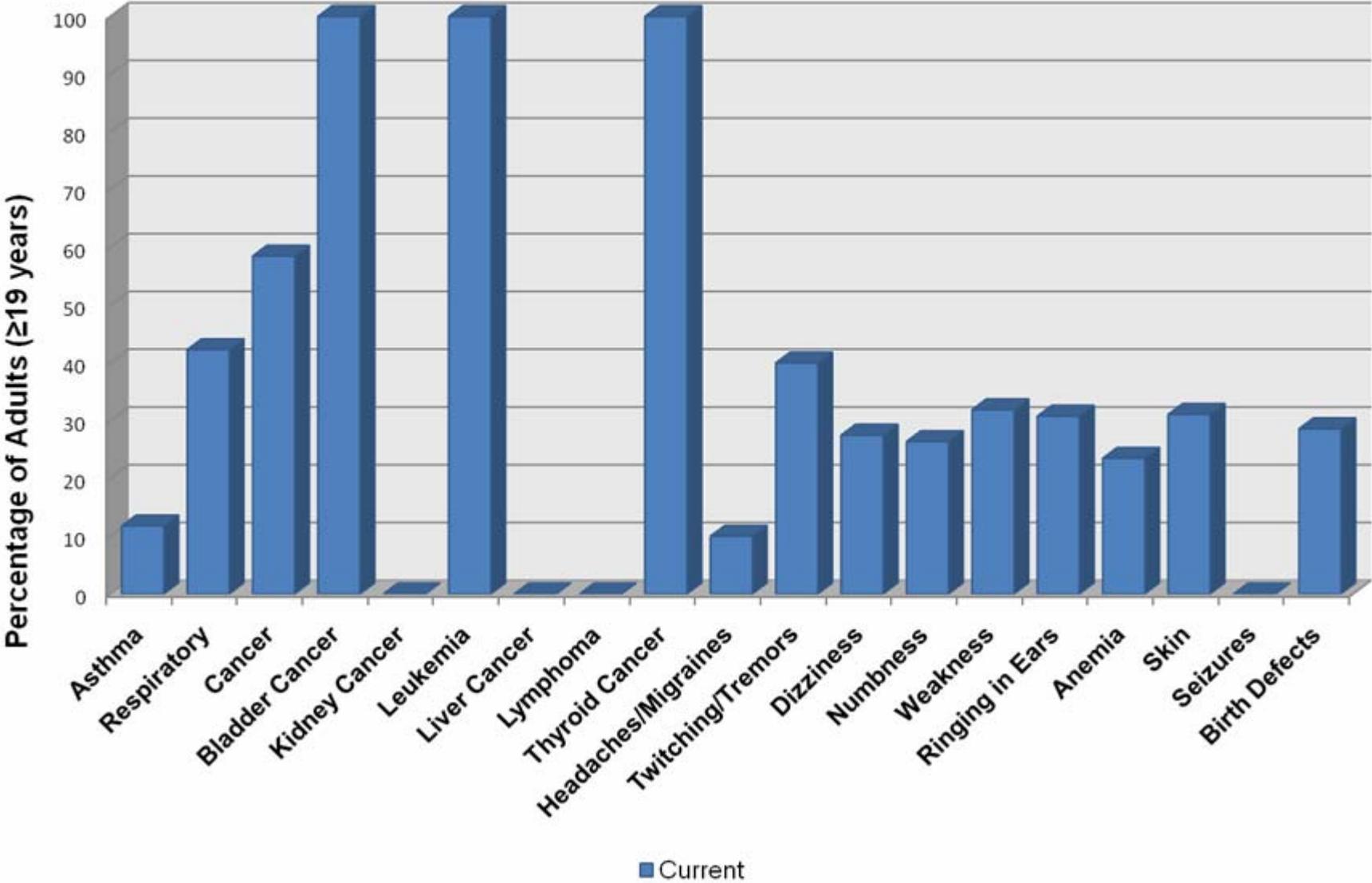


# Mean Age of Household Residents

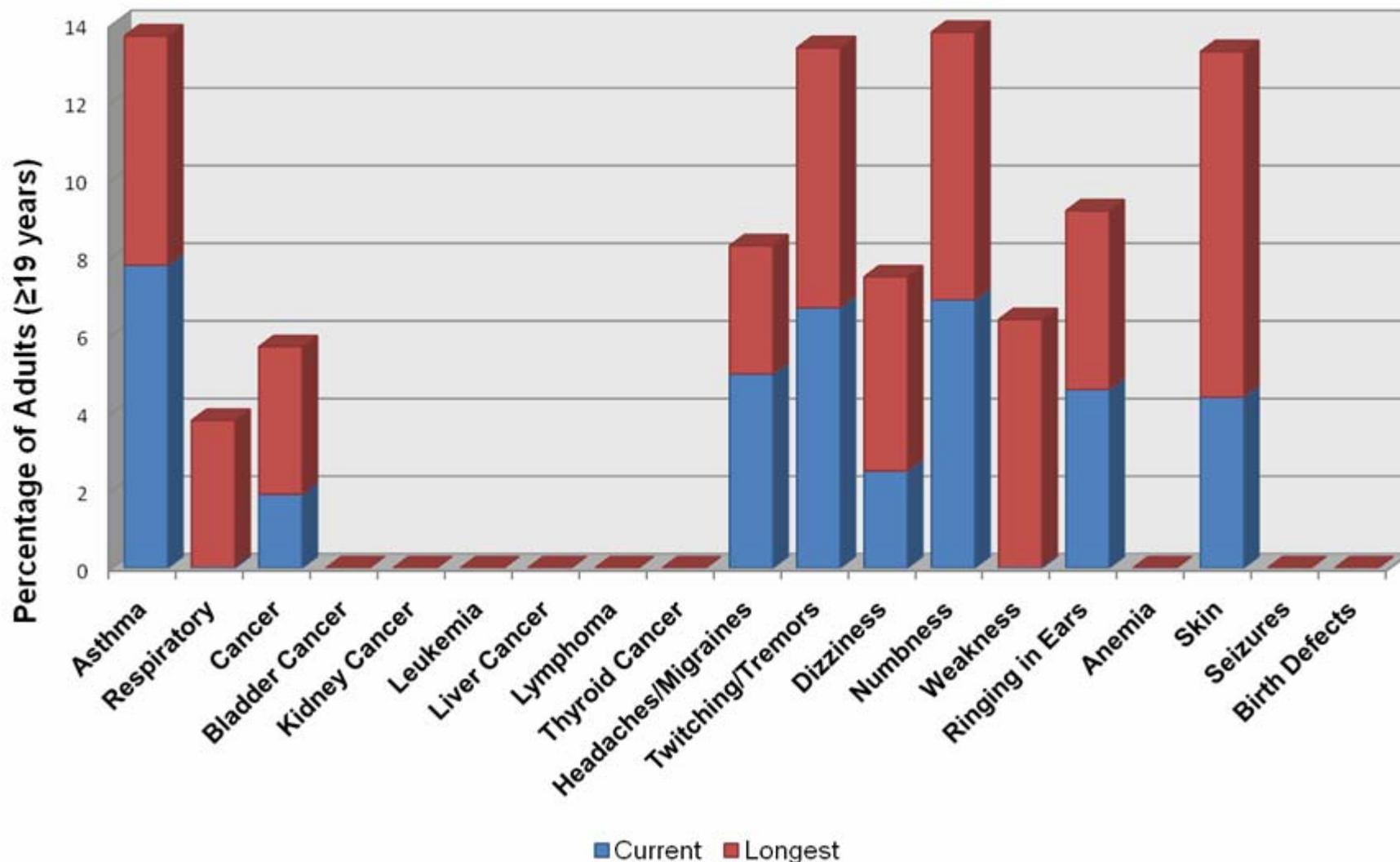


\*Spanish as the primary language in the household

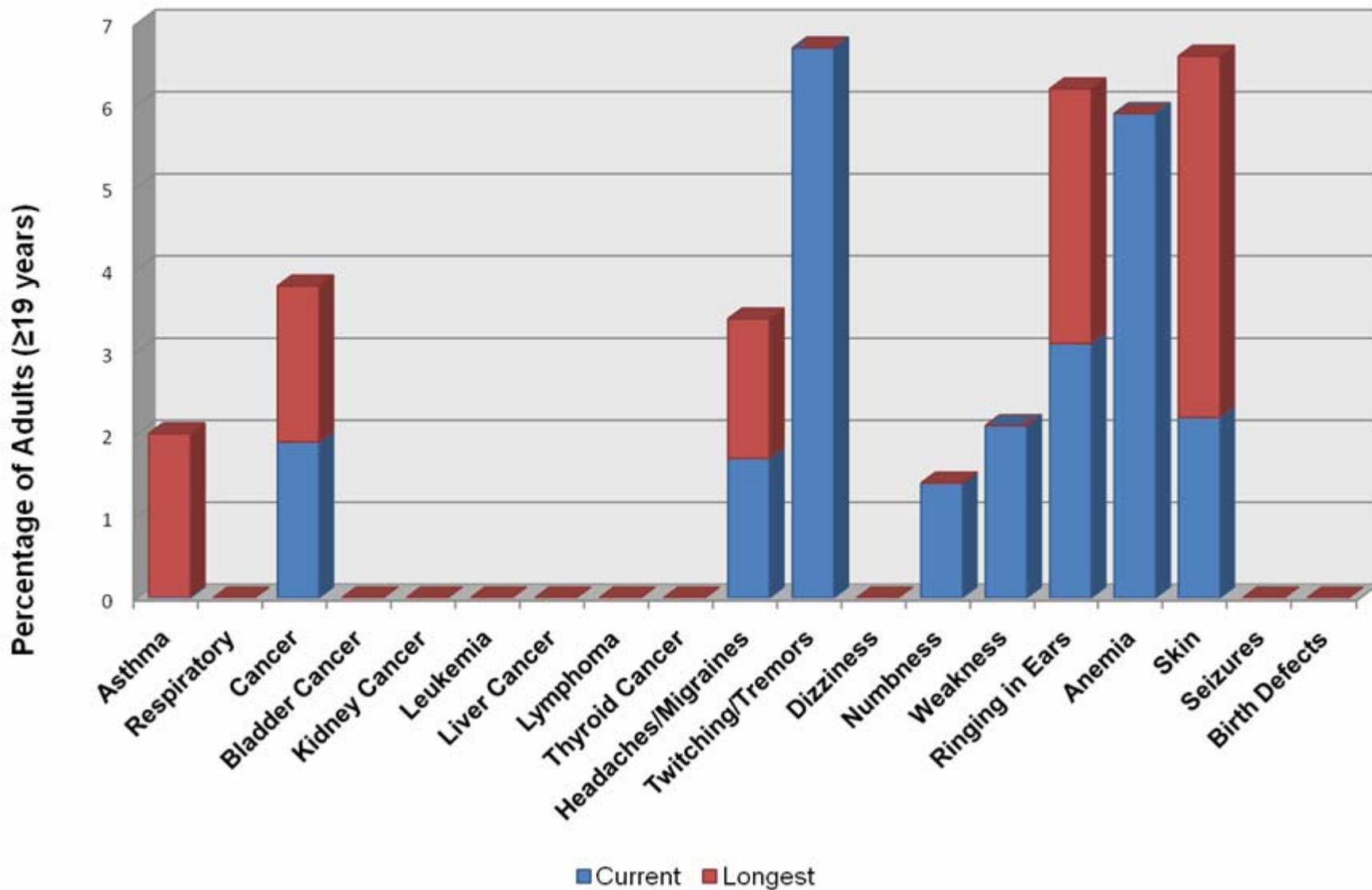
