



## **Income Inequality in Colorado**

by

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## **Income Inequality in Colorado**

Income inequality and poverty, are significant arenas for social and economic policy. While one might assume that these are problems of the developing world, significant income gaps exist within the United States as well as do the serious and unsettling social problems that result. Within Colorado's 63 counties,<sup>1</sup> median family incomes varied from \$19,531 in Costilla county to \$82,929 in Douglas county in 1999. When Census 2000 data were released, Douglas county, Colorado, was identified as the most affluent county in the United States. When these 1999 income figures are deflated by associated county cost of living indices, the range narrows somewhat to \$22,227 and \$80,446 (Garner and Eckert, 2002). Nonetheless, differentials of this magnitude, nearly 4:1 in this example, suggest major differences in county economies, their diversity and vitality, and in the life styles and opportunities of county residents. Important levels of relative deprivation and absolute poverty must also exist within such widely disparate counties. The data and analyses below suggest that important differences in economic development needs exist in different areas within Colorado and that a variety of intervention strategies may be warranted.

### **Why Are Income Inequality Measurements Important?**

Income inequality measures serve as indicators of underlying structural problems that can lead to constrained economic growth, human suffering or social unrest. A high income inequality measure says that an important part of society does not participate equally in socio-economic life. The higher the inequality measure, the greater the number of marginalized. Beneath this, can be a wide range of causes. High inequality may indicate unequal access to land or other productive capital, a discriminatory labor market, barriers to social mobility, unequal educational achievements, cultural and linguistic barriers, and other factors. Where inequality is significant, these factors can and should be addressed by policy if all people are to have an equal opportunity to reach the promise of America.

This paper is a short analysis of income inequality in Colorado using standard measures applied internationally.<sup>2</sup> The intent is to show disparities that exist, provide details on the associations between income inequality and poverty, and to provide preliminary evidence for policy change. Both inequality and poverty are significant in parts of this state. In general, the health of the State's economy and the welfare of its citizens will benefit if corrective change occurs.

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<sup>1</sup>When the data for this study were developed, Broomfield had not yet become Colorado's 64<sup>th</sup> county.

<sup>2</sup>The principal statistic used here is the Gini Ratio of Concentration (the Gini coefficient). This is supplemented with the "relative proportions" approach commonly used by the World Bank. Measuring income inequality is the subject of a copious literature. Recent works which can lead the interested reader into this material include: Sen, 1997, and Kakwani, 1980, 1999.

## **Colorado Within the National Context**

The inequality measure used through most of this study is the Gini Ratio of Concentration, or more commonly the Gini Ratio. The Gini Ratio provides a single, non-dimensional inequality statistic and has been in common usage since it was conceived in 1905. Because this statistic has no units of measure, it is particularly suited to comparisons between populations with very different incomes or even different currencies. Gini coefficients theoretically range from 0.0 for perfect equality to 1.0 for perfect inequality. In practical applications, however, Gini ratios of 0.25 – 0.35 are considered good (anything below 0.30 would be exceptional) while ratios in excess of 0.45 – 0.50 indicate serious maldistributions. The highest measured at a national level was a figure of 0.72 for South Africa under apartheid with all the discriminations that implied.

Population and income data used in this study are from the U.S. Census Bureau - Census 2000 and the Current Population Survey, March 2000. These sources provide data grouped into either 10 or 16 income classes. The normally perceived Gini ranges noted in the above paragraph are generally drawn from data organized into quintiles, or groups including 20 percent of the population. Some information is lost with larger groupings, therefore the U.S data, using more income classes, will provide somewhat higher Gini Ratios than those above.

