Hospitalization for
Ambulatory Care Sensitive Conditions

Access to Care in Rural Colorado

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This report was produced by a collaborative project with the following partners

Colorado Area Health Education Center System

Preventive Medicine Residency

Department of Family Medicine

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Colorado Department of Public Health and Environment, Prevention Services Division, Primary Care Office

Ambulatory Care Sensitive Conditions

are defined as "conditions for which good outpatient care can potentially prevent the need for hospitalization, or for which early intervention can prevent complications or more severe disease."

Executive summary:

This project studied the hospitalization rates for ambulatory care sensitive conditions in a selection of counties across rural Colorado. Ambulatory care sensitive conditions (ACSCs) are a group of diagnoses that are related to access to good primary care. We analyzed the hospital admission rate for all ACSCs in each zip code and county and compared that to the overall state average. We found that there are regions of Colorado represented by specific zip codes that have much higher hospitalization rates for ACSCs. We believe that a portion of this increased rate is due to poor access to primary care services in that region. Community members in these regions may benefit from concerted efforts to improve access to primary care services. Designation as a Health Professional Shortage Area or a Medically Underserved Area may offer the opportunity to develop a community health center in these regions, thereby improving access to primary care services.

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Contents

Objectives

- Discuss current state of access to ambulatory health care for underserved populations in Colorado
- Define and discuss Ambulatory Care Sensitive Conditions (ACSCs) as a marker of access to care
- Compare adjusted rates by zip code to those of the state of Colorado for ACSC hospitalizations in the following 12 counties: Grand, Eagle, Pitkin, Routt, Moffat, Mesa, Garfield, Baca, Huerfano, Gunnison, Chaffee, Lake
- Identify and discuss zip codes with statistically significantly higher rates of ACSC hospitalization
- Discuss implications of results and recommendations for change

Current State of Ambulatory Health Care Access in Colorado

There are several different types of designations for underserved areas in Colorado. The categories include:

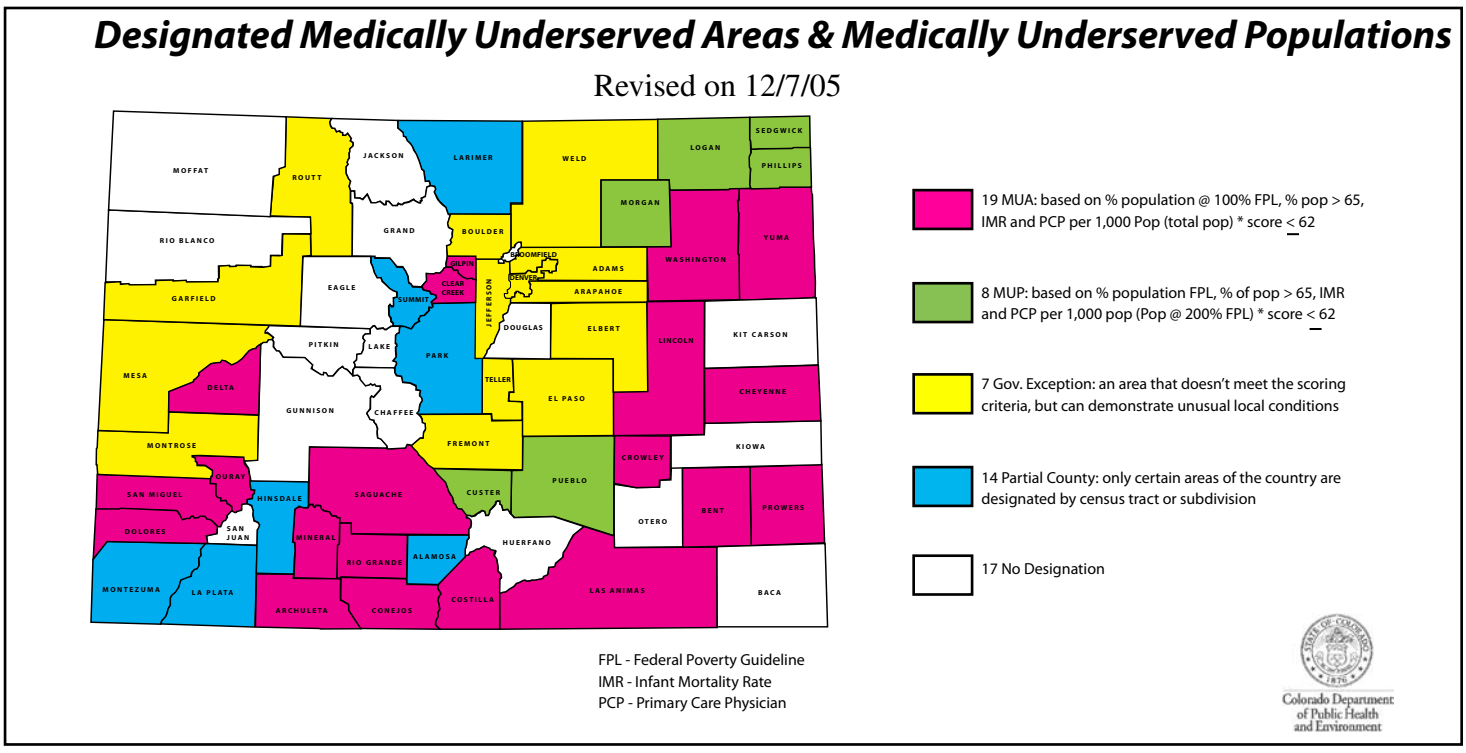
- **Medically Underserved Areas (MUAs)**- This designation is for the entire population of the service area based on a weighted value of the following four variables:
  - Ratio of full-time equivalent primary care physicians per 1,000 population
  - Infant mortality rate
  - Percentage of the population with incomes below the federal poverty level
  - Percentage of the population age 65 or over

  MUAs can be single counties, contiguous counties, sub-divisions, or a group of census tracts.

- **Medically Underserved Populations (MUPs)**- This designation is for a specific underserved population group within a designated service area. The same four variables as for MUAs are combined for the population group and a weighted value is obtained. The difference is that the ratio of primary care physicians is based on the population group, rather than the total population.

As of August 2005 in Colorado, there were:

- 19 whole counties designated as MUAs
- 8 whole counties designated as MUPs
- 7 whole counties granted a Governor's Exception, meaning that the area does not meet the scoring criteria for an MUA or MUP but can demonstrate unusual local conditions
- 14 counties with partial areas designated as MUAs or MUPs such as census tracts or subdivisions
- 17 counties with no designations

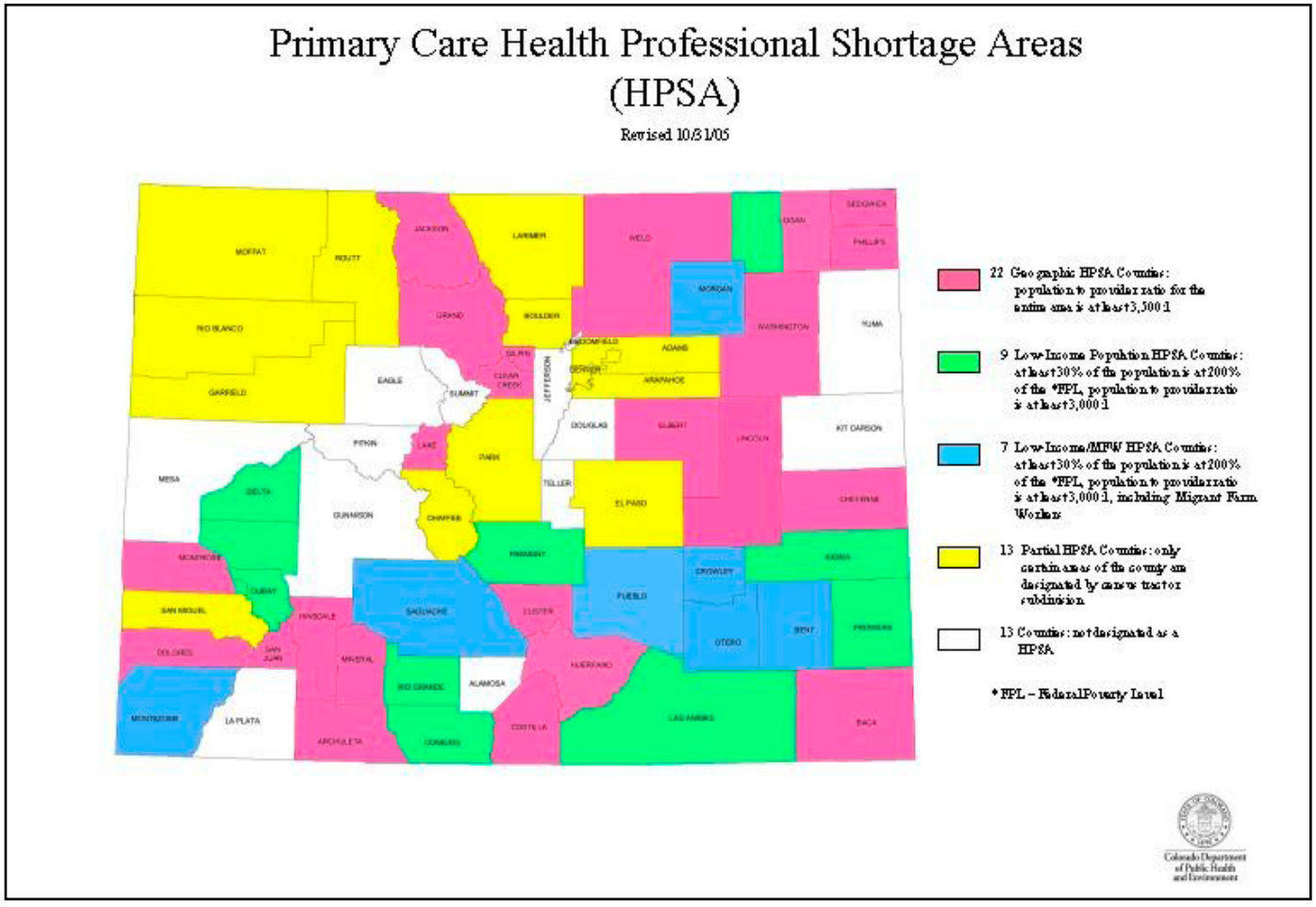


- **Health Professional Shortage Areas (HPSAs)**- A primary care HPSA is designated based upon the following criteria:

  - A county, group of contiguous counties, portion of a county, or homogenous neighborhood or community which is a rational area for delivering primary medical care services
  - One of the following conditions exists in the area:
    - A ratio of the population to full-time-equivalent primary care physician of at least 3,500:1
    - A ratio of the population to full-time-equivalent primary care physician of at least 3,000:1 and demonstrated unusually high needs or insufficient capacity of existing primary care providers.
    - A ratio of underserved population to full-time equivalent primary care physician of at least 3,000:1.
    - Primary medical care professionals in contiguous areas being overutilized, excessively distant, or inaccessible to the population of the area under consideration

As of October 2005 in Colorado, there were:

- 22 whole counties with a primary care geographic designation
- 16 whole counties with a primary care population designation
- 13 counties with a primary care partial designation such as census tracts or subdivisions
- 13 counties with no primary care designation



The significance of shortage designations is that they are used as an eligibility criteria for different systems of health care. These include Federally Qualified Health Centers (FQHCs) FQHC look-alikes, and Certified Rural Health Clinics.

- **FQHCs** are public and non-profit organizations that receive federal funding under section 330 of the Public Health Service Act. FQHCs must provide primary care services for all age groups and preventive health services on site or by arrangement with another provider. Other services that must be provided directly by an FQHC or by arrangement with another provider include: dental, mental health and substance abuse services, transportation services necessary for adequate patient care, hospital and specialty care. FQHCs receive benefits such as enhanced reimbursement for Medicaid and Medicare patients and access to lower price medications. FQHCs include:

  - Community Health Centers (CHCs)
  - Migrant Health Centers
  - Public Housing Primary Care
  - School Based Health Centers
  - Homeless Health Centers

- **FQHC look-alikes** are similar in all regards to FQHCs except that they do not receive funding through the Public Health Service Act. FQHC look-alikes do, however, also receive enhanced reimbursement for Medicaid and Medicare patients. They also must be located in an MUA or MUP.