# Percentage of Retired Adults Reporting Selected Diseases and Symptoms



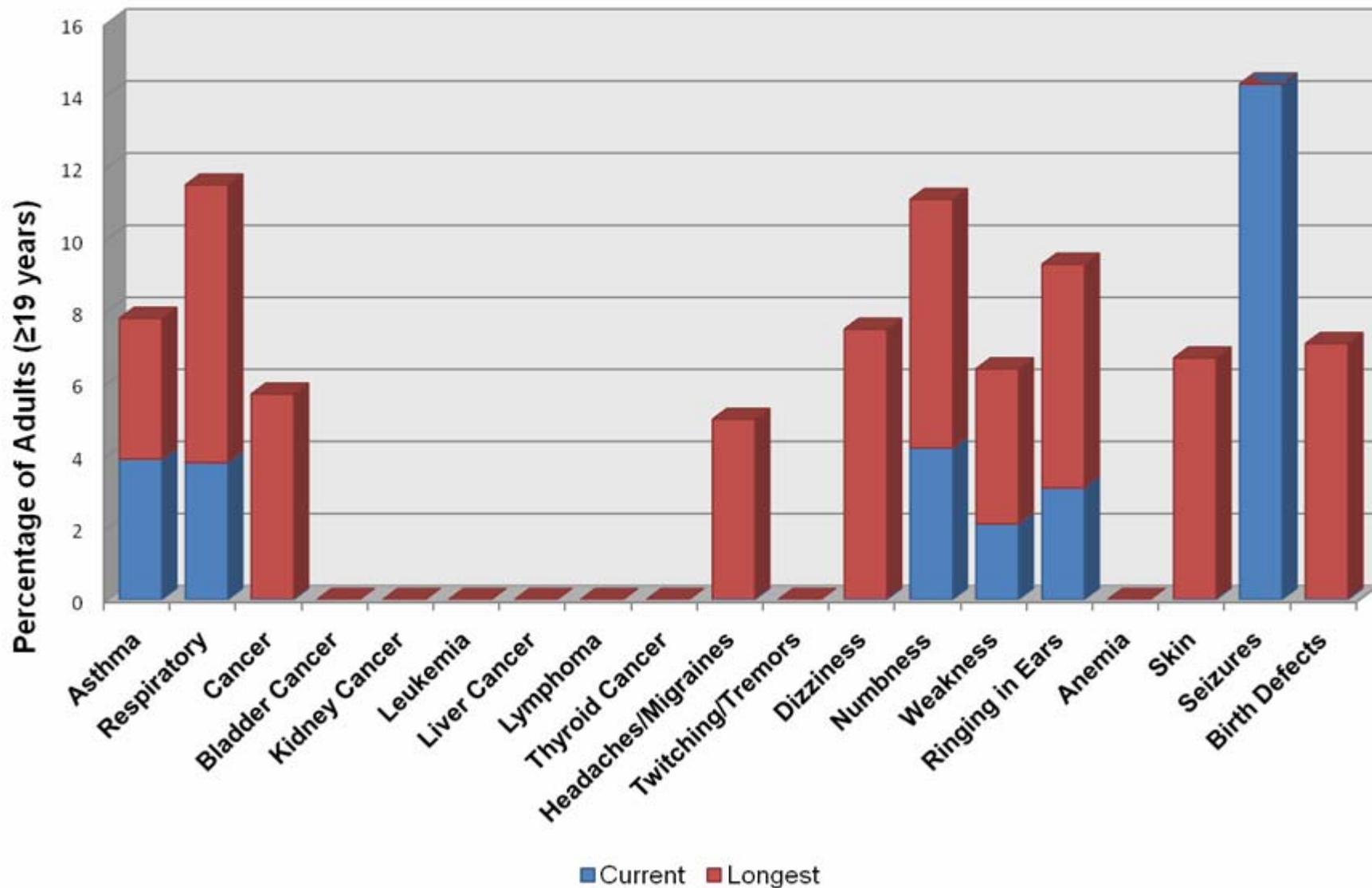
## Percentage of Adults Employed in the Transportation, Communications, or Public Utilities Industries Reporting Selected Diseases and Symptoms



