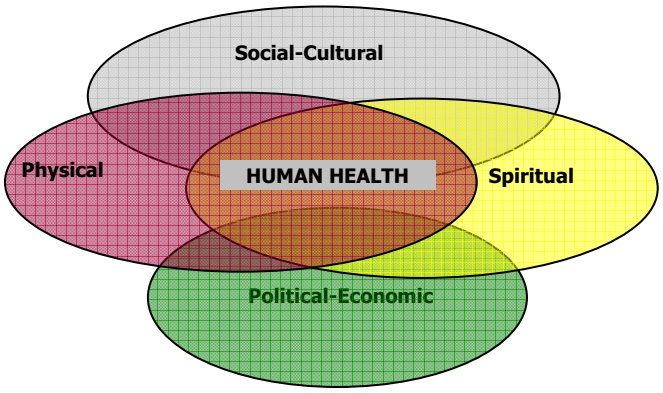
PART 2. HEALTH STUDY

PREMISES OF THE STUDY

We began this study with the premise that we would use the World Health Organization's (WHO) definition of human health; i.e., that health is broader and more inclusive than physical wellness. "Health," by the WHO definition, is inclusive of the social-cultural, spiritual and political-economic conditions of the community and its members. Thus, both quantitative and qualitative data collection included information on socio-economic and behavioral impacts and outcomes. An in-depth study of the socioeconomic impacts of growth taking place on the Western Slope of Colorado was recently published by the Mesa State College Natural Resource and Land Policy Institute (September 2007, Redifer et al.). It is beyond the scope of the current report to describe or significantly add to the information contained in the "Socioeconomics of growth" report.

Figure 8.

World Health Organization Definition of "Human



This study represents a "snapshot" in time of the health of Garfield County residents. This "snapshot" provides a baseline assessment, against which, future changes in health parameters may be measured. Trend data are provided in this report, where possible.

This is a "descriptive study". Statistical analyses are presented when and where appropriate. Whereas, it is possible, in many cases to discuss correlations between health status and residence, it is not possible to make definitive conclusions about causation, given the data that are available at this time.

METHODOLOGY

The Health Study has three major components:

- Qualitative Data: Community perceptions and concerns regarding health and well-being
- Quantitative Data: Health outcomes data
- Self-reported Health Status: Household survey

The overarching questions being asked in this study are the following;

1) Is the health of Garfield County residents different than the health of residents of Delta, Mesa or Montrose Counties?

2) 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?

Description of study area and comparison counties. The three comparison counties, Delta, Mesa, and Montrose, were selected for the following reasons:

- All four counties (including Garfield County) 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 (see Background section). As a result of the natural cycles of these industries, all four counties have experienced similar economic cycles of growth and recession ("boom and bust"), and the accompanying environmental and social impacts.

Figure 9.

- The somewhat overlapping healthcare networks and service areas allowed us to acquire comparative health data for residents of the four counties.

Demographic data for Garfield County and the three comparison counties were largely obtained from the Colorado Department of Local Affairs, State Demography Office. These data are available online at http://dola.colorado.gov.

Table 8. County Profiles: 2000 & 2006 Data*

County		July Population	Total Households	Average Household Size	Births	Deaths	Birth/Death Ratio	Similarity Ranking
Delta								
	2000	28,009	11,058	2	296	330	0.90	3
	2006	30,676	12,225	2	347	303	1.14	
Garfield								
	2000	44,267	16,229	3	733	242	3.03	--
	2006	53,020	19,587	3	893	273	3.27	
Mesa								
	2000	117,656	45,823	2	1,485	1,109	1.34	2
	2006	135,468	53,416	2	1,853	1,268	1.46	
Montrose								
	2000	33,666	13,043	3	435	296	1.47	1
	2006	38,903	15,261	3	503	361	1.39	

http://dola.colorado.gov/demog_webapps/profile_county; accessed 4/10/2008; Division of Local Government, State Demography Office

*County profile variables
July population: July 1 of each calendar year, prepared by the Demographic Section in cooperation with the U.S. Bureau of the Census.

Total Households: Households (total occupied housing units are estimated from total housing units, household population and persons per household.

Average Household Size: Computed by dividing the household population (at July 1) by the number of households.

Births: These data are received from the Department of Health on a fiscal year (July 1 to June 30) basis.