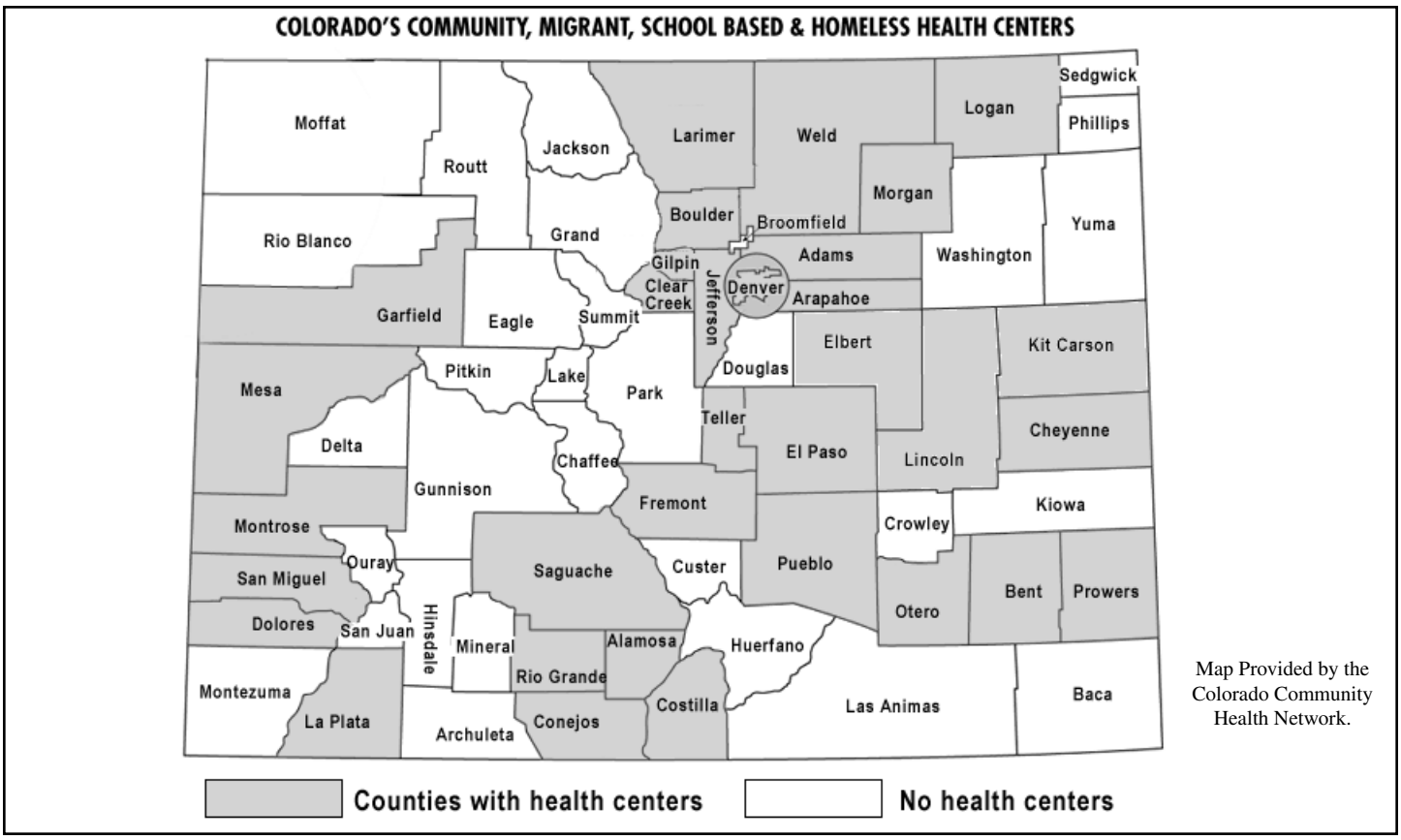
- **RHCs** must be located in an area that is a non-urbanized area and an MUA, Health Professional Shortage Area (HPSA), or a population group HPSA. Also, RHCs must employ a midlevel practitioner 50 percent of the time, provide routine diagnostic and laboratory services, arrange to provide medically necessary services not available at the clinic, and provide first response emergency care. Payment for Medicare services is made at an all-inclusive rate per covered visit.

In 2003 in Colorado there were:

- 15 FQHCs
- 108 FQHC service delivery sites
- 35 RHCs
  and
- 372,590 patients were served by FQHCs accounting for 1,507,027 visits
- Medicaid revenue accounted for the largest portion of revenue to the FQHCs, equaling 33.3 percent of all revenue
- Private insurance accounted for only 6.1 percent of FQHCs' revenue

However, also in 2003 in Colorado,

- 483,250 people had Medicaid
- 746,330 people were uninsured
  and
- from 2000-2003 there was a 2.2% increase in Medicaid and a 3.0% increase in uninsured nonelderly people.



Map Provided by the Colorado Community Health Network.

In conclusion, the health systems eligible to be located in an MUA or MUP provide a significant safety net to the uninsured and underinsured people of Colorado. However, several rural resort counties on the Western Slope that do not have designations are known to have significant difficulties in providing health care to the service worker population. These counties do not qualify based on the usual criteria for designation as an MUA/MUP as the rest of the population is affluent and there is no shortage of physicians to serve the insured population. This potentially underserved population is also hard to define demographically as many workers are seasonal or transient and may not be U.S. citizens. It is difficult to determine if this population has appropriate access to healthcare for their needs.

Ambulatory Care Sensitive Conditions (ACSCs) as a marker of access to care

Outpatient primary care, or ambulatory care, serves a number of basic purposes to provide optimal health care to patients. The Institute of Medicine definition of primary care states that primary care includes:

- Providing integrated, comprehensive, coordinated, continuous, accessible health care services
- Addressing a majority of personal health care needs
- Developing a sustained partnership with patients
- Practicing in the context of the family and the community

These attributes separate outpatient primary care, or ambulatory care, from care given by a specialist or a surgeon who may just focus on one aspect of a patient's health care needs for a limited amount of time. Outpatient primary care or ambulatory care, is positioned to provide optimal care for chronic disease prevention, and many acute conditions. Without adequate ambulatory care, many patients will not gain optimal control of their diseases or achieve maximum health status.

One marker of access to ambulatory care that has been widely used in the literature is ambulatory care sensitive condition (ACSC) hospitalizations.

- ACSCs are defined as "conditions for which good outpatient care can potentially prevent the need for hospitalization, or for which early intervention can prevent complications or more severe disease."

The Agency for Healthcare Research and Quality (AHRQ) has defined a list of 16 ACSCs which apply to the span of age ranges. AHRQ recommends that these 16 measures be used on the population level by public health groups to compare quality and access to care across communities and states:

- Short and long-term diabetes complications
- Uncontrolled diabetes
- Lower extremity amputation among diabetic patients
- Perforated appendix
- Pediatric asthma
- Adult asthma
- Chronic obstructive pulmonary disease
- Pediatric gastroenteritis
- Hypertension
- Angina without procedure
- Congestive heart failure
- Low birth weight
- Dehydration
- Bacterial pneumonia
- Urinary tract infection

An extensive body of literature exists on ACSCs. ACSCs have been studied in pediatric populations, young adults and adults, and the elderly. The elderly are not included in as many studies as nearly universal coverage by Medicare is thought to decrease the variability of access to care in this population. The following are some of the pertinent findings from studies of ACSC hospitalizations.

Children

- Among Maryland Medicaid children, preventive visits were associated with a 15-20% lower risk of having an ACSC hospitalization (Gadomski, 1998)
- Children in Georgia, California, and Michigan who were up-to-date for age on well-child visits were 30-48% less likely to have an avoidable hospitalization (Hakim, 2001)
- More pediatricians per 10,000 was associated with 4-28% fewer avoidable hospitalizations in Georgia and Michigan (Hakim, 2001)
- Black children were found to have 53-79% greater risk of ACSC hospitalization (Shi, 2000)

Adults

- In the Northeast, ACSC hospitalizations in adults decreased by 43-93% as primary care physicians increased by one per 1000 population (Basu, 2002)
- In Pennsylvania, 15% of the variation in ACSC hospitalization rates was explained by the number of family physicians/general physicians in the area (Parchman, 1994)
- In Medicaid patients, seeing the same provider at most visits was associated with a 12-66% decrease in hospitalization for chronic ACSCs (Gill, 1998)
- Rates of hospitalization for ACSCs are 2.1-2.6 times higher for patients in the lowest income compared to the highest income groups (Pappas, 1997)
- ACSC hospitalizations are twice as high for blacks compared to whites (Pappas, 1997; Basu, 2002)
- Even accounting for income, race, and education, patients' self-rated access to care and having a regular source of care has been found to predict ACSC hospitalizations (Bindman, 1995)

Limitations of ACSCs

Some limitations of ACSCs have also been discussed in the literature. One is that there may be other factors than access that influence differences in ACSC hospitalization rates, such as:

- disease prevalence
- patient tendency to use healthcare resources
- physician practice behaviors
- patient lifestyle factors (Billings, 1993)

Also, ACSC hospitalizations in rural areas are somewhat less associated with access to care; however, the magnitude of the associations is usually smaller but the direction of the association with access to care is the same. This may be an effect of smaller sample sizes and therefore less stable rates in rural areas compared with urban areas. (Schreiber, 1997)

In conclusion, many studies have identified associations between increased access to outpatient care and decreased rates of hospitalization for ACSCs. Factors most consistently associated with high ACSC hospitalization rates are low income, minority race, having Medicaid or no insurance, and lacking a regular source of care. While there are some limitations to using ACSC hospitalization rates, the benefit of having a population based marker of access to care makes ACSC hospitalizations an appropriate marker for this study.

Methods of study

The twelve counties included in the present study were chosen based upon their current lack of designation as a full-county medically underserved area as well as the potential for local interest in and need for having a community health center. The counties include: Baca, Chaffee, Eagle, Garfield, Grand, Gunnison, Huerfano, Lake, Mesa, Moffat, Pitkin, and Routt.

Anecdotal evidence in these counties also suggests that there may be populations or "pockets" within these counties that have poor access to care. For example, in Eagle County, Vail Valley Medical Center supports an indigent care clinic. The clinic sees approximately 6,000 visits per year yet still does not have enough capacity to see all the patients who need care. This population is primarily Spanish-speaking and is focused primarily in a few zip codes in Eagle County. The affluent nature of most of Eagle County overshadows these communities and hides them in statistics like the US Census Bureau data.

As further evidence of the need for indigent health care resources in Garfield County, a nurse practitioner recently opened an indigent care clinic in Rifle, Colorado, in western Garfield County because the need for care is so high. Staffed all by volunteers, the clinic is funded partially through the nurse practitioner's own retirement fund as grants were not available to help start the clinic.

Finally, in Glenwood Springs, Colorado, in eastern Garfield County, Mountain Family Health Center is a community health center that has been operating for about five years. The nurse manager of the emergency room in Glenwood Springs noticed a drop in volume in emergency room visits around the time that the clinic opened. While the volume has subsequently increased again, she notes a much lower anecdotal percent of patient receiving care for ambulatory care conditions than the nurse manager in the emergency room in Rifle, Colorado. There is no community health center in western Garfield County where Rifle is located.

Data on hospital discharges was drawn from the State Hospital Inpatient Database, a comprehensive source of all hospital discharges in Colorado. Permission to use the data was obtained from the Colorado Hospital Association. Hospitalizations for all the ACSCs defined by AHRQ except for low birth weight were combined for the years 1998-2002. Low birth weight was not used as an indicator because of not being able to properly control for confounding factors such as smoking status which have significant impact on the prevalence of low birth weight. Crude ACSC admission rates were calculated then adjusted for age, sex, and race by indirect standardization for comparison with the state level adjusted rates. Due to the rural nature of most of the counties in the study, many of the numbers for the admissions for individual diagnoses were small. Additionally, zip codes with less than 100 people in a category (such as pediatrics, or <18 years) were not reported in the analysis for that category. Therefore, the data presented will be of:

- the overall (<64 years) admission rate for any of the 15 ACSC diagnoses
- the pediatric (<18 years) ACSC admission rate
- the adult (18-64 years) ACSC admission rate

The following table defines the ACSCs included in each category.

Pediatric ACSCs	Adult ACSCs
Perforated appendix Pediatric asthma Dehydration Bacterial pneumonia Urinary tract infection Pediatric gastroenteritis	Perforated appendix Adult asthma Dehydration Bacterial pneumonia Urinary tract infection Chronic obstructive pulmonary disease Hypertension Angina without procedure Congestive heart failure Short-term diabetes complications Long-term diabetes complications Uncontrolled diabetes Lower extremity amputation in diabetic patients

*Note: All diagnoses exclude transfers from other facilities, pregnancy, childbirth, newborn, and neonates.

Results of the study

The following table highlights some differences between the populations, demographics, and poverty levels of the zip codes within the 12 counties compared to the county, state, and national levels. (US Census Bureau, 2000) In **bold** are the counties that have high ACSC admission rates.