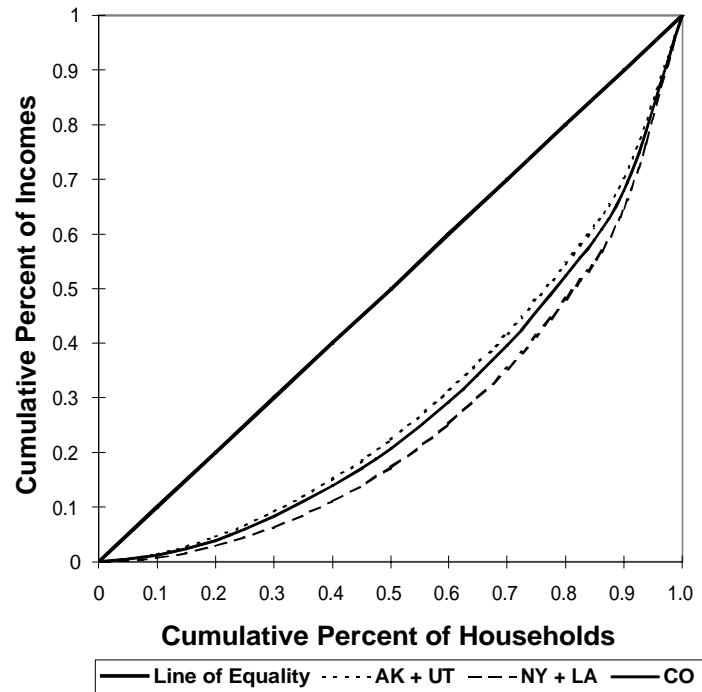
### **The Anatomy of Inequality – I**

Using 16 income classes, the Gini coefficient for Colorado is estimated at 0.436. This ranks Colorado 22 out of 50 states nationally in equality of its income distribution. Alaska and Utah are most egalitarian with Gini ratios of 0.408 and 0.409 respectively. New York and Louisiana show the least egalitarian income distributions with ratios of 0.488 and 0.476 respectively. The United States has a coefficient of 0.459. Washington D.C., estimated as a separate unit, has a Gini coefficient of 0.530, a level of inequality which could lead to political instability if found in developing countries abroad.

Inequality measures have their own particular patterns that lead to a single numeric indicator. Table 1 presents the internal structure of income patterns for Colorado in comparison with the two most equally distributed states and the two least equally distributed states. These data show the percent of income accumulated by households below specified percentile boundaries. Population deciles are used with the most affluent 10 percent being subdivided into two 5 percent groups. Quintile boundaries are indicated by shading. Percentage shares shown for Colorado lie everywhere between those for the high and low Gini pairs allowing the unambiguous conclusion that Colorado's income distribution is worse than the Alaska/Utah average and better than the New York/Louisiana average. Lorenz curves in Figure 1 provide a graphical illustration of these comparisons.

<b>Population Deciles</b>	<b>AK + UT</b>	<b>NY + LA</b>	<b>CO</b>
0.1	1.42%	0.69%	1.24%
0.2	4.63%	2.90%	3.89%
0.3	9.20%	6.27%	8.33%
0.4	15.09%	11.05%	13.89%
0.5	22.34%	17.28%	20.77%
0.6	31.21%	25.29%	29.28%
0.7	41.82%	35.39%	39.61%
0.8	54.56%	48.11%	52.31%
0.9	70.17%	64.47%	67.93%
0.95	80.27%	75.71%	78.27%
1.0	100.00%	100.00%	100.00%
<b>Gini</b>	<b>0.4085</b>	<b>~0.484</b>	<b>0.436</b>

**Figure 1.  
Lorenz  
Curves  
Comparing  
Colorado  
with High  
and Low  
Gini States**



Commonly used, the lowest 40 percent of the income distribution is considered “poor” and the particular conditions of this group examined for possible interventions. From Table 1 the poorest 40 percent of Colorado’s population receive 13.9% of the state’s household income, compared with 15.1% and 11.1% in the AK/UT and NY/LA groups respectively. At the other end of the spectrum, the richest 10 percent in Colorado receive 32.1% (100 – 67.9) of total household incomes in the state. .

Colorado’s Gini coefficient of 0.436 is not seriously unequal, but it could be improved upon. A generic interpretation is that there are significant portions of the population that remain partially marginalized as economic participants. The analysis below takes a more detailed look at the county loci of both the marginalized and the advantaged.

### **Inequality Within and Between Colorado’s Counties**

#### **General Patterns**

Considerable variation exists in the structure of household incomes within individual counties. Table 2 provides a brief comparison of selected statistics for high and low inequality counties. Comparisons are offered between two groups of 10 and 20 counties on either end of the spectrum. The data strongly concludes that counties with the highest levels of measured income inequality are also generally those with low average household incomes. As a result, these counties include a disproportionate share of Colorado families who live below the poverty line. County Gini coefficients in Table 3 are based on the ten classes for 1999 incomes from the 2000 Census. This is examined more fully below.