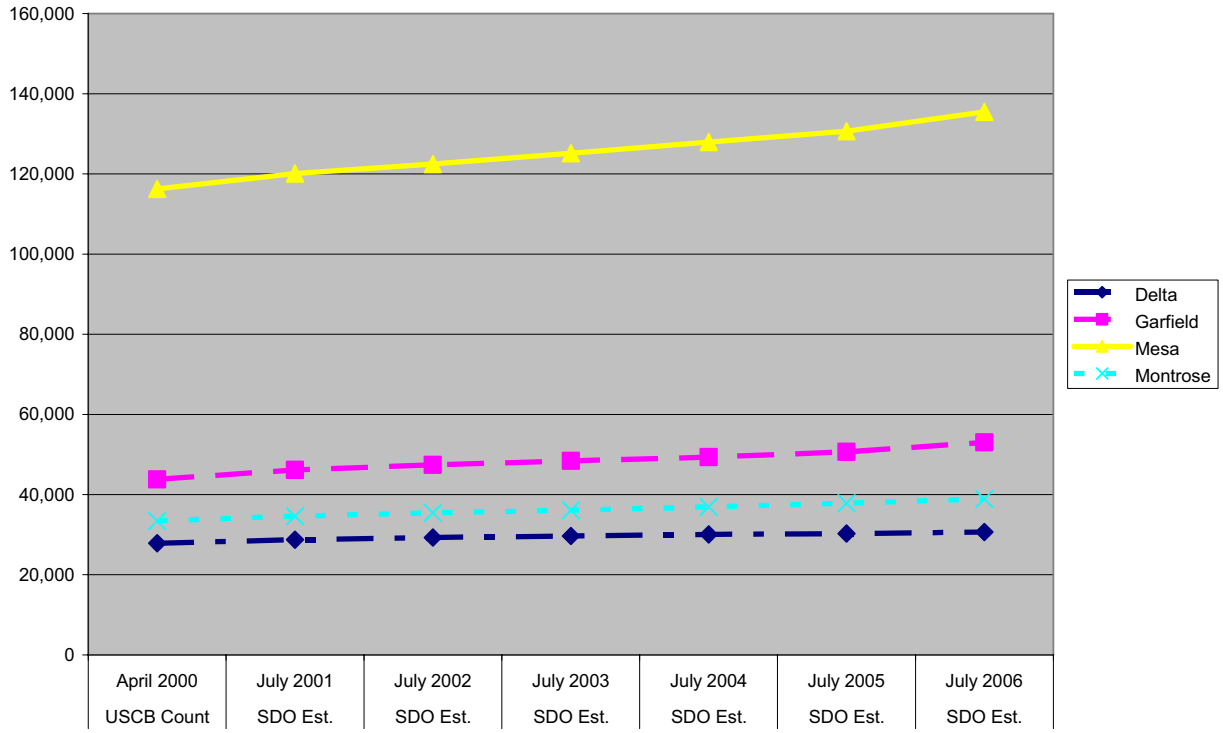
Deaths: These data are received from the Department of Health on a fiscal year (July 1 to June 30) basis.

Birth/Death Ratio: Garfield County had >3X the number of births to deaths in both 2000 and 2006. This was in contrast to the other three counties, all of which had <1.5X the number of births as deaths.

Similarity Ranking: A rank-sum algorithm (JD Boise, Jr. *et al. Rad Res* 167:711-726, 2007) was used to identify which of the three counties is most similar to Garfield County demographically. Rank values for 9 socioeconomic variables (population in 2000, population in 2006, number of households, household size, birth/death ratio, % change in population from 2000 to 2006, median household income, population age groupings, and percentage of children living below poverty) were determined, based on similarity to Garfield County. Rank values for all variables were summed, with the lowest sum representing the most similarity to Garfield County.

Some of the socioeconomic variable comparisons are illustrated in the graphs that follow. All of the data for these graphs were obtained from the Department of Local Affairs, State Demography Office website (see above).

Garfield, Montrose, and Delta County populations are most similar, while Mesa County's population is 2.5 to almost 4.5 times the population of the other counties.