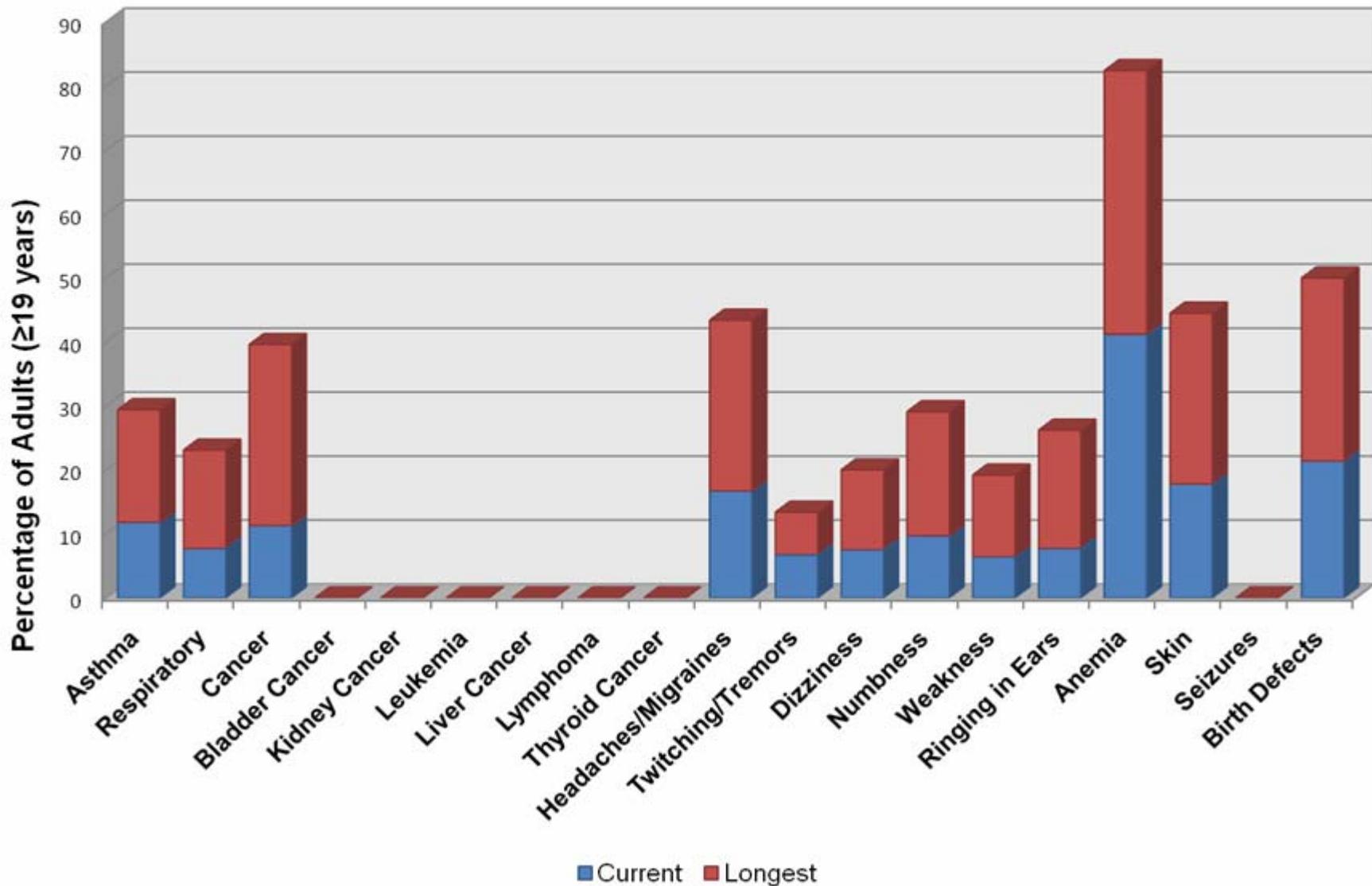
## Percentage of Individuals Employed in the Mining Industry Reporting Selected Diseases and Symptoms



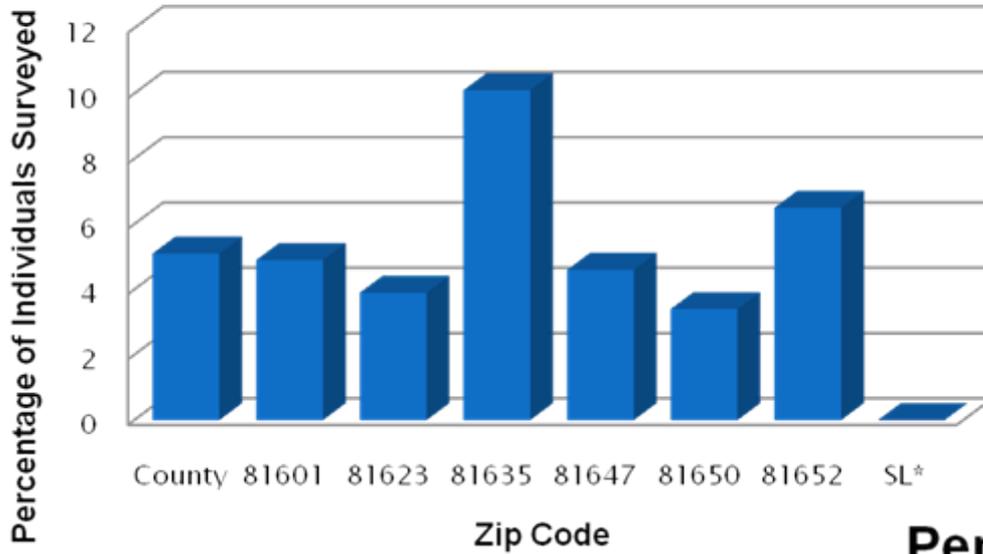
## Percentage of Adults Employed in the Retail Trade Industry Reporting Selected Diseases and Symptoms