County/Zip Code	Population	% <5 yrs.	% > 65 yrs.	% white	% hispanic	% indiv. Below FPL*	Median household income*
U.S.	281,421,906	6.8%	12.4%	75.1%	12.5%	12.4%	$ 41,994
Colorado	4,301,261	6.9%	9.7%	82.8%	17.1%	9.3%	$ 47,203
Baca	4,517	5.9%	22.4%	93.7%	7.0%	16.9%	$ 28,099
81029	447	4.9%	19.9%	96.4%	3.6%	24.8%	$ 24,609
81064	**369**	**5.4%**	**22.8%**	**97.3%**	**0.8%**	**18.0%**	**$ 30,865**
81073	**2,120**	**5.9%**	**24.8%**	**94.0%**	**6.4%**	**16.4%**	**$ 26,450**
81084	**162**	**4.9%**	**19.1%**	**90.7%**	**8.0%**	**21.5%**	**$ 31,563**
81087	162	6.2%	19.1%	93.2%	9.3%	5.1%	$ 35,000
81090	**1,315**	**6.5%**	**20.2%**	**91.5%**	**10.8%**	**15.8%**	**$ 29,881**
Chaffee	16,242	4.4%	17.0%	90.9%	8.6%	11.7%	$ 34,368
81201	**8,710**	**5.0%**	**19.2%**	**93.7%**	**8.6%**	**13.6%**	**$ 31,498**
81211	6,508	3.7%	13.4%	86.3%	9.5%	9.8%	$ 36,405
81236	1,046	4.0%	21.7%	97.3%	2.7%	5.2%	$ 61,429

**** Data in these columns from 1999***

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U.S.	281,421,906	6.80%	12.40%	75.10%	12.50%	12.40%	$41,994
Colorado	4,301,261	6.90%	9.70%	82.80%	17.10%	9.30%	$47,203
Eagle	41,659	7.10%	3.00%	85.40%	23.20%	7.80%	$62,682
80423	**108**	**1.90%**	**9.30%**	**86.10%**	**9.30%**	**2.60%**	**$53,333**
80426	89	3.40%	7.90%	92.10%	4.50%	0.00%	$29,667
80463	226	6.60%	7.50%	92.00%	4.00%	19.00%	$30,000
81620	9,969	7.20%	1.70%	81.40%	25.30%	10.00%	$66,771
81621	5,277	7.40%	3.30%	87.30%	22.80%	9.40%	$62,083
81631	4,526	8.00%	4.00%	90.00%	13.70%	6.30%	$68,625
81632	8,077	7.50%	2.80%	82.00%	27.80%	7.00%	$69,180
81637	4,916	8.80%	2.70%	82.00%	31.70%	5.30%	$56,190
81645	964	5.90%	6.00%	80.90%	42.50%	5.20%	$51,875
81649	**300**	**7.30%**	**8.30%**	**62.00%**	**61.70%**	**8.40%**	**$50,208**
81655	59	11.90%	0.00%	81.40%	16.90%	0.00%	$51,354
81657	5,195	3.40%	4.50%	94.10%	7.90%	8.20%	$57,059
Garfield	43,791	7.50%	8.80%	90.00%	16.70%	7.50%	$47,016
81601	12,768	6.20%	8.10%	89.80%	15.20%	7.80%	$47,710
81630	**861**	**5.00%**	**12.80%**	**95.20%**	**3.00%**	**9.40%**	**$35,536**
81635	**5,041**	**7.20%**	**19.80%**	**93.40%**	**9.70%**	**6.70%**	**$37,058**
81637	4,916	8.80%	2.70%	82.00%	31.70%	5.30%	$56,190
81647	4,410	8.80%	5.00%	92.90%	12.20%	6.10%	$52,756
81652	**3,107**	**6.60%**	**6.60%**	**92.90%**	**9.70%**	**6.20%**	**$47,147**
Grand	12,442	5.80%	7.80%	95.20%	4.40%	7.30%	$47,759
80442	1,532	4.80%	4.80%	95.40%	3.30%	10.40%	$42,599
80446	**3,242**	**5.70%**	**7.20%**	**94.50%**	**3.80%**	**8.10%**	**$50,230**
80447	**1,788**	**4.30%**	**12.50%**	**97.40%**	**2.40%**	**7.10%**	**$46,701**
80451	617	5.50%	6.50%	95.60%	6.00%	4.90%	$40,729
80459	**2,249**	**8.80%**	**8.50%**	**91.60%**	**10.00%**	**8.10%**	**$45,357**
80468	588	7.10%	6.80%	95.60%	4.40%	7.20%	$56,389
80478	817	6.50%	8.60%	98.00%	1.60%	1.40%	$52,393
80482	1,595	3.20%	5.90%	96.90%	1.60%	5.80%	$58,194
Gunnison	13,956	4.60%	6.90%	95.10%	5.00%	15.00%	$36,916
81210	**194**	**3.60%**	**9.80%**	**97.90%**	**1.00%**	**4.00%**	**$32,083**
81220	150	3.30%	16.70%	92.70%	4.00%	0.00%	$29,583

**** Data in these columns from 1999***

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U.S.	281,421,906	6.80%	12.40%	75.10%	12.50%	12.40%	$41,994
Colorado	4,301,261	6.90%	9.70%	82.80%	17.10%	9.30%	$47,203
81224	2,757	5.20%	2.00%	97.30%	2.60%	12.20%	$46,685
81225	707	3.50%	3.70%	97.30%	3.50%	13.00%	$48,864
81230	9,380	4.40%	8.00%	94.30%	5.90%	17.10%	$33,253
81239	160	3.80%	13.10%	95.60%	1.00%	12.20%	$52,083
81241	106	7.50%	13.20%	85.80%	23.60%	6.50%	$51,667
81243	76	10.50%	3.90%	100.00%	0.00%	17.40%	$36,719
81248	60	3.30%	13.30%	98.30%	0.00%	0.00%	$26,250
81434	**190**	**8.40%**	**20.50%**	**92.60%**	**3.20%**	**24.00%**	**$29,205**
Huerfano	7,862	4.40%	17.00%	81.00%	35.10%	18.00%	$25,775
81040	**541**	**3.10%**	**9.80%**	**74.90%**	**32.30%**	**21.00%**	**$24,667**
81055	**1,505**	**4.40%**	**15.10%**	**93.50%**	**9.10%**	**13.10%**	**$33,370**
81069	2,443	4.30%	13.40%	92.40%	10.00%	8.80%	$43,583
81089	**5,602**	**4.50%**	**18.50%**	**77.90%**	**43.10%**	**19.80%**	**$23,654**
Lake	7,812	7.80%	6.60%	77.60%	36.10%	12.90%	$37,691
80461	**7,621**	**7.90%**	**6.50%**	**77.20%**	**36.90%**	**13.00%**	**$37,842**
81251	**191**	**6.80%**	**10.50%**	**94.20%**	**5.80%**	**8.50%**	**$36,000**
Mesa	116,255	6.30%	15.20%	92.30%	10.00%	10.20%	$35,864
81501	**20,743**	**5.90%**	**16.90%**	**89.80%**	**13.70%**	**18.50%**	**$24,771**
81503	23,407	5.30%	14.60%	94.50%	7.20%	5.60%	$46,074
81504	**21,986**	**7.30%**	**13.90%**	**92.20%**	**10.60%**	**7.00%**	**$36,246**
81505	7,255	5.30%	12.90%	92.10%	12.20%	8.50%	$37,756
81506	9,161	4.10%	26.70%	95.70%	4.50%	5.10%	$46,767
81520	**12,238**	**9.40%**	**10.10%**	**88.60%**	**13.60%**	**15.50%**	**$31,592**
81521	**8,858**	**6.40%**	**15.40%**	**91.90%**	**11.00%**	**11.10%**	**$34,517**
81522	61	11.50%	9.80%	95.10%	23.00%	24.00%	$32,500
81523	**583**	**5.30%**	**8.20%**	**96.40%**	**3.40%**	**7.30%**	**$43,750**
81524	1,551	6.90%	8.60%	94.70%	5.00%	4.00%	$42,115
81525	553	6.70%	8.30%	94.80%	4.70%	5.50%	$38,750
81526	5,338	5.80%	16.90%	93.80%	8.70%	11.50%	$34,564
81527	1,402	5.70%	8.10%	95.20%	6.30%	11.80%	$41,326
81624	1,436	4.30%	11.80%	93.00%	7.40%	19.20%	$35,987
81643	718	5.70%	14.60%	94.80%	2.60%	8.70%	$40,625
81646	177	6.80%	26.00%	97.20%	11.30%	20.20%	$28,750

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81643	718	5.70%	14.60%	94.80%	2.60%	8.70%	$40,625
81646	177	6.80%	26.00%	97.20%	11.30%	20.20%	$28,750
Moffat	13,184	6.80%	9.40%	93.60%	9.50%	8.30%	$41,528
81610	424	7.50%	10.40%	95.80%	3.50%	12.90%	$33,068
81625	**12,180**	**7.00%**	**9.10%**	**93.50%**	**9.50%**	**7.70%**	**$41,997**
81638	195	3.60%	12.80%	97.90%	3.10%	10.30%	$31,786
81640	370	2.70%	13.80%	95.10%	14.10%	22.10%	$37,083
Pitkin	14,872	4.10%	6.80%	94.30%	6.50%	6.20%	$59,375
81611	**8,813**	**3.80%**	**7.70%**	**95.10%**	**5.70%**	**6.80%**	**$60,403**
81615	1,861	4.10%	6.20%	97.40%	2.60%	4.40%	$57,279
81623	13,008	7.40%	5.50%	88.70%	23.10%	7.80%	$59,010
81642	61	0.00%	3.30%	88.50%	0.00%	9.50%	$42,321
81654	1,192	3.60%	4.80%	88.20%	11.50%	8.60%	$54,318
81656	404	2.50%	5.70%	96.30%	6.70%	3.60%	$50,313
Routt	19,690	5.50%	5.00%	96.90%	3.20%	6.10%	$53,612
80428	491	6.50%	3.70%	98.00%	1.20%	0.00%	$57,708
80467	1,866	6.90%	6.90%	94.80%	4.00%	6.90%	$45,214
80469	309	6.80%	10.00%	97.40%	2.60%	1.60%	$45,000
80479	44	2.30%	2.30%	100.00%	0.00%	0.00%	$29,688
80483	608	5.40%	8.90%	96.40%	4.60%	8.70%	$38,317
80487	14,012	5.00%	4.30%	97.20%	2.80%	6.00%	$56,687
81639	2,199	6.90%	6.30%	96.50%	5.50%	6.00%	$48,073
81653	42	9.50%	7.10%	88.10%	7.10%	0.00%	$32,500

**** Data in these columns from 1999***

The following table highlights the zip codes (with >100 persons per category) that were found to have higher overall rates of ACSC admissions than the rest of state.

Overall (<65 years) ACSC admission rates

County/Zip Code		2000 population <65 years	Zip code crude annual rate (per 100,000)	Zip code adjusted* annual rate (per 100,000)	State adjusted* annual rate (95% CI)
Baca	81064	288	1388.9	1168.5	500.9 (471.5, 530.4)
	81073	1718	1292.2	1393.6	
	81084	144	1250	2195.7	
Chaffee	81201	7666	597.4	548.2	
Eagle	80423	107	934.6	1258.8	
	81649	438	456.6	691.8	
Garfield	81635	4505	630.4	642.5	
	81652	3195	607.2	614.8	
Grand	80446	3125	627.2	557.7	
	80459	2282	569.7	652.6	
Gunnison	81210	177	678	595.5	
	81434	156	256.4	557.0	
Huerfano	81040	638	376.2	608.5	
	81055	1391	589.5	634.7	
	81089	6642	698.6	794.5	
Lake	80461	9857	833.9	766.6	
	81251	182	1208.8	1251.9	
Mesa	81501	19877	586.6	657.3	
	81520	12620	586.4	554.0	
	81521	8386	558.1	569.9	
Moffat	81625	12163	672.5	661.5	

The following table highlights the zip codes (with >100 persons per category) that were found to have higher rates of ACSC admissions for pediatric diagnoses.

Pediatric (<18 years) ACSC admission rates

County/Zip Code		2000 population <18 years	Zip code crude annual rate (per 100,000)	Zip code adjusted* annual rate (per 100,000)	State adjusted* annual rate (95% CI)
Baca	81064	103	970.9	751.7	599.1 (499.8, 698.3)
	81073	513	866.3	975.2	
Grand	80447	321	560.7	716.2	
Huerfano	81040	163	122.7	956.2	
	81089	1810	519.3	776.3	
Mesa	81523	157	254.8	827.2	
Pitkin	81611	1392	689.7	1115.2	

*Adjusted by indirect adjustment for age, sex, and race.

The following table highlights the zip codes (with >100 persons per category) that were found to have higher rates of ACSC admissions for adult diagnoses (18-64 years).