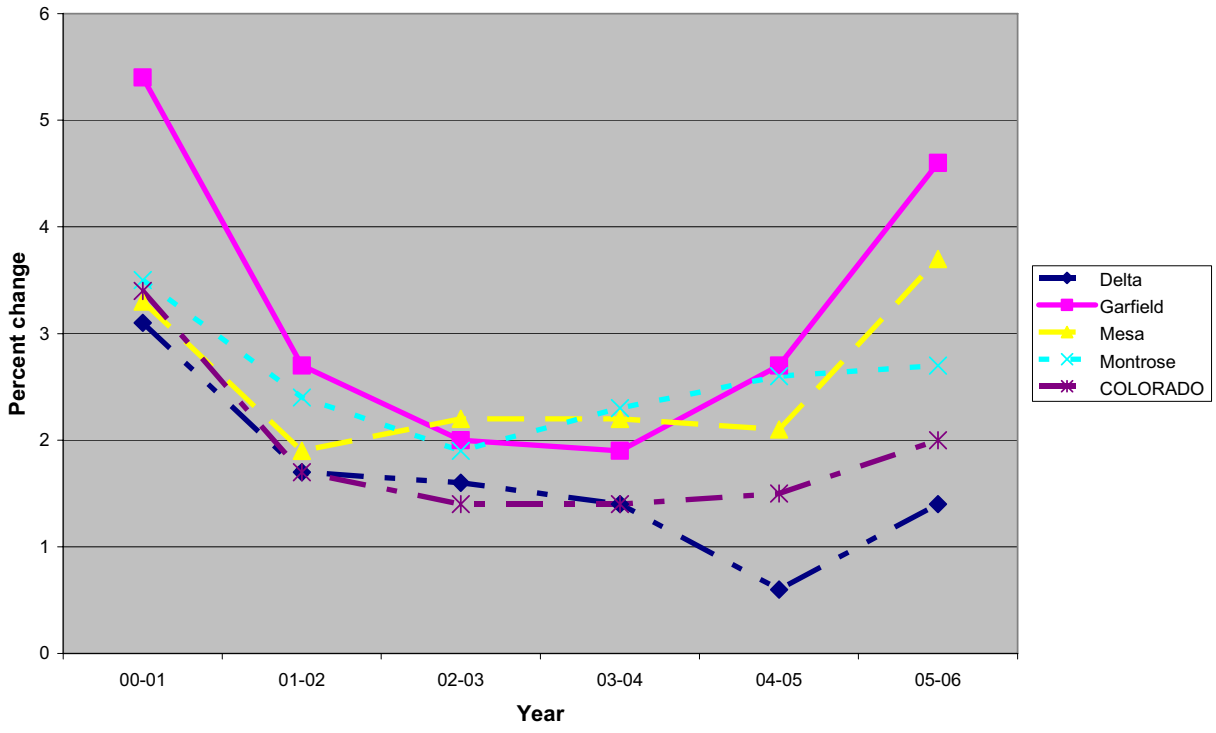


USCB: United States Census Bureau
SDO: State Demographers Office

Figure 10. Population Estimates by County, 2000-2006.

All four counties have undergone decreases, and subsequent increases, in population over the past decade. Currently, all four counties are experiencing population growth.

Figure 11. Average Annual Percent Change in Population, 2000-2006.



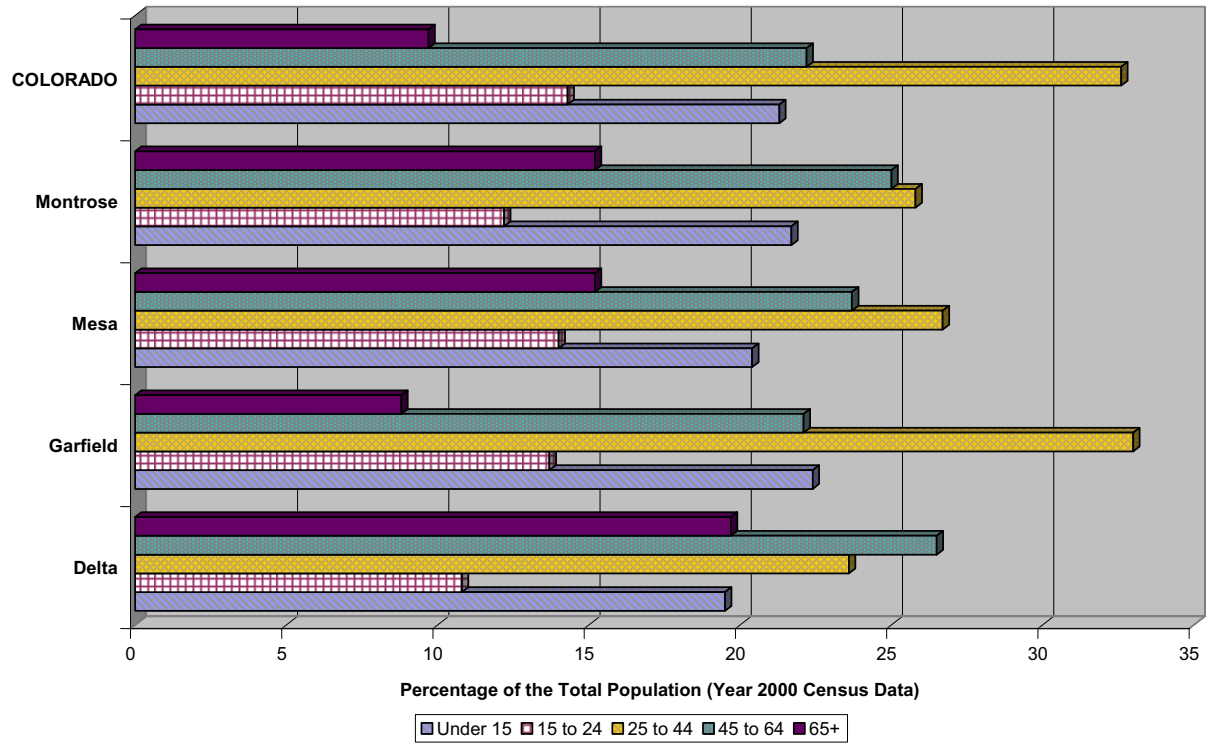
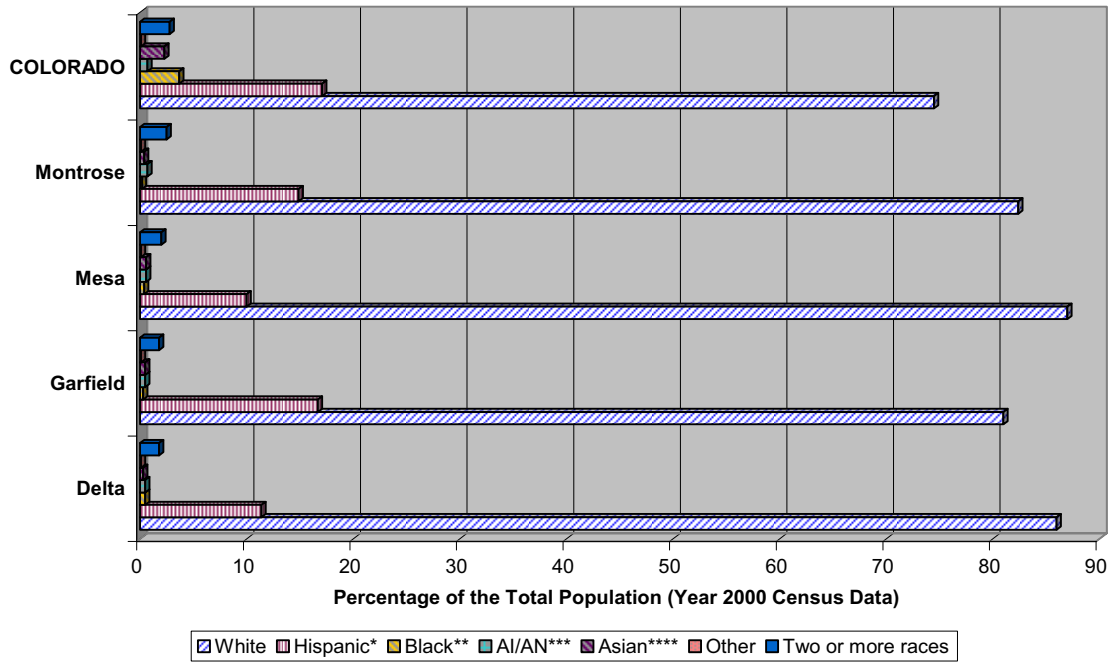