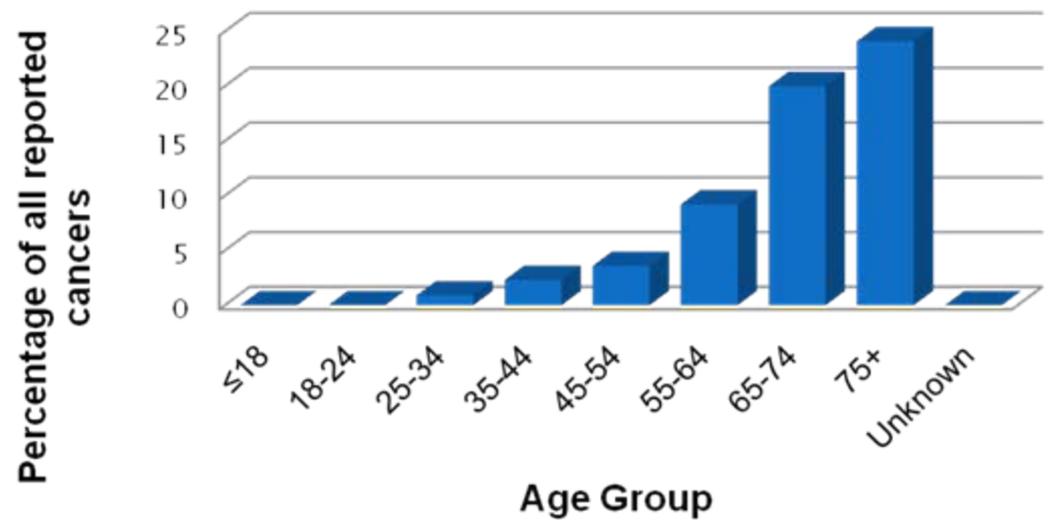
## Percentage of Adults Employed in the Professional and Related Services Industries Reporting Selected Diseases and Symptoms



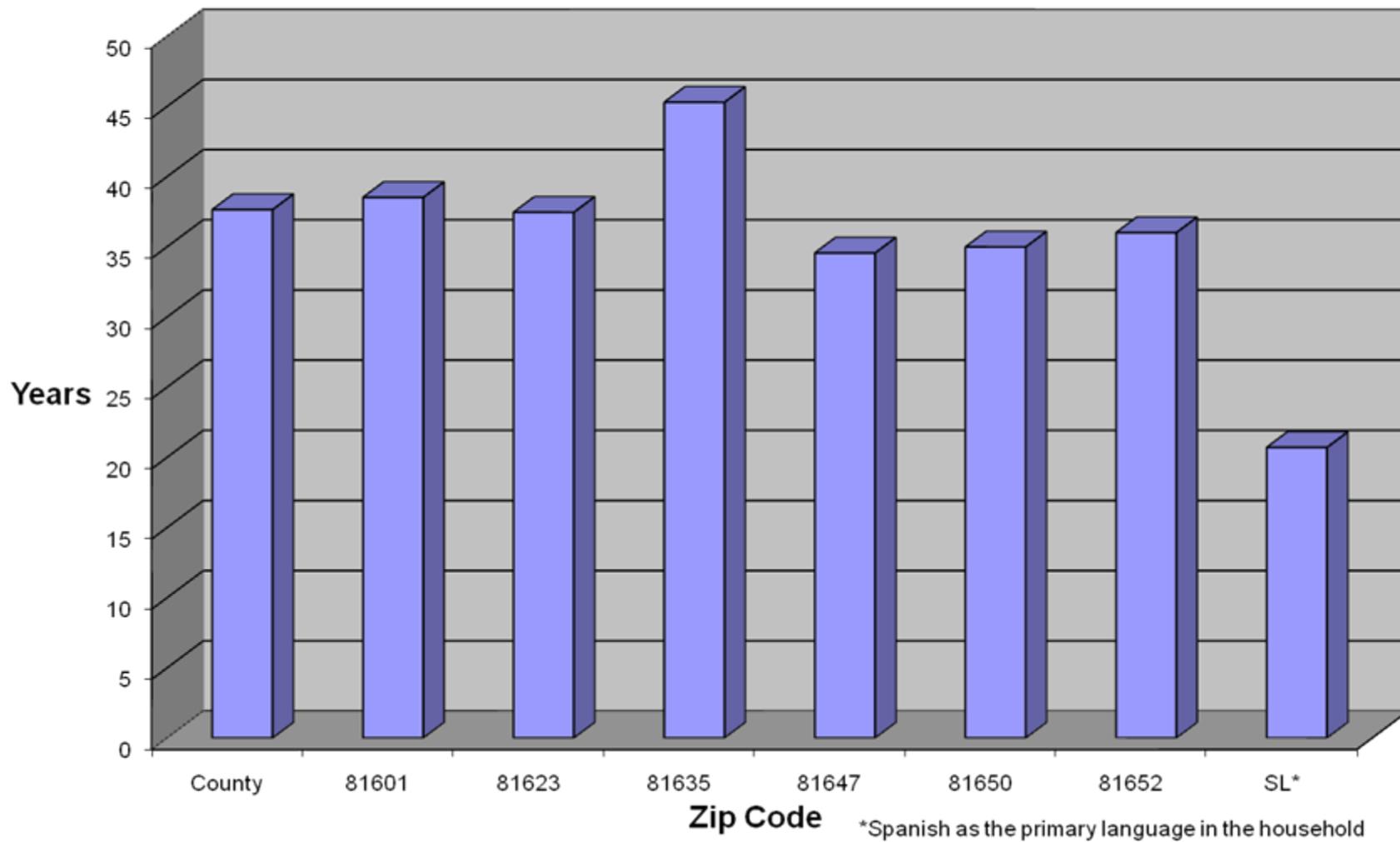
## Percentage of Individuals Reporting Cancer by Zip Code