**Table 2. Comparisons between High and Low Inequality Counties in Colorado.**

<b>Grouping</b>	<b>Average Gini</b>	<b>Avg Median Income</b>
Hi 10 Gini	0.466	\$37,728
Lo 10 Gini	0.373	\$53,033
Sig. Of Dif.	<0.0001	<0.01
Hi 20 Gini	0.458	\$35,786
Lo 20 Gini	0.389	\$47,039
Sig. Of Dif.	<0.0001	<0.005

A negative association between median household incomes and the inequality of their distribution is shown in Figure 2. The correlation between the two is shown by a coefficient,  $r = -0.417$ . In this graphic, counties are arrayed from poorest to richest across the horizontal axis. As incomes rise, income distributions improve as shown by the falling Gini coefficient trace. In these data, San Miguel and Pitkin counties deviate from the general pattern by showing both median incomes and Gini coefficients that are well above the Colorado state level. This issue is discussed later in this paper.

**Table 3. Colorado Counties Ranked by Gini Coefficient for Income Inequality  
(ranked from highest to lowest)**

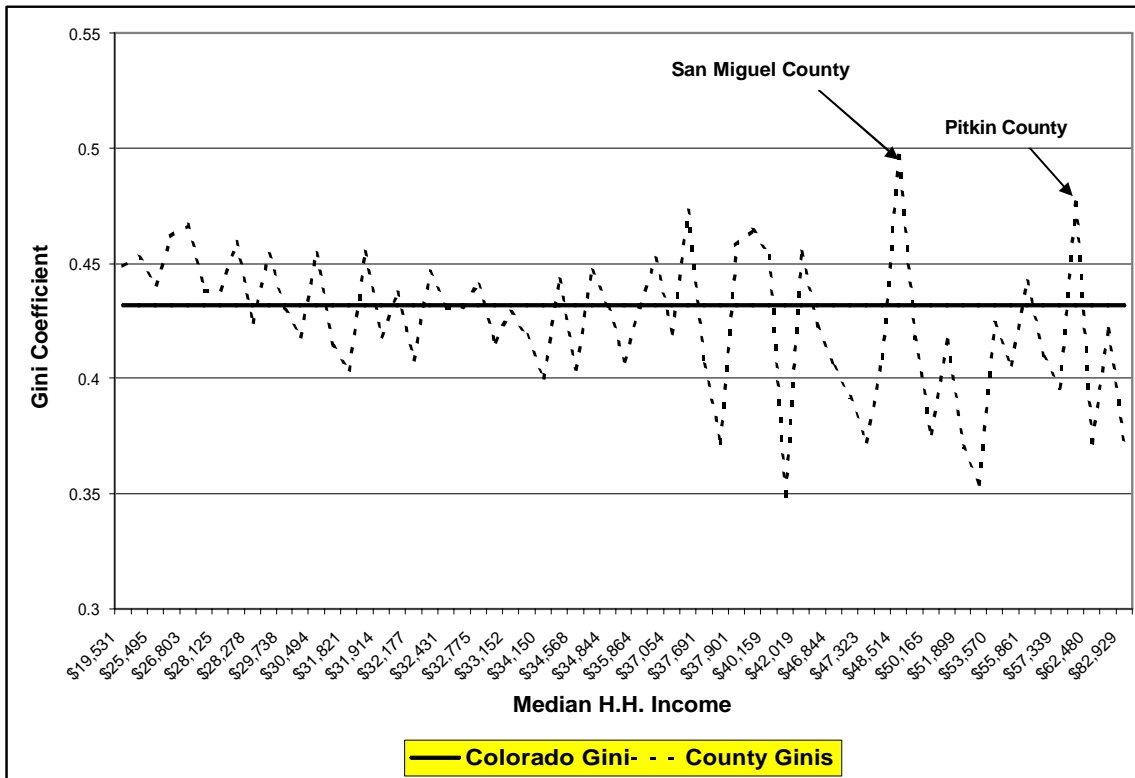
County	Gini	Median Income	County	Gini	Median Income
San Miguel	0.496	\$48,514	Eagle	0.421	\$62,682
Pitkin	0.476	\$59,375	Cheyenne	0.420	\$37,054
Hinsdale	0.473	\$37,279	Yuma	0.419	\$33,169
Crowley	0.466	\$26,803	Prowers	0.418	\$29,935
Denver	0.464	\$39,500	Lincoln	0.418	\$31,914
Huerfano	0.462	\$25,775	Larimer	0.418	\$48,655
Las Animas	0.459	\$28,273	Clear Creek	0.417	\$50,997
Archuleta	0.458	\$37,901	Delta	0.416	\$32,785
Ouray	0.455	\$42,019	San Juan	0.414	\$30,764
Rio Grande	0.454	\$31,836	Summit	0.409	\$56,587
Kiowa	0.454	\$30,494	Grand	0.409	\$47,759
Alamosa	0.454	\$29,447	Phillips	0.408	\$32,177
Lake	0.453	\$40,159	Montrose	0.408	\$35,234
Conejos	0.453	\$24,744	La Plata	0.406	\$37,691
Gunnison	0.452	\$36,916	Routt	0.406	\$53,612
Costilla	0.449	\$19,531	El Paso	0.405	\$46,844
Custer	0.447	\$34,731	Morgan	0.404	\$34,568
Dolores	0.447	\$32,196	Jackson	0.404	\$31,821
Chaffee	0.443	\$34,368	Fremont	0.400	\$34,150
Boulder	0.442	\$55,861	Jefferson	0.396	\$57,339
Pueblo	0.441	\$32,775	Garfield	0.392	\$47,016
Saguache	0.440	\$25,495	Teller	0.376	\$50,165
Bent	0.439	\$28,125	Adams	0.373	\$47,323
Baca	0.439	\$28,099	Rio Blanco	0.372	\$37,711
Montezuma	0.437	\$32,083	Elbert	0.372	\$62,480
Mineral	0.431	\$34,844	Park	0.370	\$51,899
Mesa	0.431	\$35,864	Douglas	0.370	\$82,929
Logan	0.431	\$32,724	Gilpin	0.354	\$51,942
Washington	0.431	\$32,431	Moffat	0.349	\$41,528
Otero	0.430	\$29,738	Colorado	0.432	\$47,203