Figure 12. Population Age as a Percentage of Total Population

The largest population by age in Garfield County is the 25- to 44-year old age group. Garfield County tends to have a younger population, overall, than the comparison counties. The age demographic of the Garfield County's population is more similar to that of the state, overall.

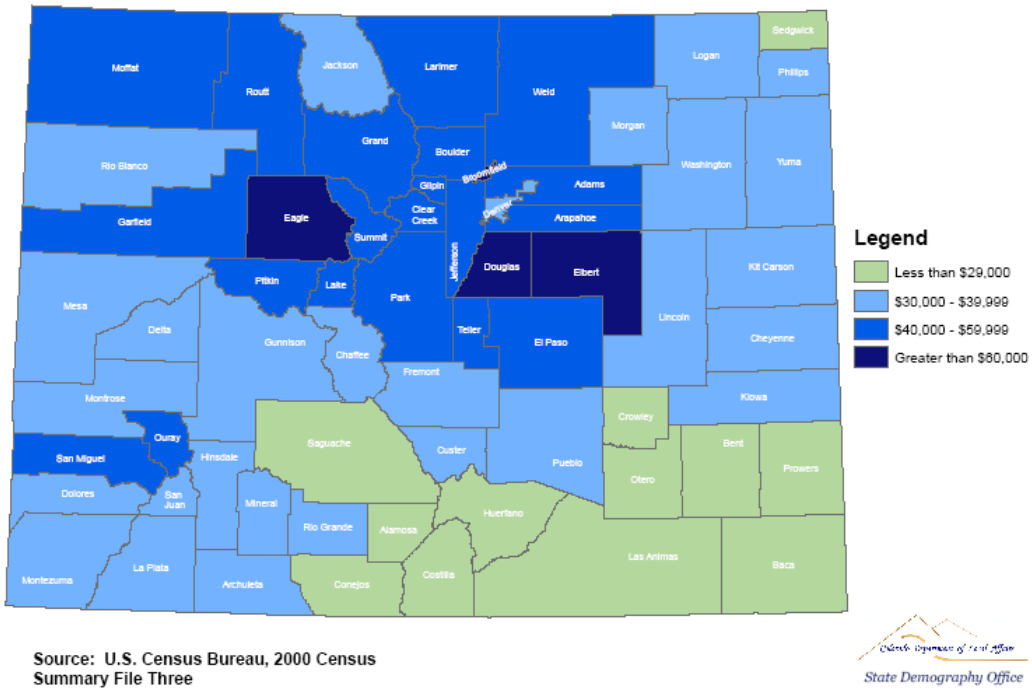
Figure 13. Race and Ethnicity as a Percentage of Total Population



Greater than 80% of the individuals who live in Garfield County are non-Hispanic white, with Hispanic individuals making up <15% of the residents. Garfield County is most similar to Montrose County, with respect to the race and ethnicity makeup of the population.

The following maps illustrate other demographic comparisons among the four counties: (http://dola.colorado.gov/demog_webapps/profile_county; accessed 4/10/2008; Division of Local Government, State Demography Office).