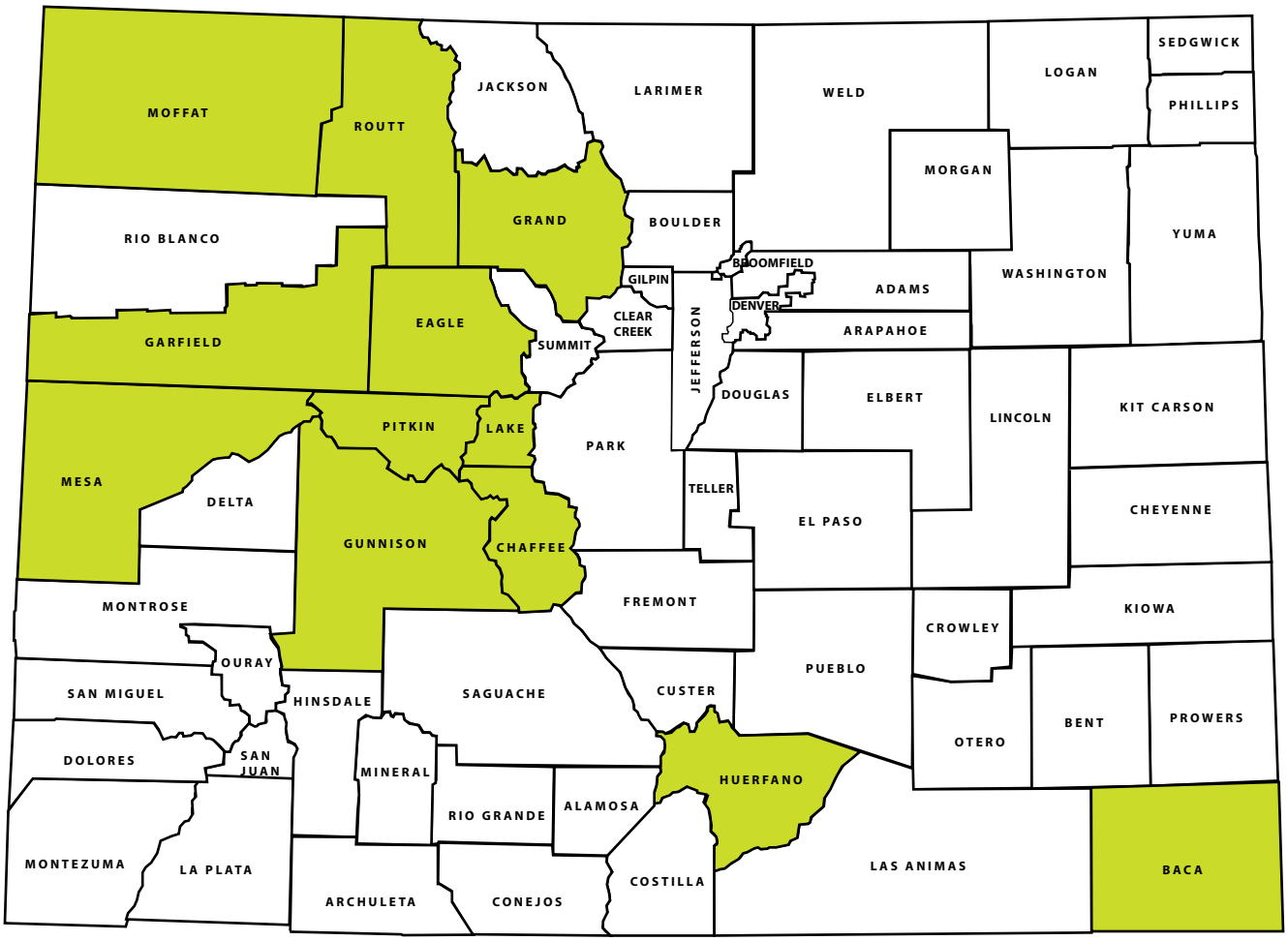
Adult (18-64 years) ACSC admission rates

County/Zip Code		2000 population <65 years	Zip code crude annual rate (per 100,000)	Zip code adjusted* annual rate (per 100,000)	State adjusted* annual rate (95% CI)
Baca	81064	185	1621.6	1400.5	544.4 (511.2, 577.6)
	81073	1187	1482.7	1577.9	
	81084	103	582.5	1001.1	
	81090	784	612.2	607.2	
Eagle	81649	325	492.3	885.9	
Garfield	81630	513	545.8	634.5	
	81635	2994	714.8	790.8	
	81652	2200	654.5	707.1	
Grand	80446	2316	716.8	660.2	
	80459	1562	589.0	741.3	
Gunnison	81434	115	347.8	750.7	
Huerfano	81055	1020	647.1	671.9	
	81089	4832	765.7	800.8	
Lake	80461	6709	781.0	799.3	
	81251	144	1388.9	1411.9	
Mesa	81501	14823	618.0	705.7	
	81504	14244	581.3	617.1	
	81520	8037	572.4	657.6	
	81521	5643	588.3	655.3	
Moffat	81625	8289	709.4	743.5	

*Adjusted by indirect adjustment for age, sex, and race.

The 12 counties and zip codes will be discussed individually below.

County Profiles



Baca County

All Zip Codes: 81029, 81064, 81073, 81084, 81087, 81090

Four zip codes had high **adult** ACSC admission rates:

- 81064, 81073, 81084, and 81090

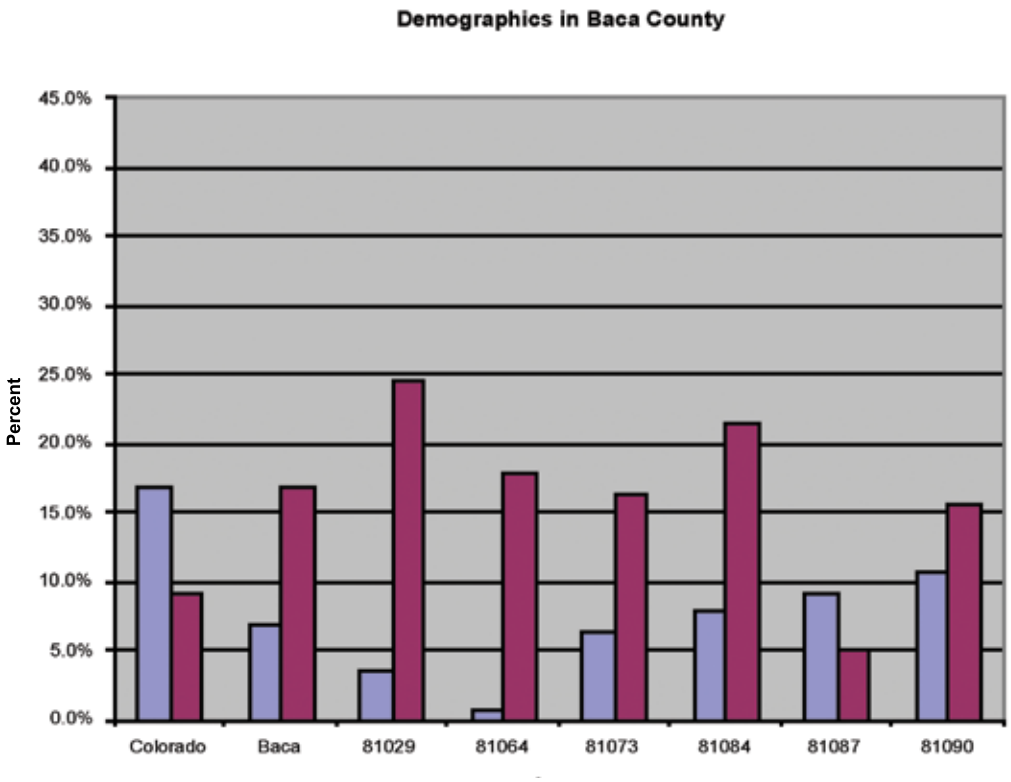
Two of the same zip codes also had high **pediatric** ACSC admission rates:

- 81064, 81073

Map of Baca County

The affected zip codes contain greater than 85% of the county's population.

The following graph shows some of the demographic features of Baca County.



All of the zip codes in Baca County with high ACSC admission rates also have much higher poverty levels than the rest of the state. The Hispanic population throughout most of Baca County is lower than the rest of the state, so language and cultural barriers to health care may not be a large reason for poor access to ambulatory health care, but financial barriers may be.

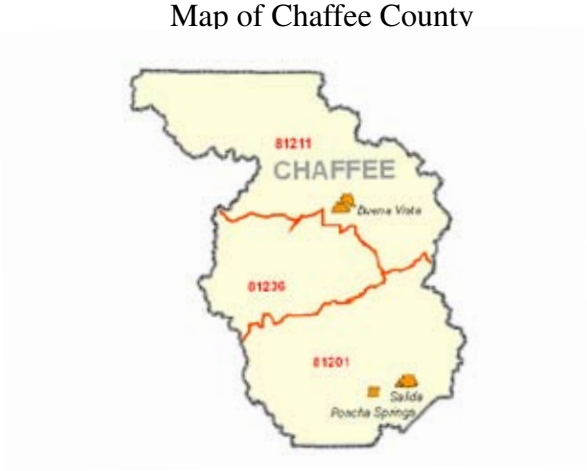
Chaffee County

All Zip Codes: 81201, 81211, 81236

One zip code had a high **overall** ACSC admission rate:

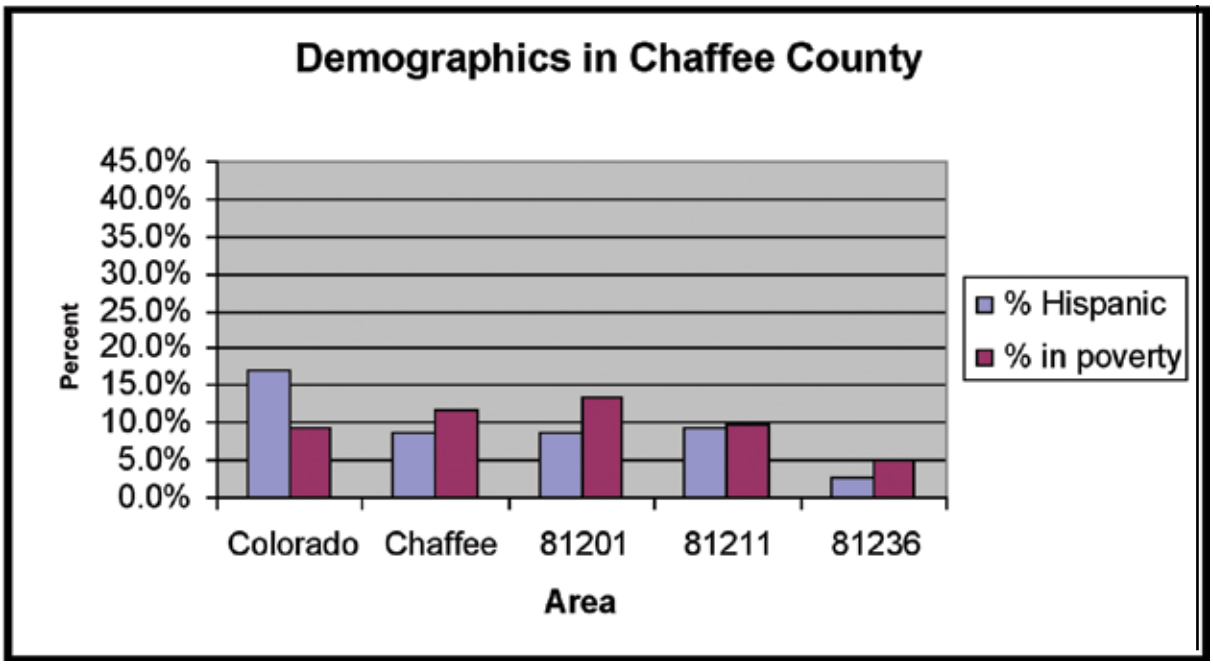
- 81201

Map of Chaffee County



The zip code 81201 accounts for over 50% of the population in Chaffee County.

The following graph shows some of the demographic features of Chaffee County.



The zip code 81201 has a high rate of poverty at almost 14% compared to the rest of the state at 9%. It does not have a high Hispanic population compared to the rest of the state. Therefore, financial barriers may be one of the prominent issues with poor access to care in the zip code 81201. Even though just one zip code has high ACSC rates, since it contains over 50% of the county's population, it may be an indicator of poor access to health care in the whole county.