## Percentage of Reported Cancers by Age

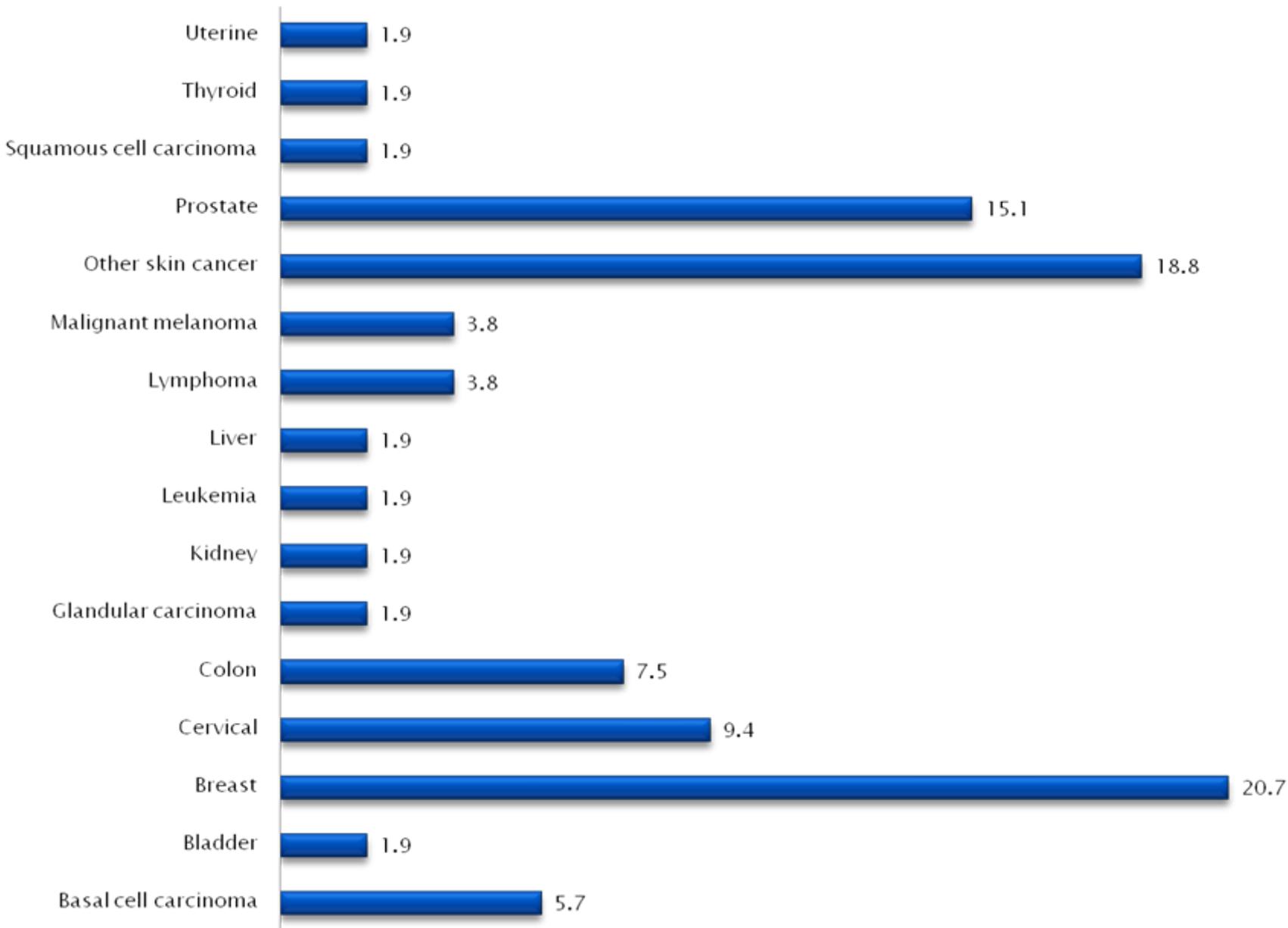


# Mean Age of Household Residents



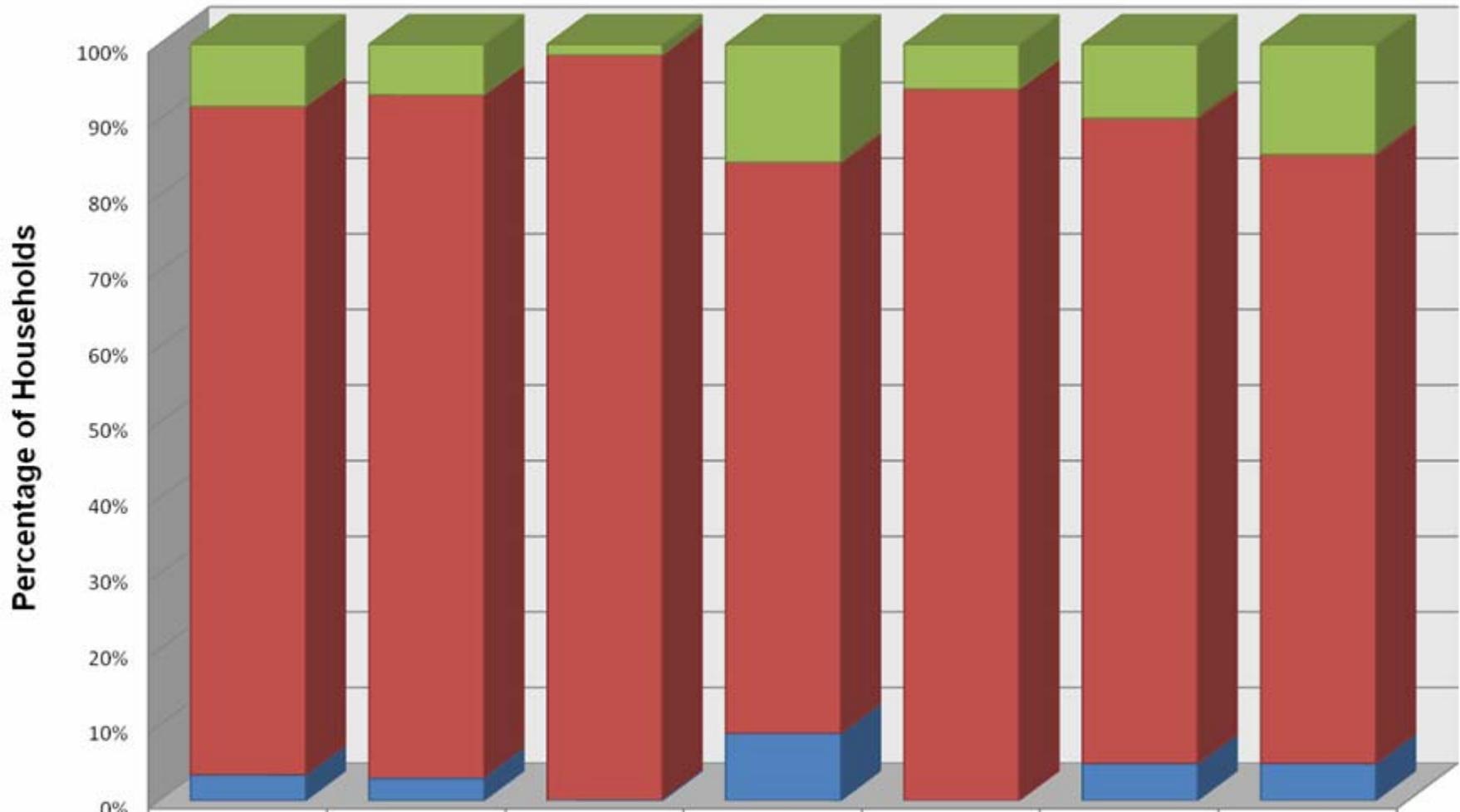
\*Spanish as the primary language in the household