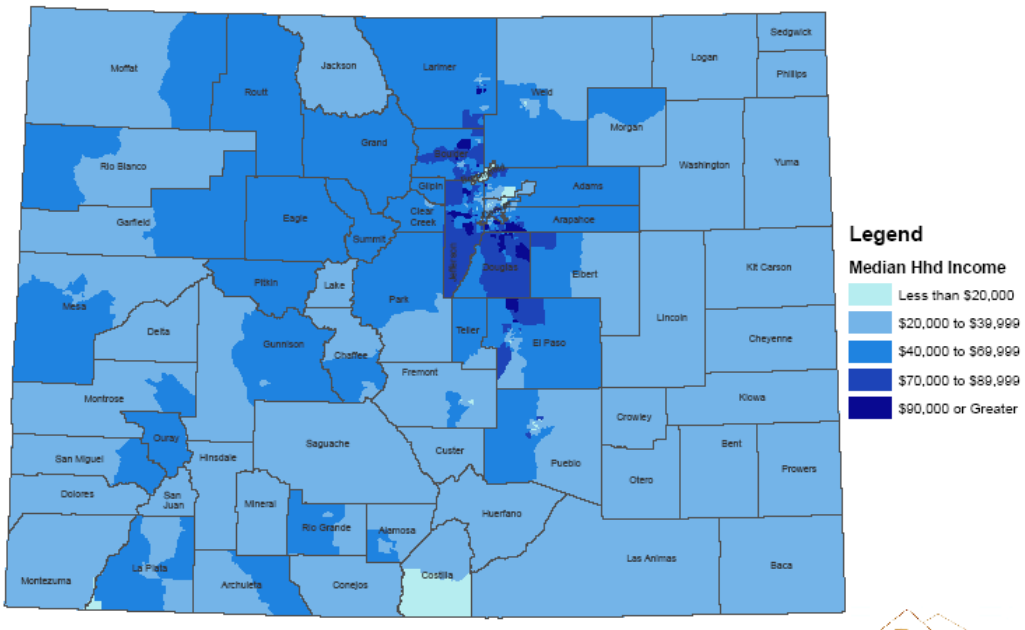
Figure 14. Median Household Income by County, 2000 Census



Source: U.S. Census Bureau, 2000 Census Summary File Three

State Demography Office

Figure 15. Median Household Income by Census Tract, 2000 Census



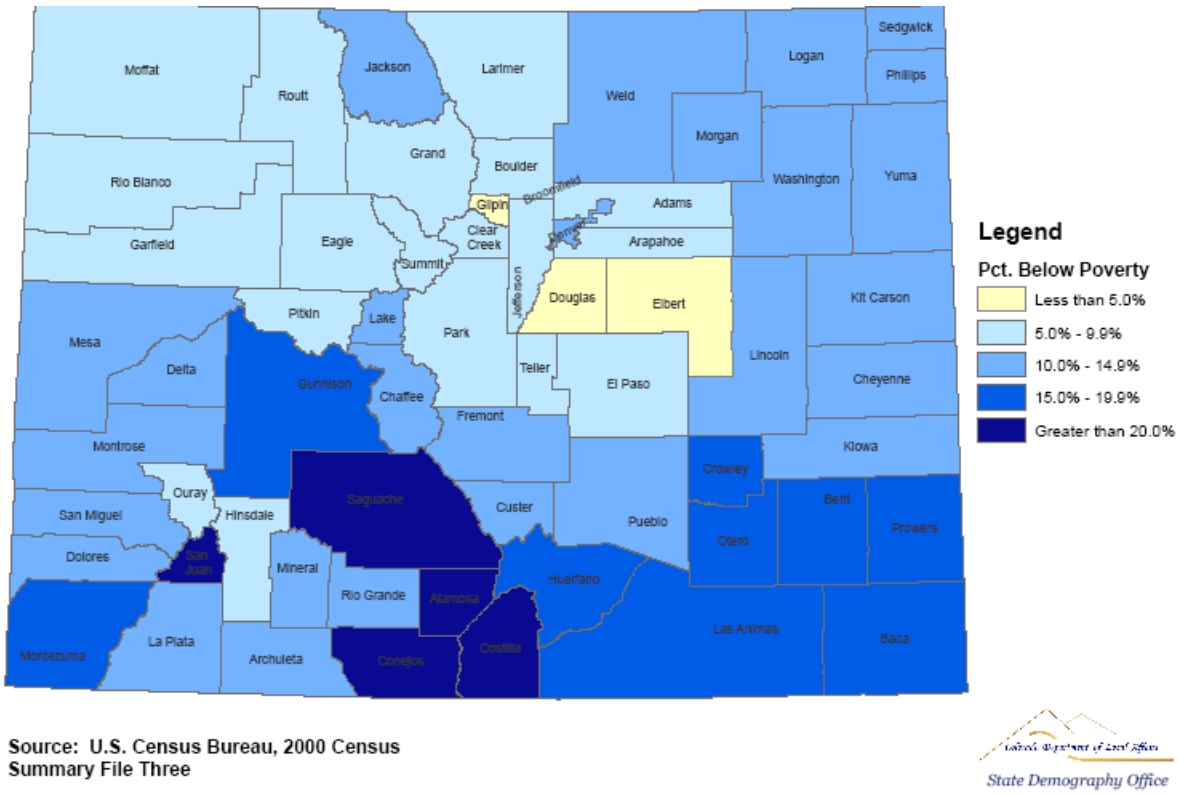
Source: U.S. Census Bureau, 2000 Census Summary File Three

State Demography Office

According to U.S. Census Bureau data for 2000, median household income in Garfield County is higher than in any of the comparison counties. However, the census tract data indicate that the western part of Garfield County, where more of the natural gas activity is located, has lower median household incomes than the eastern half of the county. Census tract data for Mesa County shows higher median household incomes for the southern half of the county. There is less discrepancy for median household incomes among census tracts for Delta and Montrose Counties.