Eliminating these two counties for the moment and estimating the relationship between median incomes and Gini coefficients econometrically leads to the following linear equation:

$$G = 0.4776 - 0.001414(Y)$$

where G is the Gini Ratio of Concentration and Y is median household income in thousands of dollars. Adjusted  $R^2 = 0.300$  indicates that thirty percent of the variation in inequality can be associated with median incomes. Note also that variation in this pattern is considerably greater at higher income levels.

**Figure 2. Association of Gini Coefficients and Median Household Income by County**



## The Anatomy of Inequality – II

Table 3 raises an interesting question. The 20 counties with the highest Gini coefficients seem a disparate lot. Among them are Denver and Boulder, the predominantly rural counties of Crowley, Kiowa, Ouray and Chaffee, the rural, Hispanic counties of Conejos, Costilla, Huerfano and others, and mountain counties of Pitkin, Hinsdale, Lake and others. Median household incomes in this group range from the lowest in the state (Costilla at \$19,531) to the third highest (Pitkin at \$59,375). What could bring these counties into a single group sharing higher levels of income inequality?

The correlation between the Gini ratio and median income was discussed above and illustrated with a predictive regression equation. Four additional correlations also suggest answers to this question. Gini coefficients for Colorado's counties are strongly and positively correlated with percent of households listing less than \$15,000 annual income ( $r = 0.492$ ), strongly and negatively correlated with percent of households in the middle income bracket of \$35,000 -

100,000 ( $r = -0.595$ ), positively correlated with percent of households with incomes exceeding \$50,000 ( $r = 0.628$ ) and, again, positively with percent of households with incomes exceeding \$200,000 ( $r = 0.207$ ). The first two are to be expected. Income inequality “should be” positively associated with a high proportion of families in the lowest income classes and negatively associated with a dominant middle class. However, Colorado data suggest a third category, where high inequality is driven by a combination of households in the poorer classes and a larger portion of households in the higher income levels and affluent class. In U.S. census data, this latter class is defined as having incomes  $\geq$ \$200,000, suggesting two distinct categories within the most unequally distributed counties: Poverty Driven Inequality (PDI) for counties deriving their higher coefficients largely from the extent of houses in the lower two income classes and Bi-Polar Inequality (BPI) for counties whose higher inequality measure is influenced by the coincidence of poverty and affluence.

Looking at data for the 20 Colorado counties with the highest Gini ratios, one logical threshold between PDI vs. BPI inequality categories would seem to be whether or not two percent of county households fall within the highest income group. Within the 20 high Gini counties, 11 counties fall below this threshold, with from 0.3 to 1.6 percent of their households in this highest income class. Nine counties fall in the bi-polar group, with between 2.2% and 9.0 percent of households in the top income class.