# Reported Cancer Types



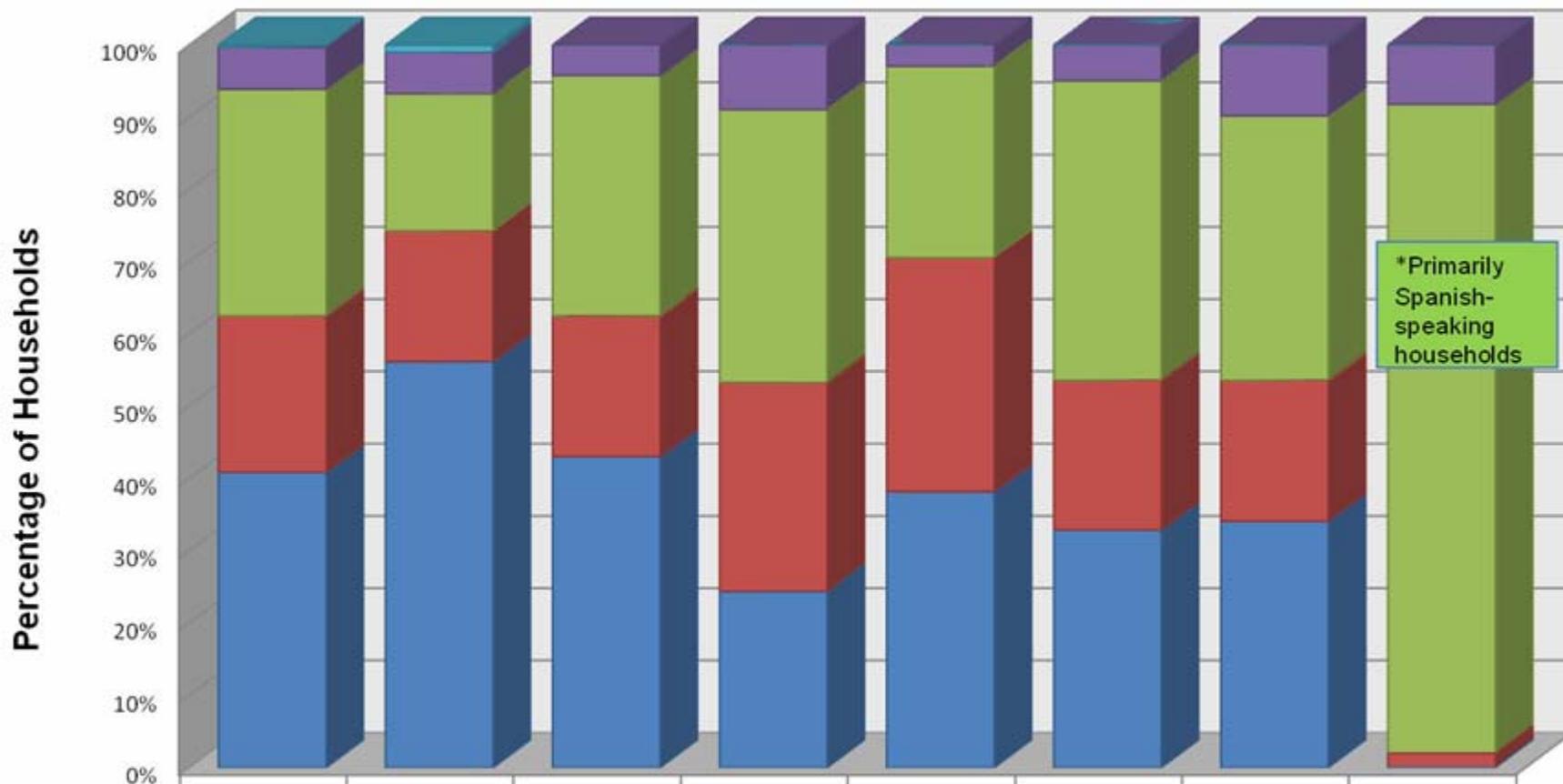
Percentage of all reported cancers

## Percentage of Households Concerned that Health Problems May Be Related to Chemicals In or Near the Home



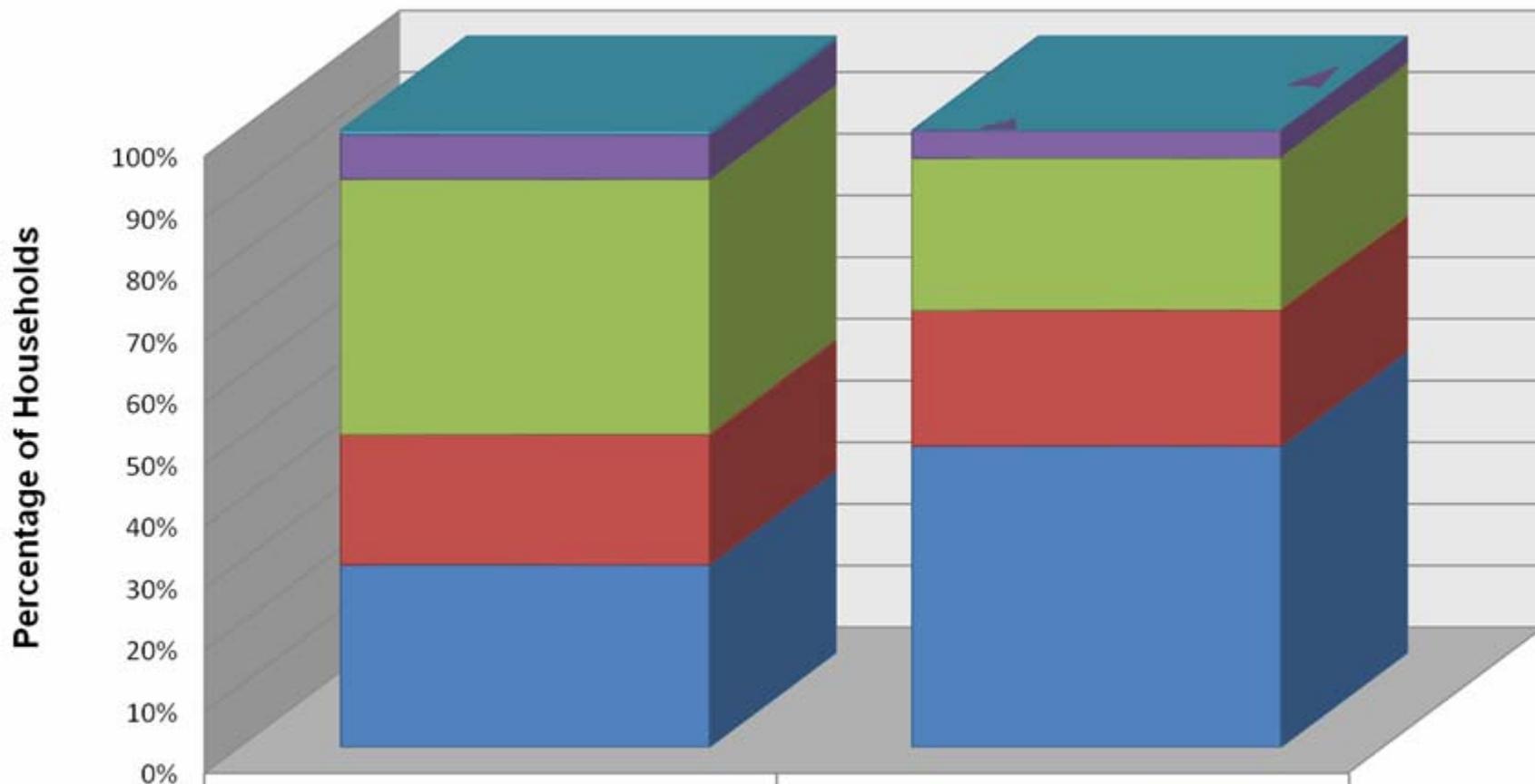
	County	81601	81623	81635	81647	81650	81652
DK/Not sure	8.2	6.7	1.4	15.6	5.9	9.8	14.6
No	88.4	90.5	98.6	75.6	94.1	85.4	80.5
Yes	3.4	2.9	0	8.9	0	4.9	4.9