The 2000 U.S. Census showed that fewer people were living below poverty in Garfield County than in Delta, Mesa or Montrose Counties. This is generally true, also for the percentage of children living in poverty, although percentages differ by census tract within the counties (see below).

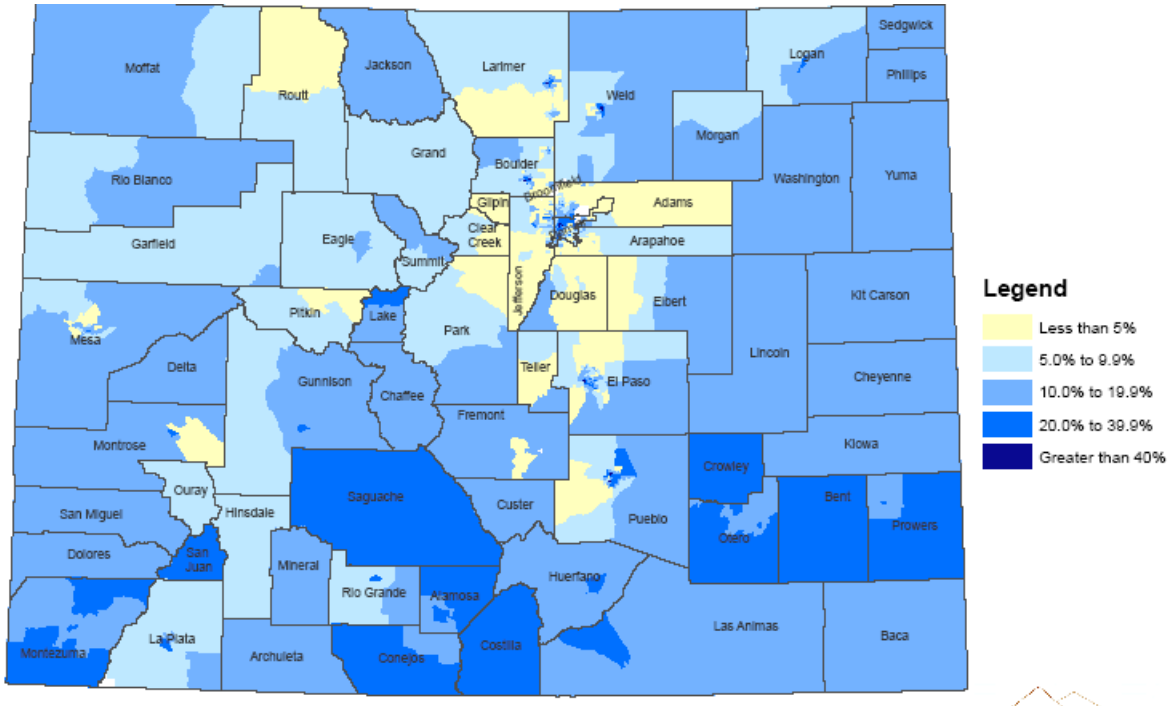
Figure 16. Percent of Persons Below Poverty by County, 2000 Census



Source: U.S. Census Bureau, 2000 Census Summary File Three

State Demography Office

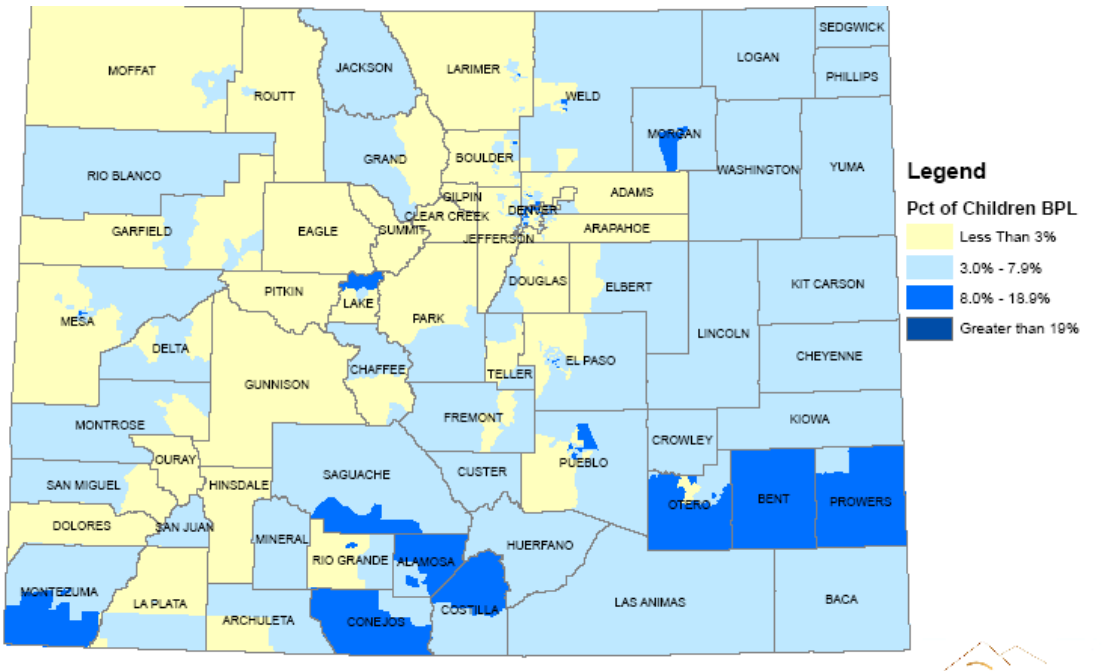
Figure 17. Percent of Persons Below Poverty by Census Tract, 2000 Census