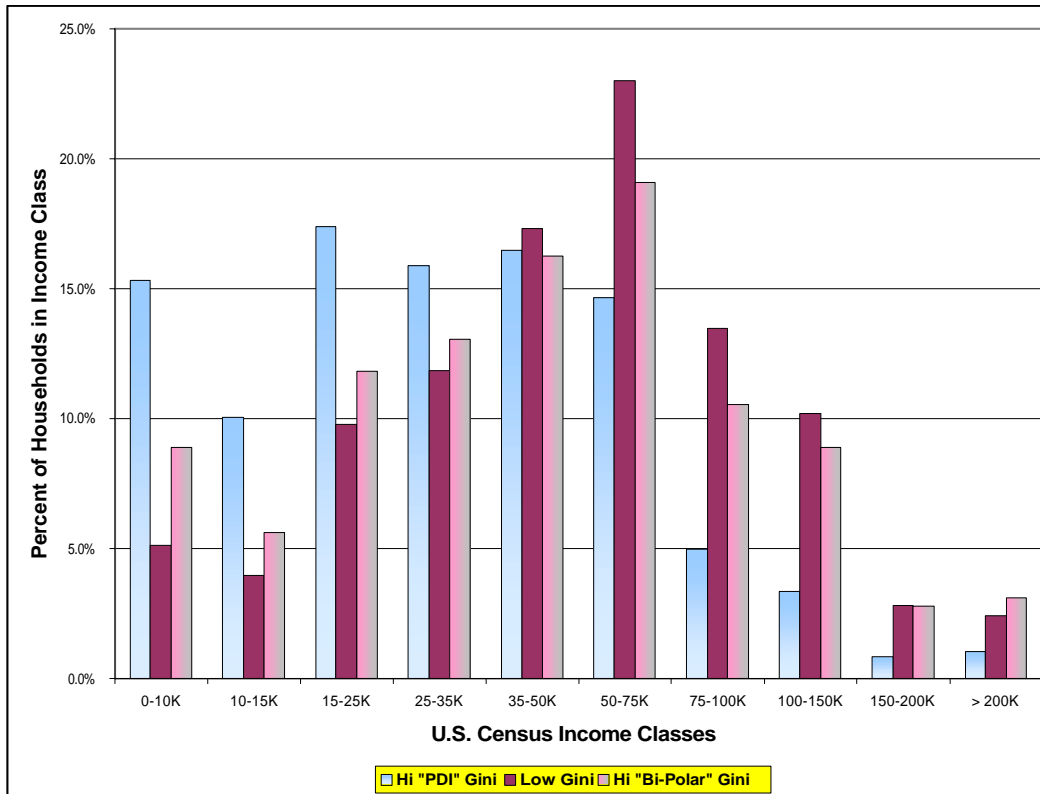
Figure 3 uses the demographic structure of counties with the lowest 20 Gini ratios in Colorado for comparison with the two high Gini classes defined here. The 11 PDI counties show a clear and significant concentration of households into annual income levels below \$35,000.<sup>3</sup> As one would expect, the 20 low Gini counties have income distributions dominated by the middle class, households incomes ranging from \$35,000 – \$150,000. The Bi-Polar Inequality counties differ from the low Gini group in having more households below \$35,000 *and* more in the highest income class. Contrasts between the structures of the PDI and the BPI groups are particularly accentuated at incomes above \$75,000, yet these two groups share similar Gini coefficients.

Table 4 provides additional comparisons of selected socio-economic data between the three groups of counties identified in Figure 3. While the differences are numerically small, the Gini for the Bi-Polar counties significantly exceeds that of the PDI counties. In terms of percentage of households in the  $>$  \$200K income class, PDI and Lo Gini counties have more in common than either does with the Bi-Polar counties. Yet with respect to median household incomes, the Bi-Polar and Lo Gini counties are similar while PDI counties measure very much lower.

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<sup>3</sup>Colorado median household income is \$47,203.

**Figure 3. Within-County Household Distributions by Income Class and Gini Characteristics**



**Table 4. Associations of Gini Measures with Selected Social Characteristics**

	Lo Gini 20 Counties	Bi-Polar 9 Counties	PDI 11 Counties	Signif. of Diff. <sup>a</sup>
Gini	0.389	0.463	0.453	< 0.001
% HH > 200K	1.8%	4.0%	1.0%	< 0.0001
Median Income	\$ 47,039	\$ 44,169	\$ 28,927	< 0.001
% Minority <sup>b</sup>	15.3%	15.3%	33.8%	< 0.05
% Hispanic	11.5%	10.3%	29.7%	< 0.05
% of HH in Poverty	5.6%	6.3%	13.4%	< 0.001

<sup>a</sup> Significance of difference between Bi-Polar and PDI counties.