## Percentage of Households Concerned that Health Problems May Be Related to Environmental or Chemical Hazards in Their Neighborhoods



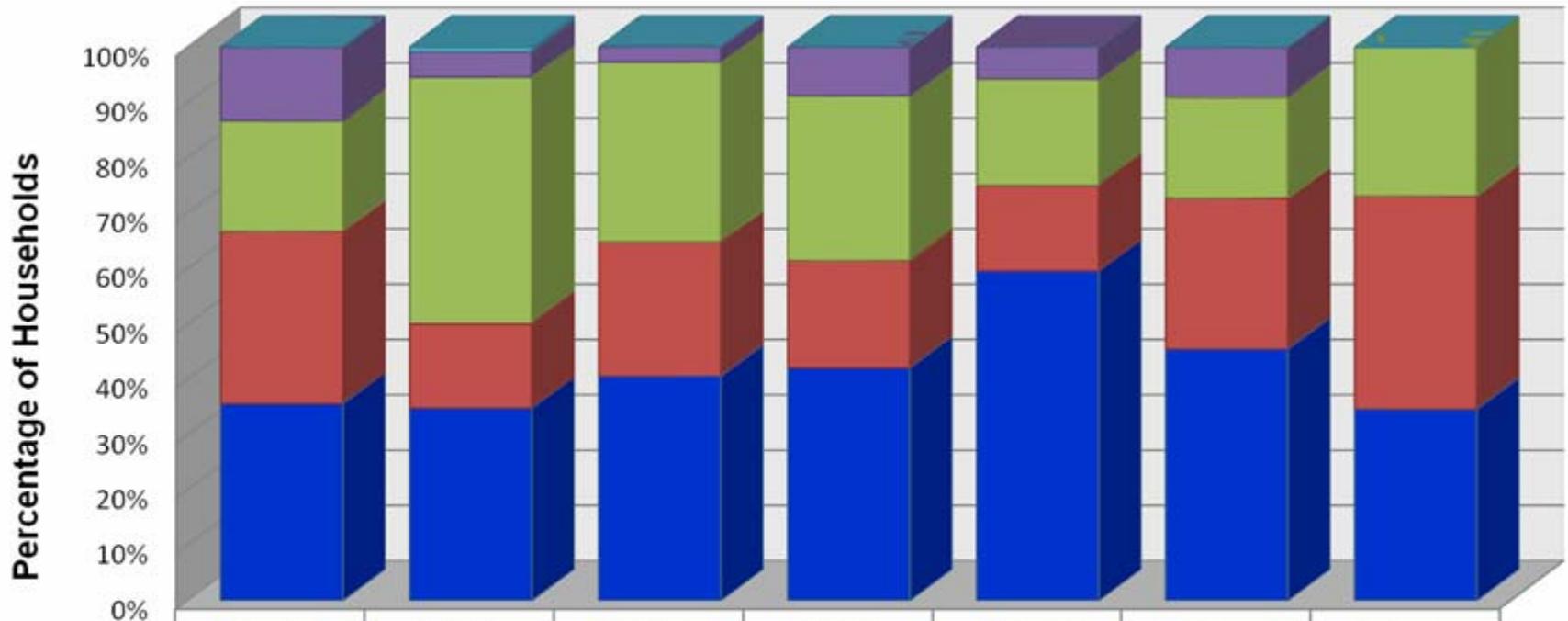
	County	81601	81623	81635	81647	81650	81652	SL*
Refused	0.3	1	0	0	0	0	0	0
DK/Not sure	5.8	5.7	4.2	8.9	2.9	4.9	9.8	8.2
Very much	31.4	19	33.3	37.8	26.5	41.5	36.6	89.8
A little	21.6	18.1	19.4	28.9	32.4	20.7	19.5	2
Not at all	40.9	56.2	43.1	24.4	38.2	32.9	34.1	0

## Concern that Environmental or Chemical Hazards in the Neighborhood May Be Related to Health Problems: Correlation with Education



	≤High School	Some College and higher
Refused	0.7	0
DK/Not sure	7.2	4.5
Very much	41.4	24.7
A little	21.1	22
Not at all	29.6	48.9

## Concern that Environmental or/Chemical Hazards May Be Related to Health Problems: Correlation with Household Income



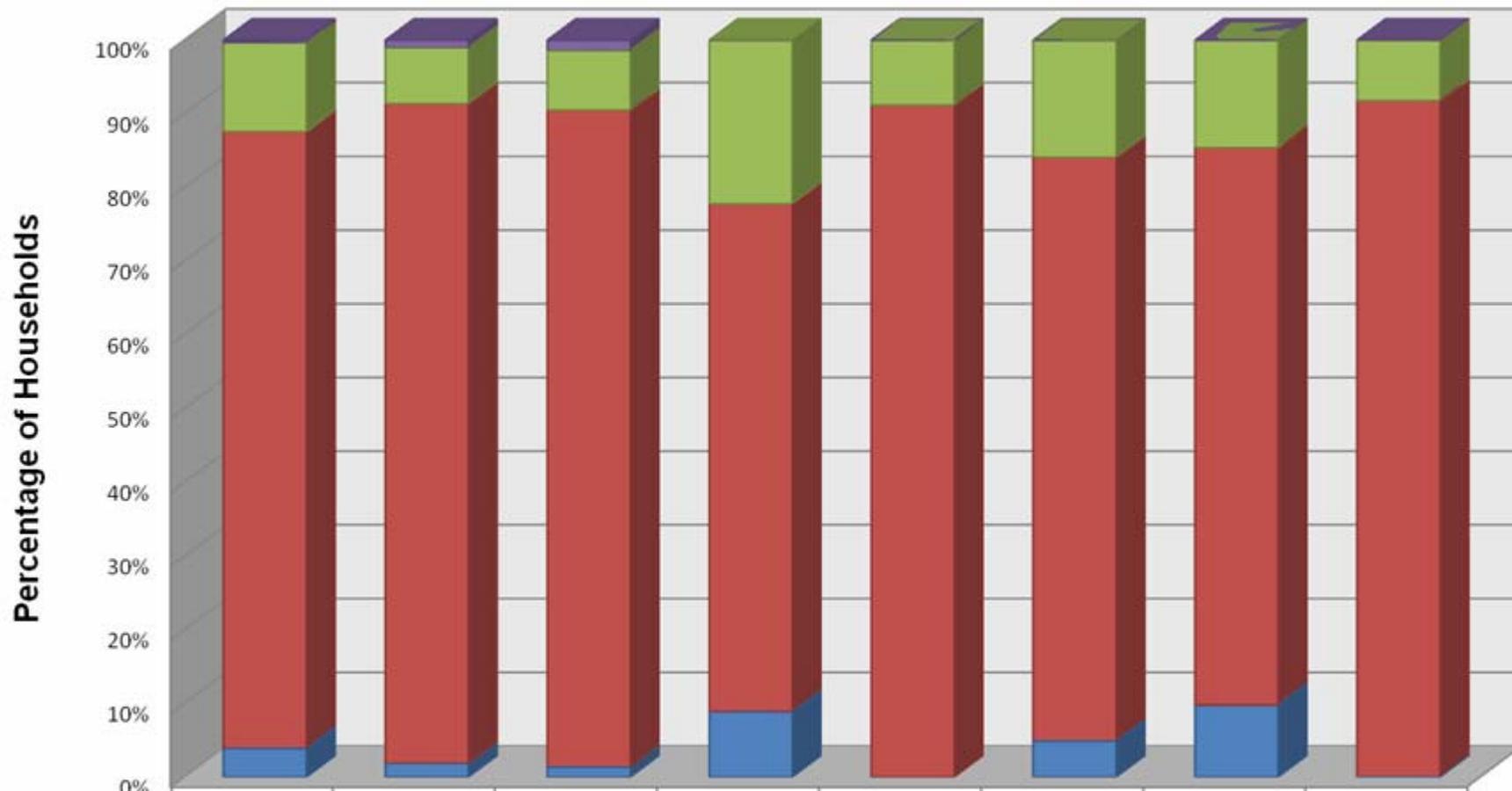
	<\$25,000	\$25,000-\$50,000	\$50,000-\$75,000	\$75,000-100,000	>\$100,000	DK/Not sure	Refused
Refused	0	0.9	0	0	0	0	0
DK/Not sure	13.3	4.5	2.7	8.8	5.8	9.1	0
Very much	20	44.6	32.4	29.8	19.2	18.2	26.9
A little	31.1	15.2	24.3	19.3	15.4	27.3	38.5
Not at all	35.6	34.8	40.5	42.1	59.6	45.5	34.6