Eagle County

All Zip Codes: 80423, 80426, 80463, 81620, 81621, 81631, 81632, 81637, 81645, 81649, 81655, 81657

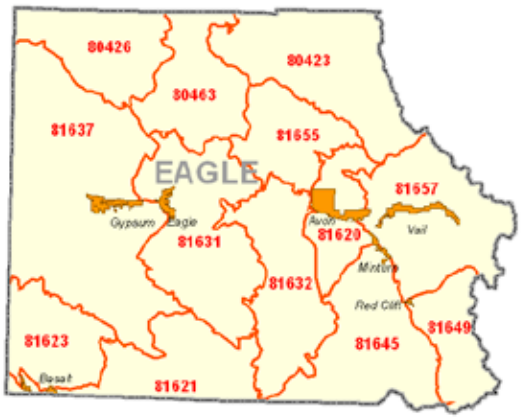
Two zip codes had high **overall** ACSC rates:

- 80423, 81649

One zip code had a high **adult** ACSC rate:

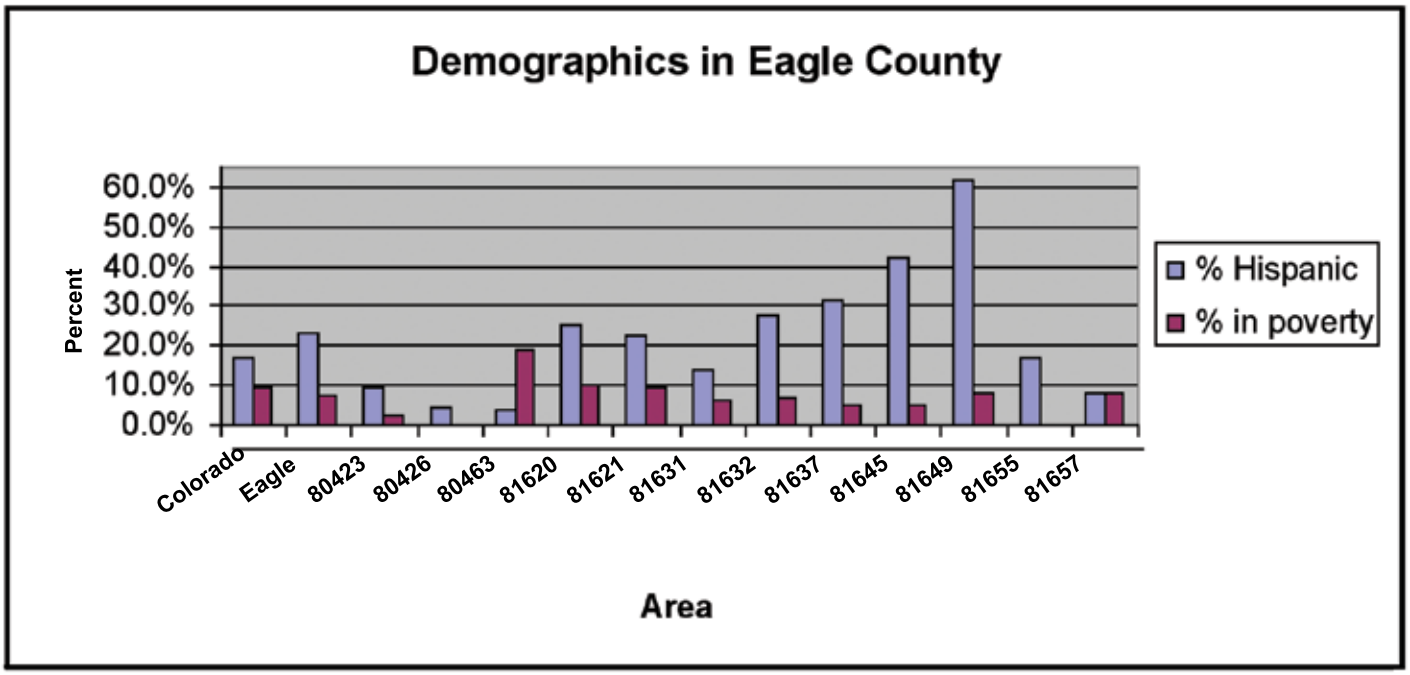
- 81649

Map of Eagle County



The two affected zip codes comprise less than 1% of Eagle County's population.

The following graph shows some of the demographic features of Eagle County.



Zip code 81649 has the greatest proportion of Hispanic population in the county with a rate of 62% compared to the state average of 17%. This may represent a population that has cultural barriers to accessing health care. Poverty is not high compared to the state in either affected zip code. The two affected zip codes are small, so perhaps not indicative of access to health care for the whole county. However, it is also possible that the existing resources in Eagle County are working to prevent some ACSC hospitalizations but that access to healthcare could be even better with expanded resources that could serve residents of all zip codes.

Garfield County

All Zip Codes: 81601, 81630, 81635, 81647, 81652, 81637

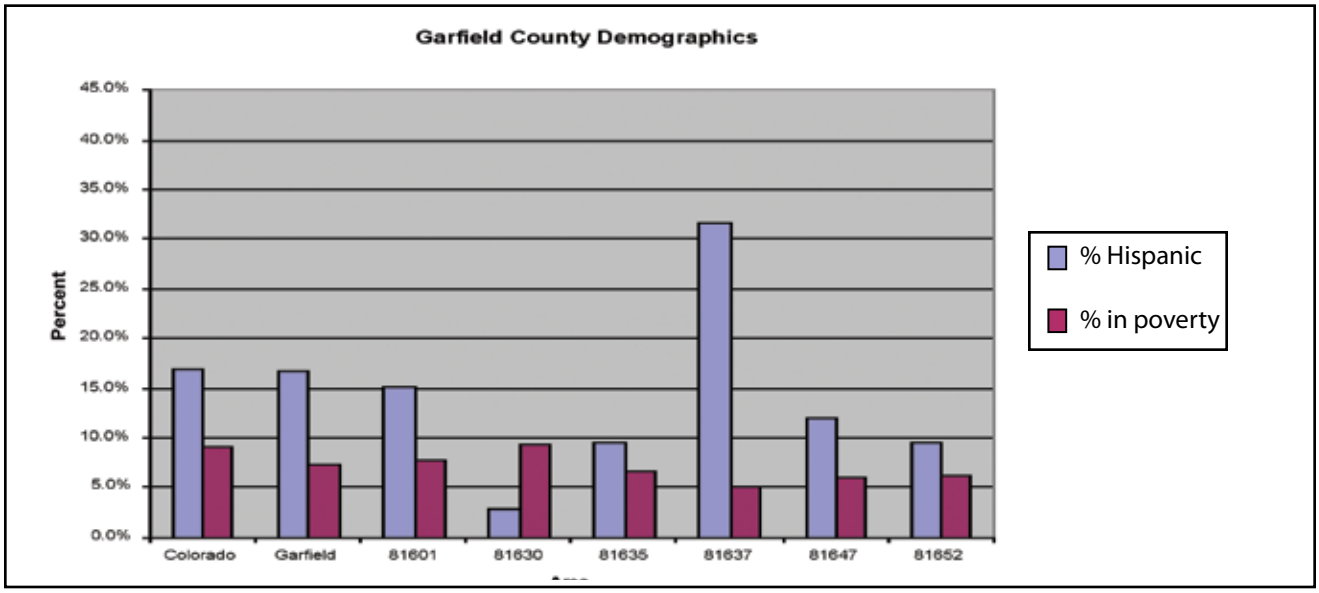
Three zip codes had high **adult** ACSC rates:

- 81630, 81635, 81652

Map of Garfield County

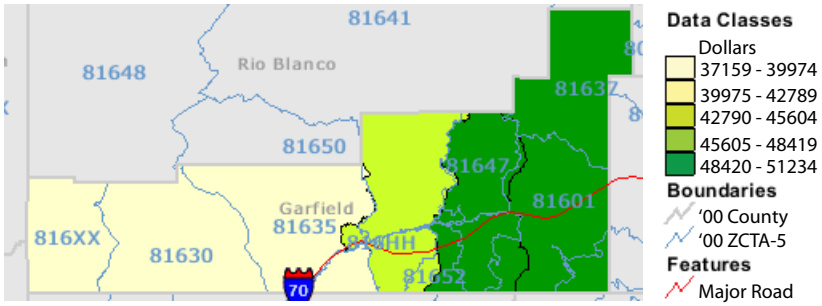
The three affected zip codes contain about 20% of the county's population. The Glenwood Springs/New Castle Service Area in eastern Garfield County already has a designation as an MUP and there is a community health center located in Glenwood Springs.

The following graphs show some of the demographic features of Garfield County.



Zip code 81630 has the highest poverty rate in the county. The percent age of the Hispanic population in other zip codes is much higher than in the affected zip codes. Therefore there may not be cultural barriers to accessing health care in Garfield County as much as financial barriers.

The following map shows the median household income in Garfield County. Two of the three affected zip codes are located in the poorest region of Garfield County.



Grand County

All Zip Codes: 80442, 80446, 80447, 80451, 80459, 80468, 80478, 80482

One zip code had a high **pediatric** ACSC admission rate:

- 80447

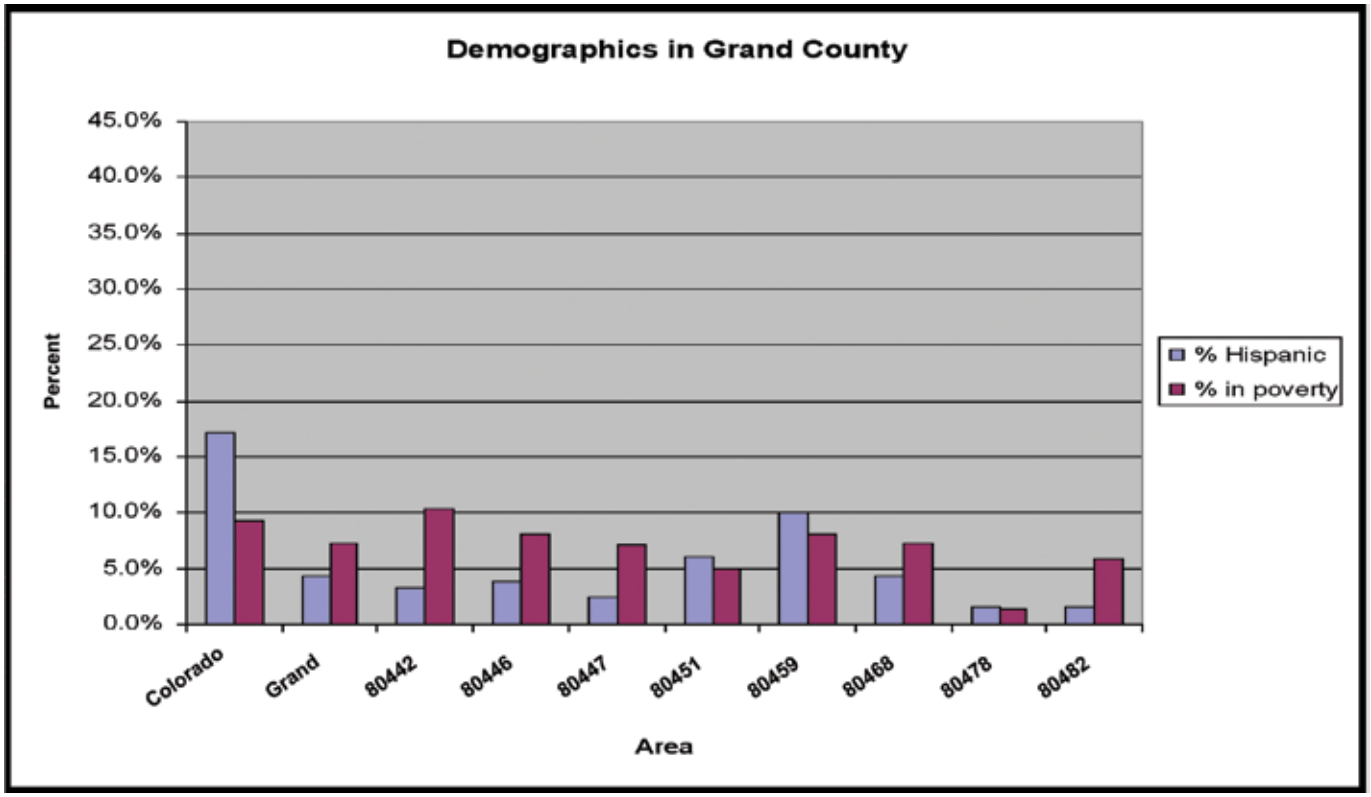
Two zip codes had high **adult** ACSC admission rates:

- 80446, 80459

Map of Grand County

The three affected zip codes contain almost 60% of the county's population.

The following graph shows some demographic features of Grand County.



Zip code 80446 has a slightly higher poverty rate at 8% compared to 7% in the rest of the county. Zip code 80459 has the highest Hispanic population in the county at 10% compared to 4% in the rest of the county. Both financial and cultural barriers may contribute to lack of adequate ambulatory health care in Grand County.