Source: U.S. Census Bureau, 2000 Census
Summary File Three

State Demography Office

Figure 18. Percent of Children Below Poverty by Census Tract, 2000 Census



Source: U.S. Census Bureau, 2000 Census
Summary File Three

State Demography Office

Perceptions and Concerns (Qualitative Data Collection).

Data Collection Process

Perceptions about community health and priority health concerns were collected through a process of public meetings, focus groups, and individual interviews that took place over a period of approximately two years. A separate process of collecting complaints and concerns occurred at the Garfield County Health Department, where the Environmental Health Manager kept a running phone log. Information in that log, as it relates to this study's objectives, is included in the data analysis.

Community Meetings

Two public meetings were held early in the data collection process; one each in Rifle (at the Fairgrounds) and in Battlement Mesa (at the Community Center). The Rifle meeting was held during the day on a Saturday, while the Battlement Mesa meeting was held in the evening on a weeknight. The objective was to give community members a choice of venue and time of day/day of the week to allow for greater participation. Both meetings were advertised through several venues; in the local newspapers, through flyers, at the Garfield County Health Department, and through announcements at Grand Valley Citizens Alliance (GVCA) meetings.

A total of 36 individuals (including Garfield County Health Department staff) attended the meetings. The format for the meetings was an initial presentation by Drs. Teresa Coons and Russell Walker, describing the human health assessment study, followed by an opportunity for attendees to ask questions and state concerns.

Key Informant Interviews

Interviews (either in-person or by telephone) were conducted by study staff with individuals who requested the opportunity to "tell their stories". All of these interviews were voluntary and self-selected. Individuals learned of the opportunity to be interviewed and share personal experiences and concerns through newspaper and radio stories about the study, word-of-mouth, and as a result of attending community or GVCA meetings.

Focus Groups

Six focus groups were held, with a total of more than 60 individuals participating. The focus groups were held at different times and locations, over a time period of approximately one year. Individuals attended by invitation. Participants were not compensated, nor did they receive any incentive for their participation. Focus group discussions were recorded and transcribed for analysis. The following groups of community citizens were each represented by a focus group:

Elected officials (municipal and county elected officials and administrators)
Grand Valley Citizens Alliance (local concerned citizens' organization)
Elderly residents (Battlement Mesa Assisted Living facility residents)

Healthcare Providers (The focus group was held at Grand River Medical Center in Rifle and was advertised to all medical staff and allied healthcare providers. Participation in this group was poor; we followed up with a survey of local providers.)

Garfield County Human Services Council (One hour of a regular meeting was devoted to the study focus group. A wide range of county service agencies, both profit and non-profit, were represented.)

Garfield County School Districts (Separate groups were held for School District Re-2, comprising Rifle, Silt and New Castle, and School District Re-16, comprising Parachute and Battlement Mesa. Invitations to participate were coordinated through the district's administrative offices.)

Focus group participants were instructed to think of "health" broadly, i.e., not just physical health, but also psychosocial health and "well-being". All focus groups were "guided discussions" conducted by Dr. Teresa Coons, using a common set of discussion questions.

Focus Group Questions

1. How would you rate the health of people in Garfield County and/or your community relative to the health of people in other Colorado communities or other communities in which you've lived? Note: I am simply asking for your perception, based on your own experience.

2. What do you consider to be the priority health-related issues in your community? Note: I am using the term, health, in the context of not only specific physical ailments, but also the broader concept of "well-being".

3. Who is most affected by health issues in your community? Are there particular age or demographic groups that are more at risk or have more health problems?

4. To what environmental or societal factors (if any) would you attribute any of the priority health issues that you've identified in your community?

5. What health issues concern <u>you</u> the most? (Question asked of each participant individually.)

Note: Healthcare providers were also asked to identify the health conditions that they saw most frequently in their practices.

<u>Complaint Phone Logs</u>

The phone log maintained by the Garfield County Environmental Health Manager documents telephone calls received from early 2003 through 8/2007. Information in the log includes date of call, type of complaint or concern, region or location (if applicable), caller name and address, complaint or concern narrative and resolution of the call. The list of callers overlapped, to some extent, with the list of individuals who asked to be interviewed, and some of the individuals were repeat callers. The health concerns expressed in the phone log reflect the concerns documented in the previously described data collection process.