**Household Income**

■ Not at all   
 ■ A little   
 ■ Very much   
 ■ DK/Not sure   
 ■ Refused

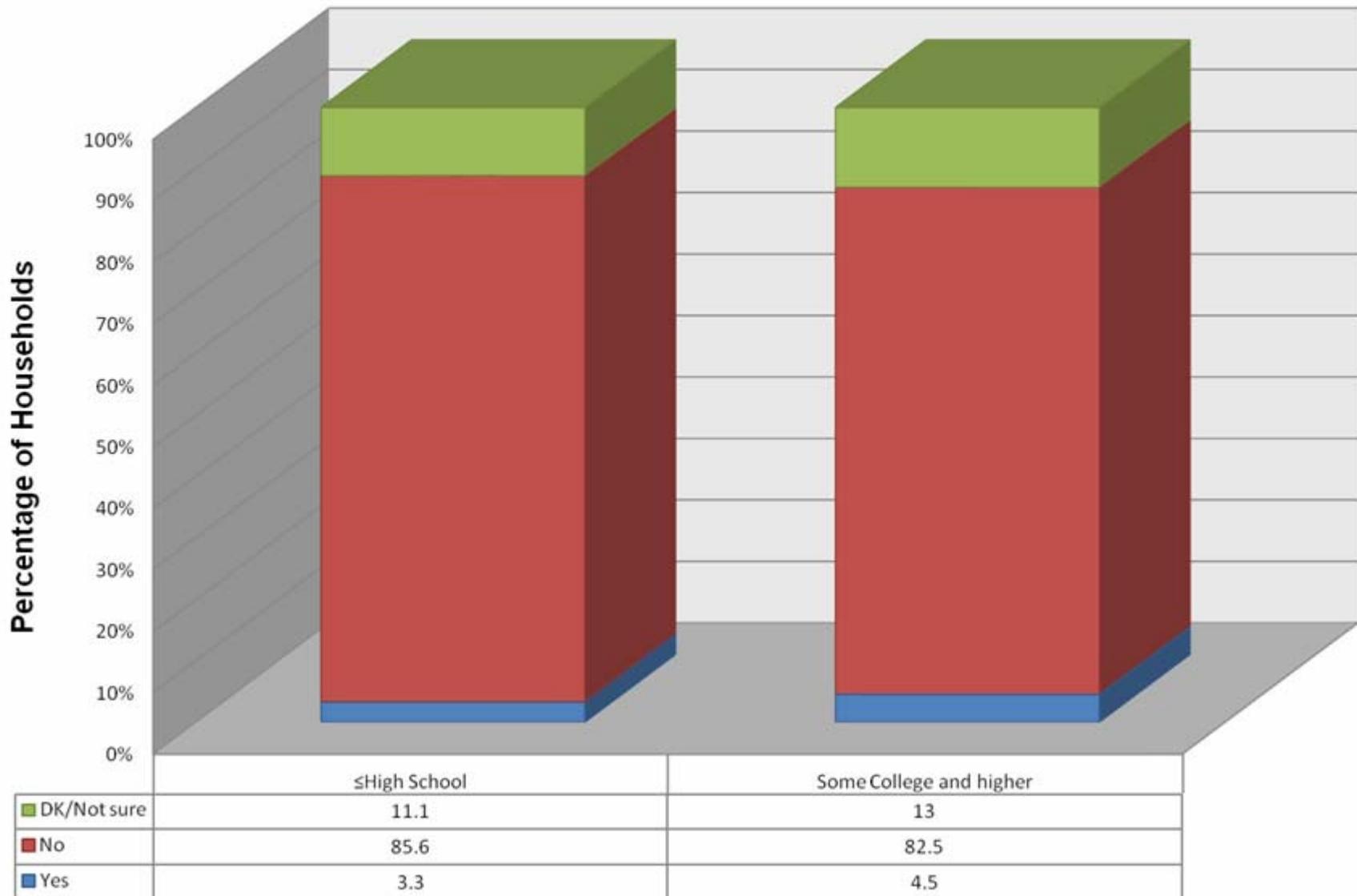
## Percentage of Households Concerned That the Natural Gas Industry May Be Related to Health Problems

\*Primarily Spanish-speaking households



	County	81601	81623	81635	81647	81650	81652	SL*
Refused	0.3	1	1.4	0	0	0	0	0
DK/Not sure	12.1	7.6	8.2	22.2	8.8	15.9	14.6	8.2
No	83.7	89.5	90.4	68.9	91.2	79.3	75.6	91.8
Yes	3.9	1.9	1.4	8.9	0	4.9	9.8	0

## Concern that the Natural Gas Industry May Be Related to Health Problems: Correlation with Education



# Conclusions and Recommendation

## ▶ Conclusions

- ▶ At the present time – based on our data sources – there is not a health crisis in Garfield County, but there are some health trends that should be monitored.
- ▶ We cannot say conclusively that any of these health trends are directly related to the presence of natural gas industry activities or to other factors.
- ▶ Risk modeling indicated that there are industry factors that could present a public health risk – use of best practices can reduce that risk.

## ▶ Recommendation

- ▶ Establish a medical monitoring system – especially through primary care networks – to identify any changes in baseline data or trends and/or anomalies in medical practices.