Gunnison County

All Zip Codes: 81210, 81220, 81224, 81225, 81230, 81239, 81241, 81243, 81248, 81434

Two zip codes had high overall ACSC admission rates:

- 81210, 81434

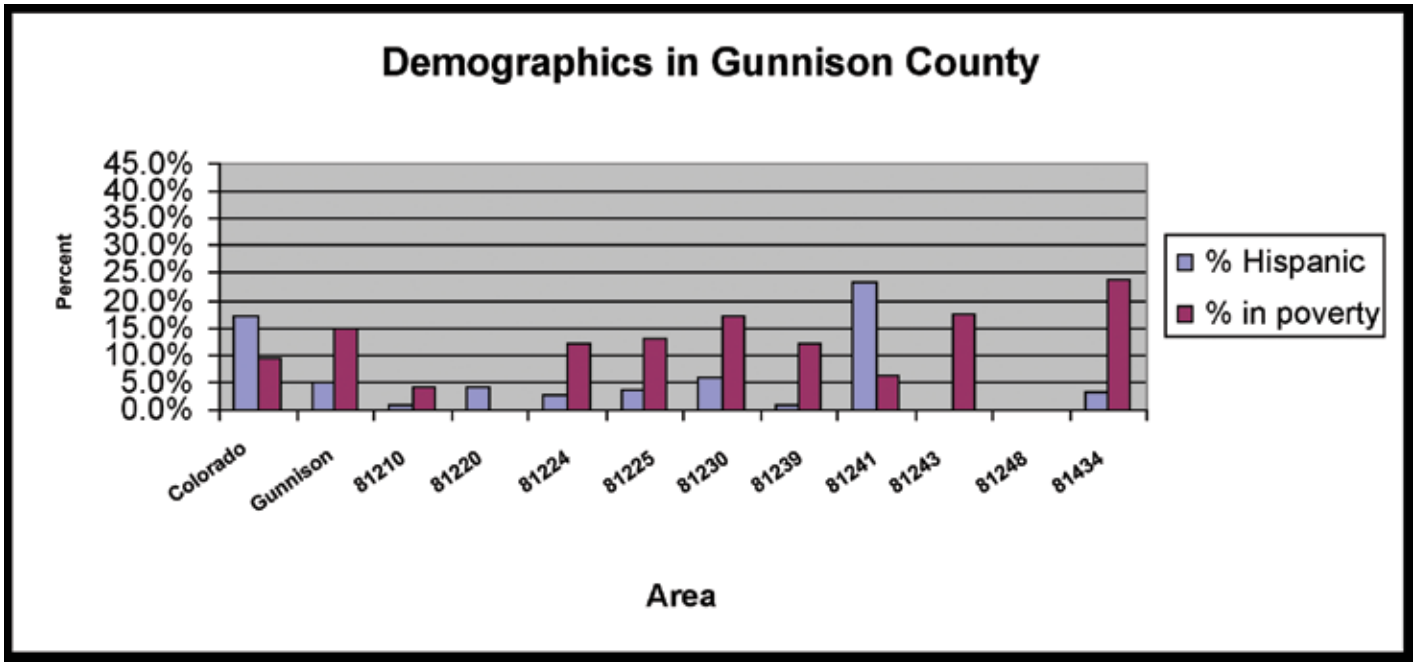
One zip code had a high adult ACSC admission rate:

- 81434

Map of Gunnison County

The two affected zip codes comprise about 3% of the county's population.

The following graph shows some demographic features of Gunnison County.



Zip code 81434 has the highest poverty rate in the county, which at 24% is much higher than the state average of 9%. The two zip codes with high ACSC rates do not have a high percent Hispanic population, which is consistent with the county overall having a low percent Hispanic population. These two zip codes make up a small percent of the county's overall population and may not be representative of access to health care in the whole county. However, with the high rate of poverty in zip code 81434 is data indicates that there may be some underlying disparities in access to health care in Gunnison County based on financial resources.

Huerfano County

All Zip Codes: 81040, 81055, 81069, 81089

Two zip codes had high **pediatric** ACSC admission rates:

- 81040, 81089

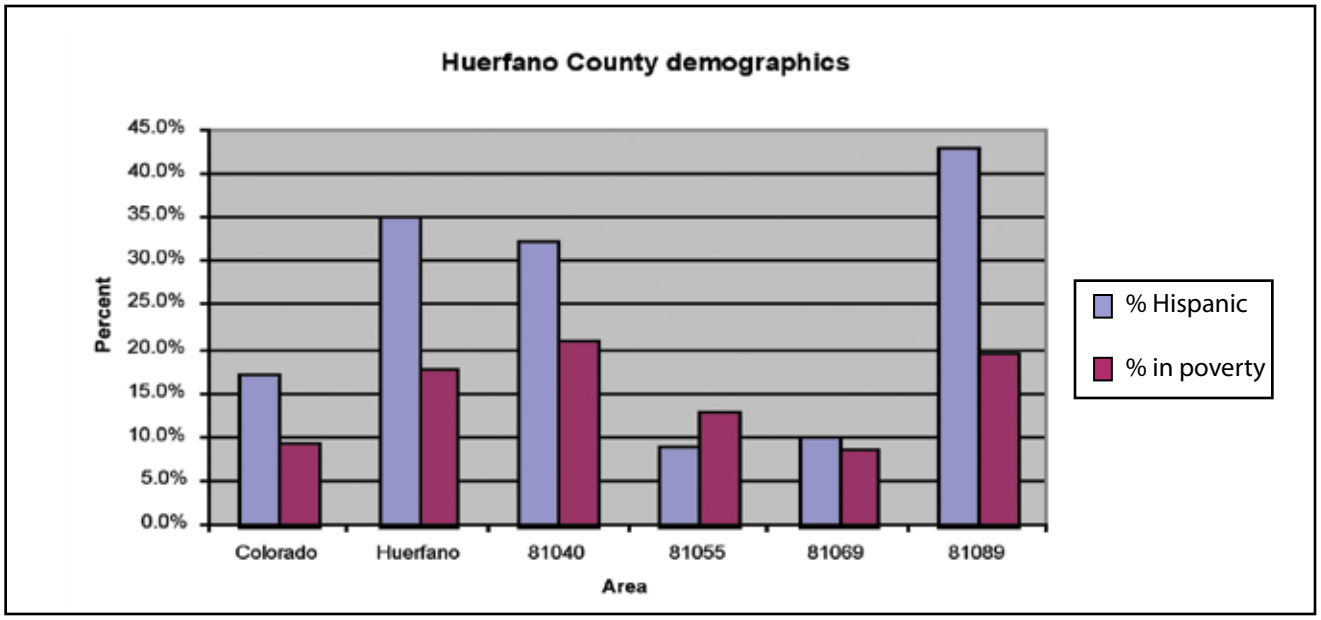
Two zip codes had high **adult** ACSC admission rates:

- 81055, 81089

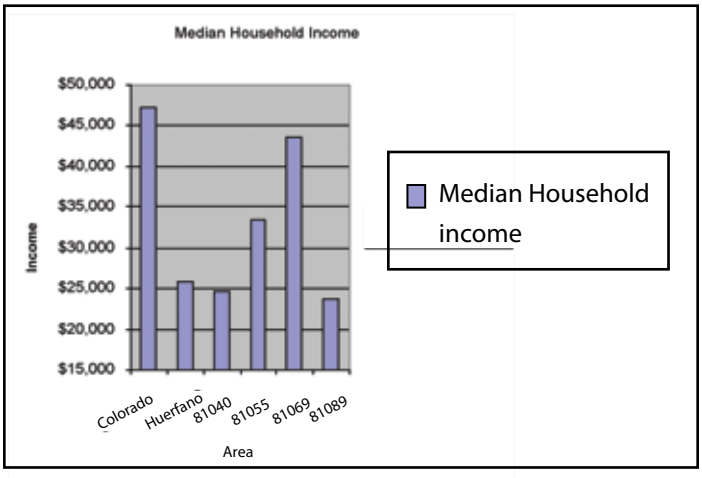
Map of Huerfano County

Zip codes 81040 and 81089 contain almost 80% of the population of the county.

The following graphs show some of the demographic features of Huerfano County.



The Hispanic population in the whole county at 35% is higher than the rest of the state at 17%, especially in zip codes 81040 and 81089. The same two zip codes also have a slightly higher poverty rate than the rest of the county and a much lower median household income than the rest of the state. So both cultural and financial considerations may be a barrier to receiving adequate ambulatory health care in Huerfano County.



Lake County

All Zip Codes: 80461, 81251

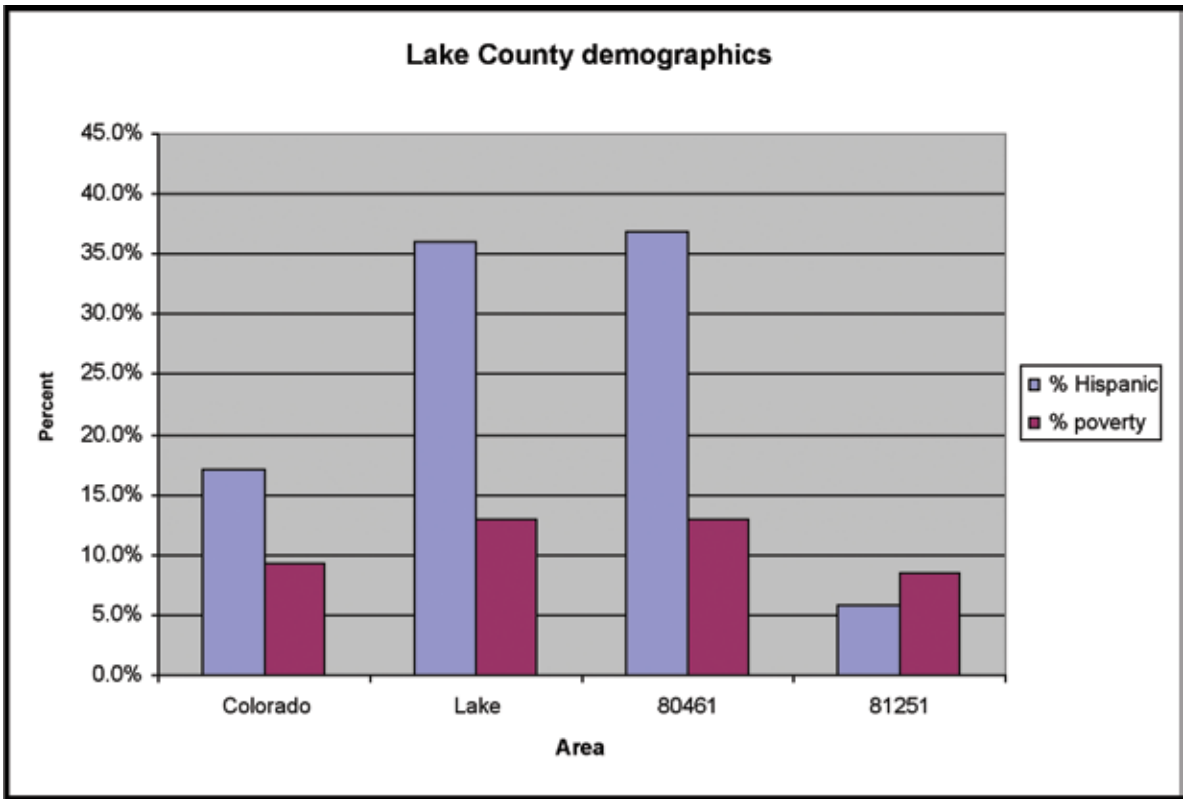
Two zip codes had high **adult** ACSC admission rates:

- 80461, 81251

Map of Lake County

Essentially the whole county has a high rate of hospitalization for ACSC conditions.

The following graph shows some of the demographic features of Lake County



Zip code 80461 has a larger Hispanic population than the rest of the state. This zip code contains the vast majority of the county's population. Lake County's median household income of $37,691 is also much lower than the state average of $47,203. So both financial and cultural barriers to healthcare may exist in Lake County.

Mesa County

All Zip Codes: 81501, 81503, 81504, 81505, 81506, 81520, 81521, 81522, 81523, 81524, 81525, 81526, 81527, 81624, 81643, 81646

One zip code had a high pediatric ACSC admission rate:

- 81523

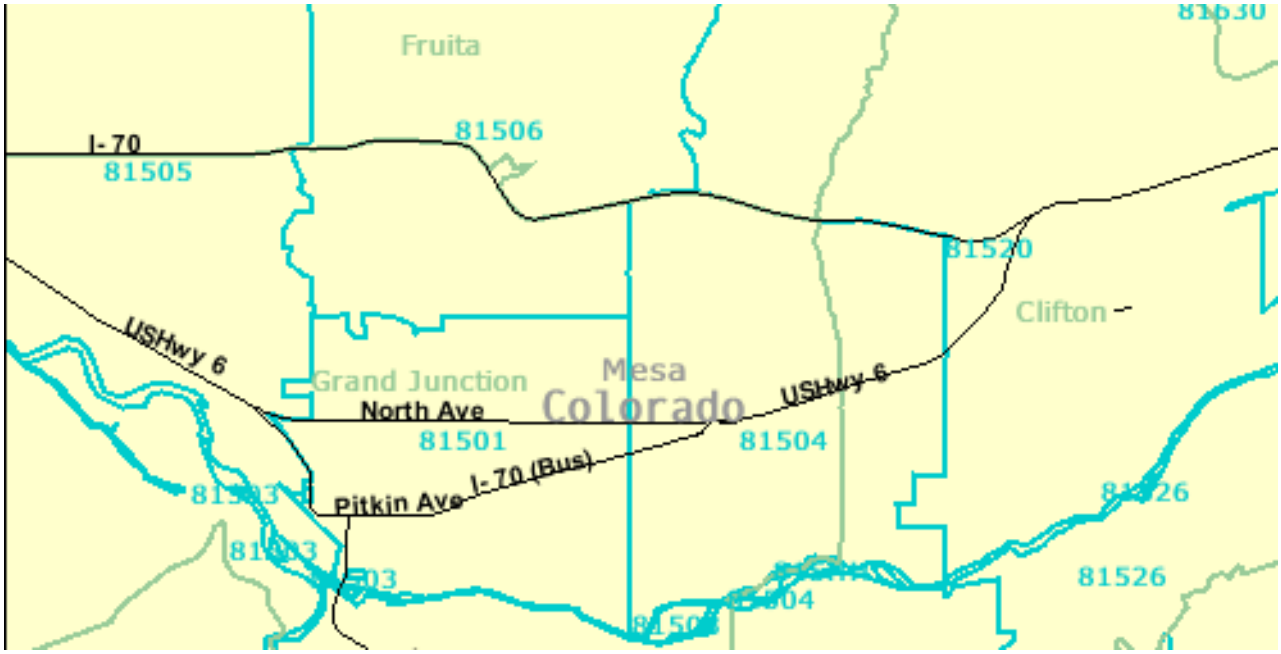
Four zip codes had high **adult** ACSC admission rates:

- 81501, 81504, 81520, and 81521

Map of Mesa County

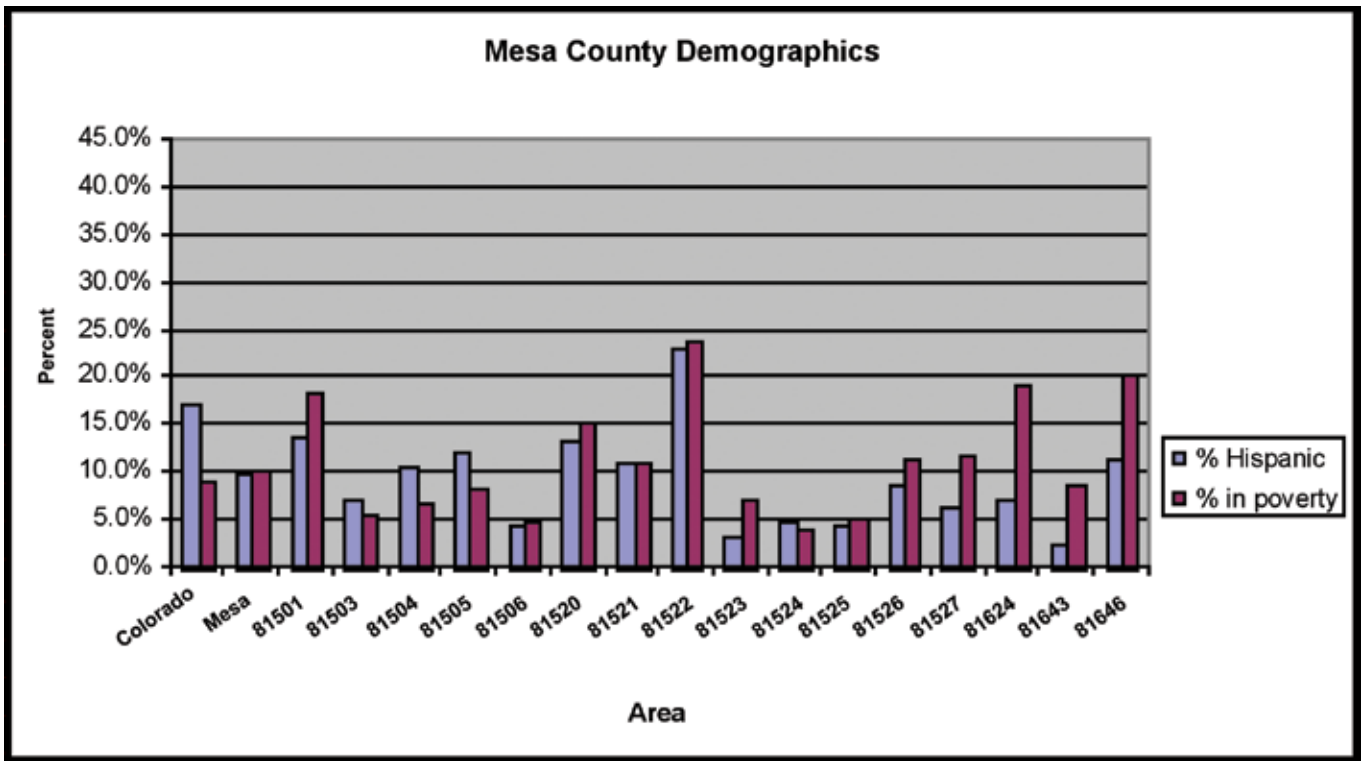
About 55% of the county's population resides in the affected zip codes.

Map of Grand Junction and surrounding areas

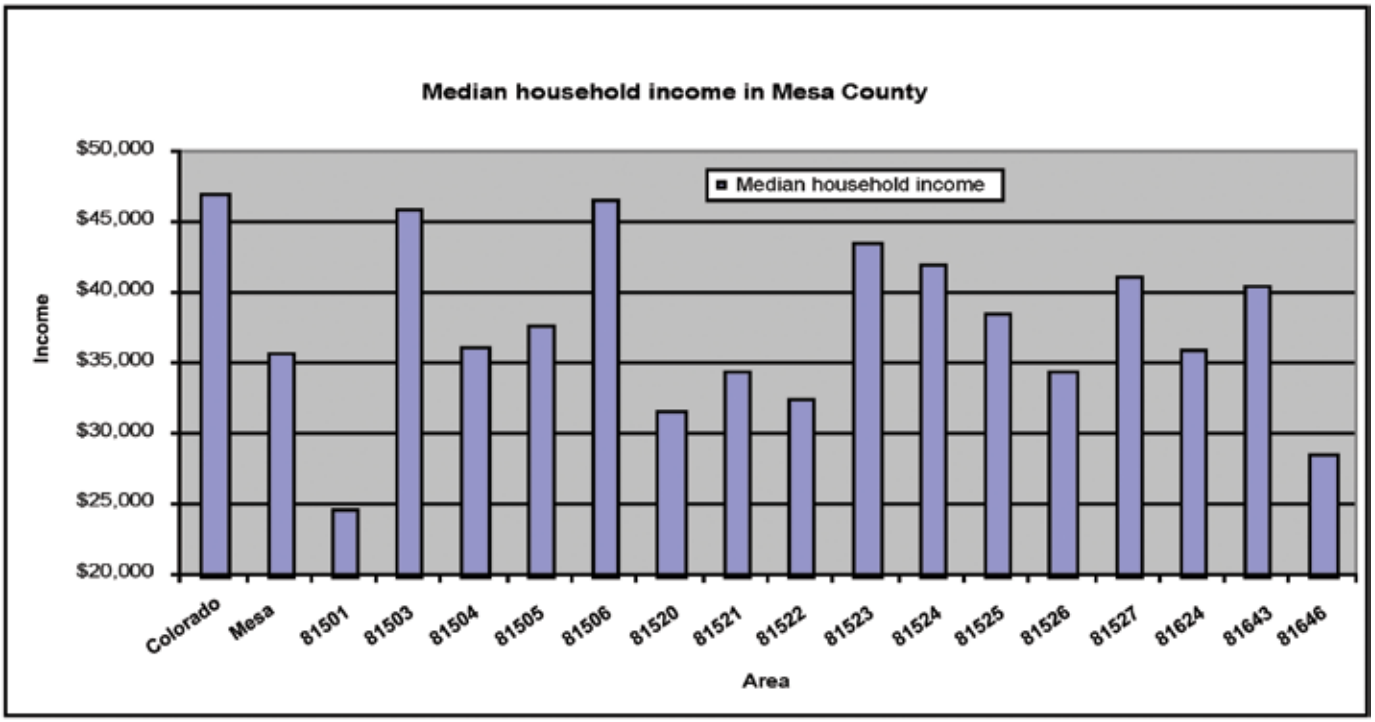


Mesa County

The following graphs show some of the demographic features of Mesa County.



Two of the zip codes, 81501 and 81520, have much higher rates of poverty and lower household income levels compared to the rest of the state and the county, as well as a slightly greater Hispanic population than the rest of the county.



Moffat County

All Zip Codes: 81610, 81625, 81638, 81640

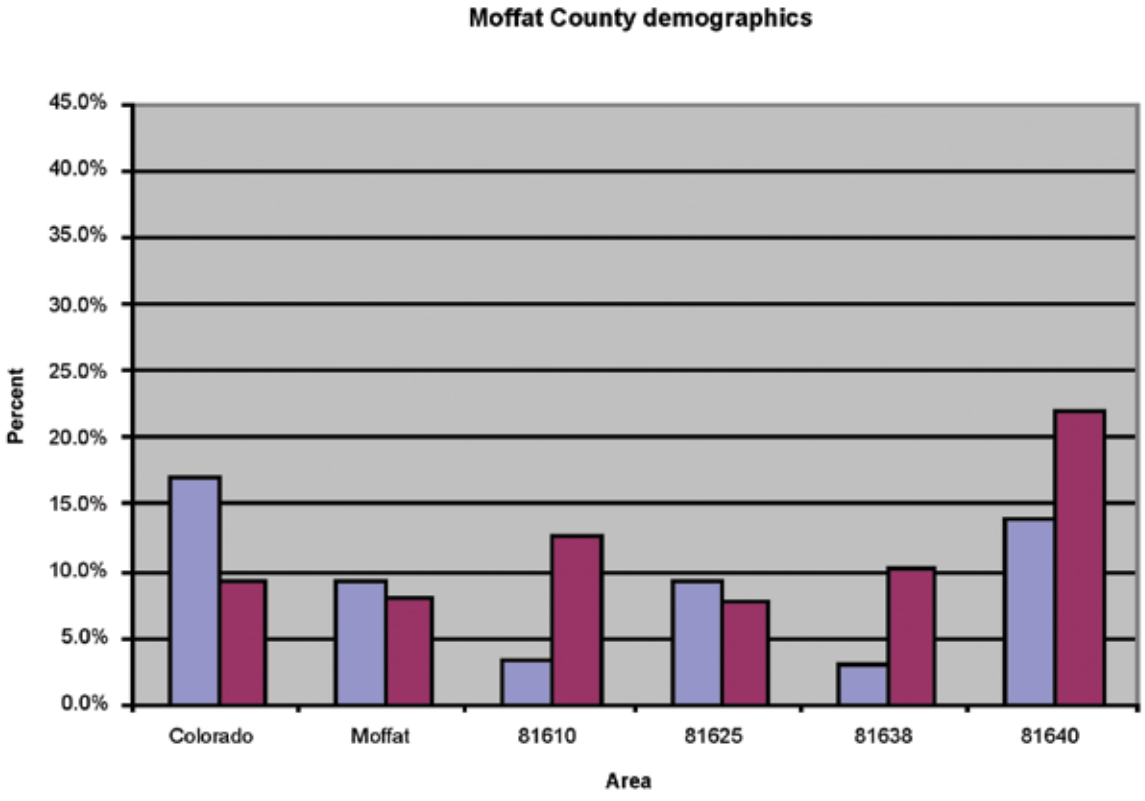
One zip code had a high **adult** ACSC admission rate:

- 81625

Map of Moffat County

Zip code 81625 contains over 90% of the county's population.

The following graph shows some of the demographic features of Moffat County.



While the demographics of zip code 81625 are similar to the rest of the county, over 90% of the county's population lives in this zip code area. Therefore, the vast majority of the county experiences high rates of hospitalization for ACSC conditions, indicating a lack of adequate ambulatory care in most of the county's residents.

Pitkin County

All Zip Codes: 81611, 81625, 81623, 81642, 81654, 81656

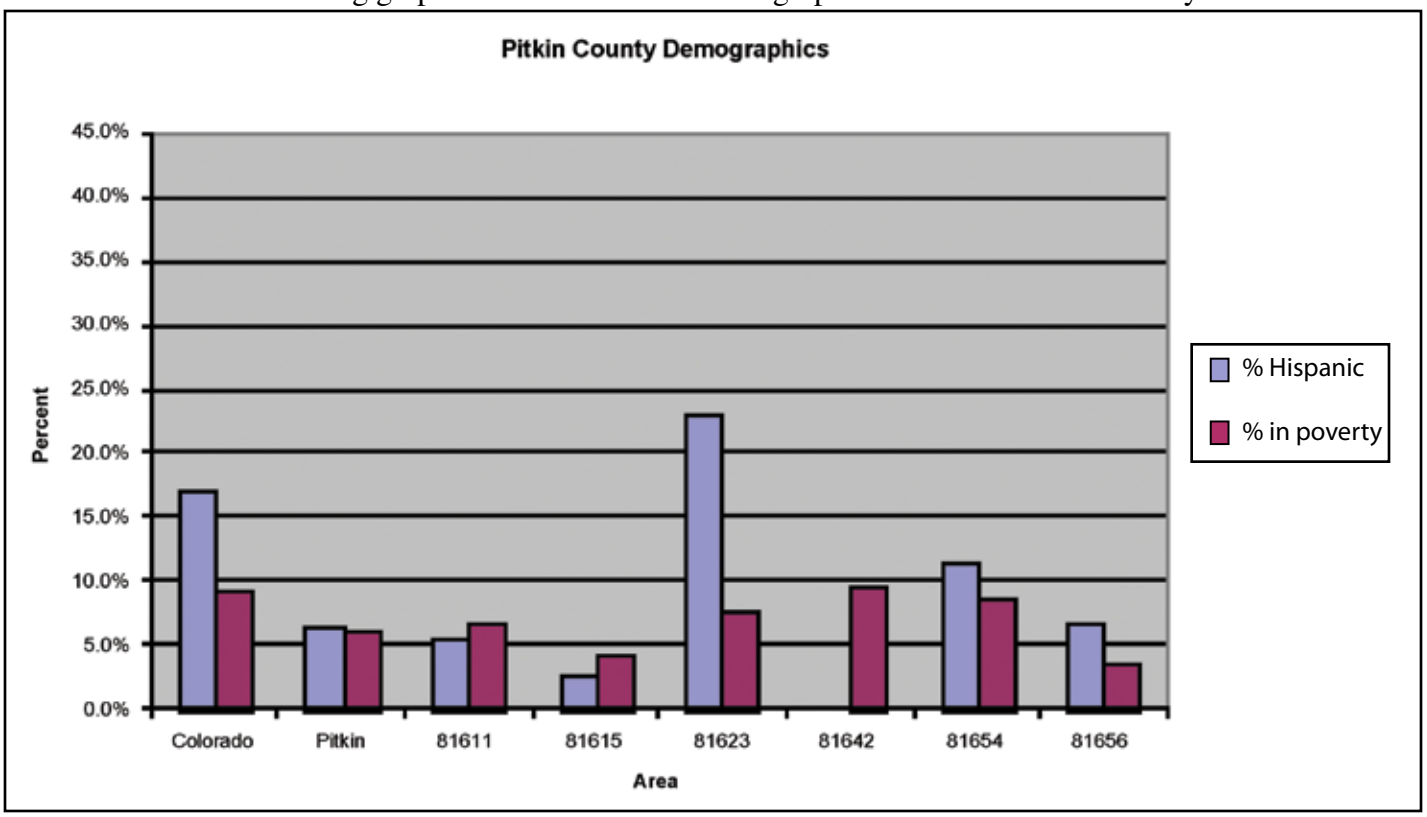
One zip code had a high **pediatric** ACSC admission rate:

- 81611

Map of Pitkin County

The affected zip code contains almost 60% of the county's population.