Quantitative Health Data. Health outcomes data were collected from a number of sources for Garfield County and comparison counties. The search for health outcomes data was driven by two objectives: 1) to complete a "snapshot in time" picture of the health of Garfield County residents in comparison to the health of residents in the comparison counties, and 2) to obtain statistical data that could be used to respond to the concerns voiced by Garfield County residents during the qualitative data collection process. Thus, to the extent that the data were available, we collected statistical information on the prevalence of conditions such as cancer and asthma and the predominant causes of mortality and morbidity in Garfield County.

The following data were obtained from the Colorado Department of Public Health and Environment (datasets represent the most current data available at the time this report was written):

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

Hospital and outpatient data were obtained from the following sources:

- Colorado Hospital Association, DRG-based hospital discharge data (2000 through 1st quarter 2006)
- Emergency room data
    - Grand River Medical Center (located in Rifle, CO and serving western Garfield County)

- Valley View Hospital (located in Glenwood Springs, CO; primarily serving eastern Garfield County)
- Rocky Mountain Health Plans* (RMHP) – member data for 4 counties
- St. Mary's Hospital *CareFlight* data

- RMHP hospital inpatient, outpatient and ambulatory member data – 4 county comparison
- By DRG category
- Focus on respiratory conditions

*RMHP is a non-profit, Colorado-based health insurance company that provides healthcare coverage for a significant number of Western Colorado residents. RMHP provides a full range of health plans, including Medicare supplement and Medicaid coverage.

Self-reported Health Status: Household Survey. A targeted health survey was administered to Garfield County residents by trained interviewers. The in-home surveys captured information about the general health and health risk factors of residents, as well as information about specific health conditions that were identified as priority concerns during focus group discussions. This information was intended to provide a more objective measure of the health status of community residents, and a means of conducting within County comparisons.

A randomly selected sample of households from throughout Garfield County was surveyed. The sampling protocol was designed to provide a zip code-based sampling pool of 2-4% of the households in Garfield County that have listed telephone numbers (4% of households in zip code areas that are highly impacted by the presence of natural gas industry operations and 2% of households in the zip code areas that have little or no natural gas activity); a sample that would give a 95% confidence level (±5% error rate) for the study results. Randomly selected phone numbers (and the respective mailing addresses) from each Garfield County zip code area were obtained from infoUSA (infoUsa, Inc., 5711 South 86th Circle, P.O. Box 27347, Omaha, NE 68127), a marketing research firm that specializes in health-related community surveys. In order to achieve the desired number of completed household interviews, we requested 15 phone numbers for each number that we hoped to complete. Drawbacks to this survey approach include the unwillingness of many people to respond to telephone calls from unknown individuals (either because they don't want to be bothered or because they are afraid that the call is from a telephone solicitor), and the fact that many individuals are hard to reach at home during convenient hours. We hoped to avoid the problem of individuals being unwilling to speak with us on the telephone by preceding our initial phone call with a letter to the household that explained the nature of the survey and requested return information on the

best day(s) and time(s) of day to call. A postage-paid return card was included in the letter for this purpose.

Because of the difficulty of reaching people by phone (see above), and a relatively low initial response rate, we also developed a mail survey. We split the sample of randomly selected phone numbers/addresses for each zip code area, and mailed a written survey to half of the selected respondents. Because we used the same randomly selected sample to create a mailing list, we have no reason to suspect that there is any identifiable significant difference between the group that received phone calls from an interviewer and the group that received a survey in the mail. By using the two methods – both of which can have low response rates – we attempted to maximize our ability to reach a representative sample of households in Garfield County. The written survey contained questions that were essentially the same as in the phone survey, modified only to allow the respondent to document their responses on paper. (A copy of the survey documents are provided in Appendix T.)

Telephone surveys were conducted by a limited number of trained interviewers, using an ACCESS (2002) database that allowed direct data entry during the telephone conversation. All sample household information and survey documentation (e.g., attempted phone contacts and outcomes, reasons for refusing to participate in the survey) and written survey responses were entered into the same ACCESS database.

To assure that we achieved a representative cross-section of the population demographic, adult respondents were asked to complete the survey questions for all members of their household, regardless of age or family relationship. The telephone survey required, on average, 20 minutes to complete – depending on the number of household members and the range of reported health conditions.

In addition, to assure that we did not exclude primarily Spanish-speaking individuals from the surveyed population, the survey document was translated into Spanish and then back-translated by a professor of Spanish language, who, in particular, tested for the appropriateness of dialect and idiom for this geographic region. As telephone contact was made with potential survey respondents, interviewers documented households within which the primary language was Spanish. Those households were re-contacted by a native Spanish-speaking public health nurse, who was an employee of the Garfield County Health Department. Standardized interviews were conducted in Spanish, results were recorded in English on survey forms, and the data were entered into the survey database.

ACCESS data tables were downloaded into *EpiInfo* Version 3.4.1, Centers for Disease Control and Prevention for analysis. (Please see Appendix U for data analysis protocols and outcomes.)