The following graph shows some of the demographic features of Pitkin County.



Zip code 81611 is similar demographically to the rest of the county. Since Pitkin County does not have any zip codes with high rates of adult ACSC hospitalizations, there may be factors in the county specifically contributing to those rates in children. These factors may be related to inadequate numbers of pediatricians in the community, access to health insurance for children, or other local factors. This high pediatric ACSC admission rate may need to be examined at the local level since over 60% of the county's population is included in the affected zip codes.

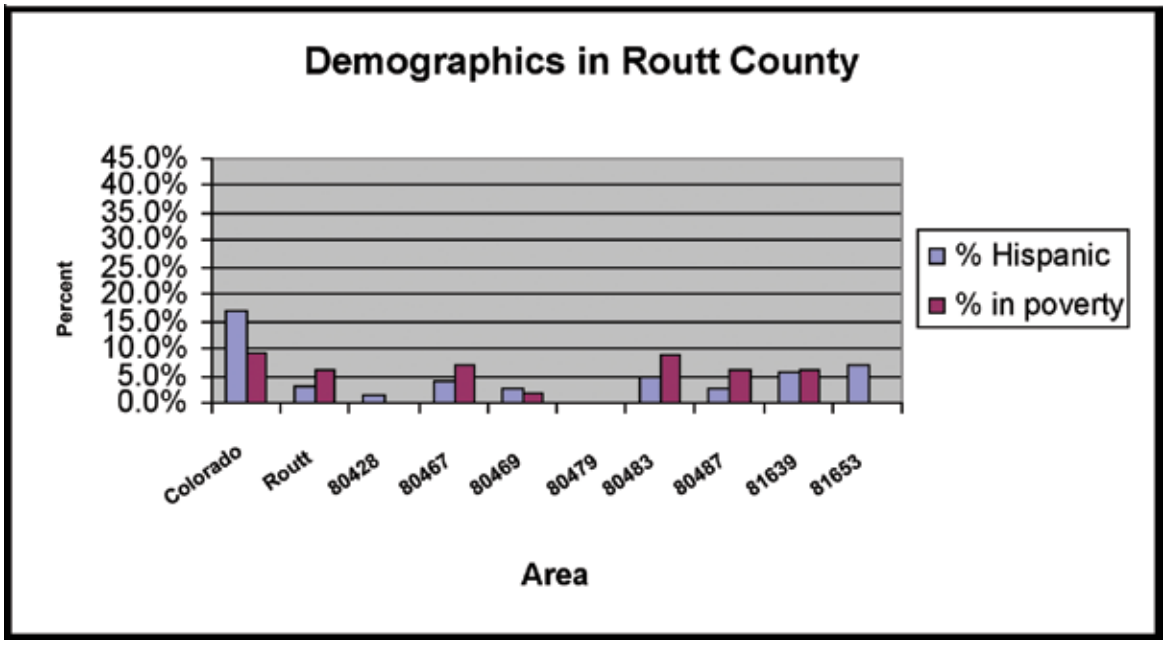
Routt County

All Zip Codes: 80428, 80467, 80469, 80479, 80483, 80487, 81639, 81653

No zip codes had high rates of ACSC admissions.

Map of Routt County

The following graph shows some of the demographic features of Routt County.



The county of Routt and all of the zip codes are well below the state averages for poverty rates and proportion of Hispanic population. No zip codes had high ACSC admission rates in Routt County. This may be in indication that health care access is adequate in Routt County. However, there may be other factors such as a transient seasonal workforce, service workers living outside of Routt County, or large numbers of emergency room visits for ACSCs without hospitalizations that may need to be examined on a local level. The lack of high ACSC admission rates in Routt County does not mean that there are no problems with access to health care on the local level.

Discussion of results

The results of this study support the concern that there are medically underserved areas within the 11 of 12 counties that were examined. Specifically, in looking at rates of hospitalization for ACSCs within the 12 counties, higher rates of hospitalization were found in zip codes in the following counties: Baca, Chaffee, Eagle, Garfield, Grand, Gunnison, Huerfano, Lake, Mesa, Moffat, and Pitkin counties.

In many of the zip codes with high ACSC admission rates, there were also higher rates of poverty, greater Hispanic populations, or lower median household incomes. This lends credibility to the idea that ACSC admissions are an indication of underlying problems with access to care, as these same factors have also been associated with health care access problems. While this study did not specifically examine rates of ACSC admissions in counties with community health centers to be able to compare with these 12 counties, previous studies have looked at this issue. A study of patients who utilized a FQHC found that FQHC patients were 5-33% less likely to be hospitalized and 8-18% less likely to have emergency room visits for ACSCs than patients treated by another provider (Falik, 2001)

ACSCs have been extensively used in the literature and endorsed by AHRQ as a measure of access to health care. ACSC admission rates are a good population based measure to indicate broad problems with access to health care. One of the limitations of using ACSCs is that the solution to the problem is not identified. Therefore, the problem with access in these zip codes could be lack of providers, lack of insurance, lack of providers who see patients with certain insurance, other financial or cultural barriers to obtaining ambulatory health care, or other reasons. Therefore, the following list of recommendations offers potential solutions to the problem with access to health care in these areas. Specific actions for each community will need to be made based on local needs and resources.

Recommendations

- Establish programs to increase medical insurance coverage of underserved populations in these areas
- Increase provider acceptance of Medicaid or self-pay patients through local outreach programs
- Establish new or improved relationships with providers in adjoining areas to better serve the health care needs of the underserved areas such as providing better transportation or telecommunication services through email or the telephone
- Designate underserved areas as medically underserved areas or HPSAs to allow community health centers or health providers to be recruited to the area to better serve the underserved populations

While all of the above recommendations have the potential to improve access to health care in these areas, the final recommendation of designating the areas as medically underserved areas has several advantages over the other recommendations. The primary benefit is that community health centers are designed to serve underserved populations. Establishing community health centers in some of these areas has the best long-term potential to provide adequate health care to these populations. Second is that establishing a community health center will also accomplish some of the other recommendations such as recruiting more providers and increasing providers' acceptance of uninsured or Medicaid patients. Community health centers also often serve as a source of collaboration with existing providers to provide referrals to specialists and other medical services.

Two areas that this study does not address include access to mental health and dental care throughout Colorado. Both of these issues are well-known access problems in Colorado and were sited by several communities with whom we spoke about this project. Neither condition has been examined well in the literature through inpatient hospitalization records. However, it is conceivable that hospitalizations for conditions such as substance abuse may prove to be beneficial in the future. Since they have not been previously validated or extensively used in the literature, they were not included in this study.

One final comment about the results of this study is that these results do not mean that there are not problems with access to ambulatory health care in the zip codes or counties that did not have high rates of ACSC hospitalizations. There may still be access problems in these communities that did not materialize as increased ACSC admission rates for various reasons. Perhaps some communities have healthier populations who do not get hospitalized frequently whether or not they have access to ambulatory care. Or perhaps the populations in some communities are transient so that the lack of access does not result in hospitalizations for that zip code. One other indicator of adequate ambulatory care is how frequently the emergency room is utilized for primary care needs. Unfortunately, state-wide data is not collected on emergency room visits, but local communities may consider studying their emergency room use as another possible way to document inadequate ambulatory health care resources.

Conclusions

This study found pockets of higher rates of pediatric, adult, or both ACSC hospitalizations throughout Baca, Chaffee, Eagle, Garfield, Grand, Gunnison, Huerfano, Lake, Mesa, Moffat, and Pitkin counties. These higher rates of admissions are an indication that populations in these zip codes do not have adequate access to ambulatory health care services. The strongest recommendation is to designate these areas as medically underserved areas so that resources like community health centers can be established to better serve these communities. Lack of high ACSC admission rates does not mean that a zip code or county does not have problems with access to health care. Local needs assessments may help all communities in the study to identify problems with access to health care. Taking such steps will improve access to health care and the overall health of the residents of Colorado.

References

AHRQ Quality Indicators-Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions. Rockville, MD: Agency for Healthcare Research and Quality. Revision 4. (November 24, 2004). AHRQ Pub. No. 02-R0203.

Basu, J, Friedman, B, Burstin, H. (2002). Primary Care, HMO Enrollment, and Hospitalization for Ambulatory Care Sensitive Conditions. Medical Care, 40(12), 1260-1269.

Billings, J, Zeitel, L, Lukomnik, J, Carey, TS, Blank, AE, Newman, L. (1993). Impact of Socioeconomic Status On Hospital Use In New York City. Health Affairs, 12, 162-173.

Bindman, AB, Grumbach, K, Osmond, D, Komaromy, M, Vranizan, K, Lurie, N, Billings, J, Stewart, A. (1995) Preventable Hospitalizations and Access to Health Care. JAMA, 274(4), 305-311.

Donaldson, M, Yordy, K, Vanselow, N, Editors. Defining Primary Care: An Interim Report (1994). Institute of Medicine. National Academy Press, Washington D.C., p. 15-28.

Falik, M, Needleman, J, Wells, B, Korb, J. (2001). Ambulatory Care Sensitive Hospitalizations and Emergency Visits: Experiences of Medicaid Patients Using Federally Qualified Health Centers. Medical Care, 39(6), 551-561.

Gill, JM, Mainous, AG. (1998). The Role of Provider Continuity in Preventing Hospitalizations. Archives of Family Medicine, 7, 352-357.

Gadomski, A, Jenkins, P, Nichols, M. (1998). Impact of a Medicaid Primary Care Provider and Preventive Care on Pediatric Hospitalization. Pediatrics, 101(3), e1-e10.

Guidelines for Medically Underserved Area and Population Designation, HRSA Bureau of Health Professions, US Department of Health and Human Services. Accessed on July 20, 2005 at http://bhpr.hrsa.gov/shortage/muaguide.htm.

Hakim, RB, Bye, BV. (2001). Effectiveness of Compliance With Pediatric Preventive Care Guidelines Among Medicaid Beneficiaries. Pediatrics, 108, 90-97.
Pappas, G, Hadden, WC, Kozak, LJ, Fisher, GF. (1997). Potentially Avoidable Hospitalizations: Inequalities in Rates between US Socioeconomic Groups. American Journal of Public Health, 87, 811-816.

Health Professional Shortage Area Primary Medical Care Designation Criteria. HRSA Bureau of Health Professions, US Department of Health and Human Services. Accessed on August 15 at http://bhpr.hrsa.gov/shortage/hpsacritpcm.htm.

Maps in American FactFinder, U.S. Census Bureau. Accessed on August 19, 2005 at http://factfinder.census.gov/jsp/saff/SAFFInfo.jsp?_pageId=gn7_maps.

Parchman, ML, Culler, SD. (1994). Primary Care Physicians and Avoidable Hospitalizations. The Journal of Family Practice, 39(2), 123-128.

Rural Health Clinic Fact Sheet. Centers for Medicare and Medicaid Services. Accessed on July 26, 2005 at http://www.cms.hhs.gov/medlearn/2RuralHlthClinic.pdf.

Shi, LY, Samuels, ME, Pease, M, Bailey, WP, Corley, EH. (1999). Patient Characteristics Associated With Hospitalizations for Ambulatory Care Sensitive Conditions in South Carolina. Southern Medical Journal, 92(10), 989-998.

StateHealthFacts.org, Individual State Profiles, Colorado. Kaiser Family Foundation. http://www.statehealthfacts.org/cgi-bin/healthfacts.cgi?action=profile

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