<sup>b</sup> All persons except “White, non-Hispanic” designees

Table 4. shows another correlation in Colorado. The counties which we have called “Poverty Driven” are distinguished by low incomes, a high proportion of families living below the poverty threshold, and a high proportion of minorities (especially Hispanics) in their populations.

## Challenges to Economic Development

Examining data on the distribution of incomes within and between the counties of Colorado uncovered several related data series that indicate counties with potentially significant economic development challenges. These challenges occur with respect to combating poverty and inequality, conditions that are unfortunately correlated with each other and with ethnic minority status in Colorado. To identify which counties might most benefit from economic development initiatives, counties were ranked separately by four socio-economic indicators: Gini, median family income, percentage of families in poverty and educational attainment. A single measure was chosen from many options for the latter, the percent of individuals aged 25 or older who attained a post-secondary degree of any kind. Each metric led to an ordinal ranking with the most challenged county ranked as 1<sup>st</sup>. These single variable rankings were then combined into a composite ranking and the counties arrayed from most to least challenged.

A methodological nuance must be noted. Census data includes characteristics of the entire population, including those incarcerated within a county. In the current data sets it is impossible isolate the prisoners' characteristics from the rest of the county. In counties where a large percent of their population are prisoners, their socio-economic parameters are inconsistent and do not accurately reflect the non-prison population. Therefore, for the discussion that follows, both Crowley and Lincoln were removed from the dataset.”

Table 5 summarizes the data that characterize the 20 most economically challenged counties in Colorado. Comparative data show the same measures averaged for the 20 least challenged counties.<sup>4</sup> Differences between the two county groups are very highly significant. Again, the association between minority population and economic development challenges appears. Two counties among this listing of the economically challenged have prison populations exceeding 10 percent; Huerfano (10%) and Bent (12%). Their metrics suggest, however, that even if prison populations could be excluded, they would remain on the challenged list.

Figure 4 maps these relative levels of advantage and disadvantage. Advantaged counties, with their higher median incomes, lower incidence of poverty, greater education levels, cluster along the northern Front Range and the I-70 corridor to the West. Denver constitutes an island of economic challenge in a sea of advantage, which is the greater Denver metropolitan area. Challenged counties comprise the southern tier of the state plus a significant portion of the eastern plains.

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<sup>4</sup>Counties in this group include, in order from the most advantaged: Douglas, Routt, Gilpin, Elbert, Jefferson, Summit, Park, Eagle, Teller, Clear Creek, Larimer, Arapahoe, Boulder, El Paso, Pitkin, Grand, Garfield, Adams, Rio Blanco, La Plata.

**Table 5. Selected Data for Economically Challenged Counties with Comparisons  
(Listed in Descending Order of Economic Challenge)**

County	Gini	Median Income as % of CO	% of Families in Poverty	% with post-H.S. degree	Percent Minority
Costilla	0.449	41.4%	21.3%	17.0%	71.7%
Conejos	0.453	52.4%	18.6%	18.6%	60.8%
Huerfano	0.462	54.6%	14.1%	22.0%	41.4%
Bent	0.439	59.6%	16.6%	18.7%	36.7%
Saguache	0.440	54.0%	18.7%	23.4%	48.2%
Baca	0.439	59.5%	12.9%	20.0%	9.6%
Las Animas	0.459	59.9%	14.0%	26.9%	44.7%
Alamosa	0.454	62.4%	15.6%	31.0%	45.7%
Dolores	0.447	68.2%	10.2%	18.7%	7.2%
Kiowa	0.454	64.6%	9.6%	23.1%	5.5%
Rio Grande	0.454	67.4%	11.3%	25.1%	43.3%
Otero	0.430	63.0%	14.2%	22.9%	40.8%
Prowers	0.418	63.4%	14.5%	20.0%	34.8%
Montezuma	0.437	68.0%	13.1%	26.2%	22.3%
Sedgwick	0.424	59.9%	7.8%	19.6%	13.5%
Pueblo	0.441	69.4%	11.2%	26.2%	42.1%
Kit Carson	0.429	70.2%	9.4%	21.9%	16.6%
Washington	0.431	68.7%	8.6%	21.6%	7.2%
Logan	0.431	69.3%	9.0%	25.3%	15.6%
Denver	0.464	83.7%	10.6%	39.4%	47.9%
<b>Average Values for Comparative Groups</b>					
<b>Challenged Counties</b>	0.442	62.5%	13.0%	23.0%	30.7%
<b>Advantaged Counties</b>	0.400	112.5%	4.0%	43.2%	13.9%
<b>Sig. Of Diff.</b>	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.002

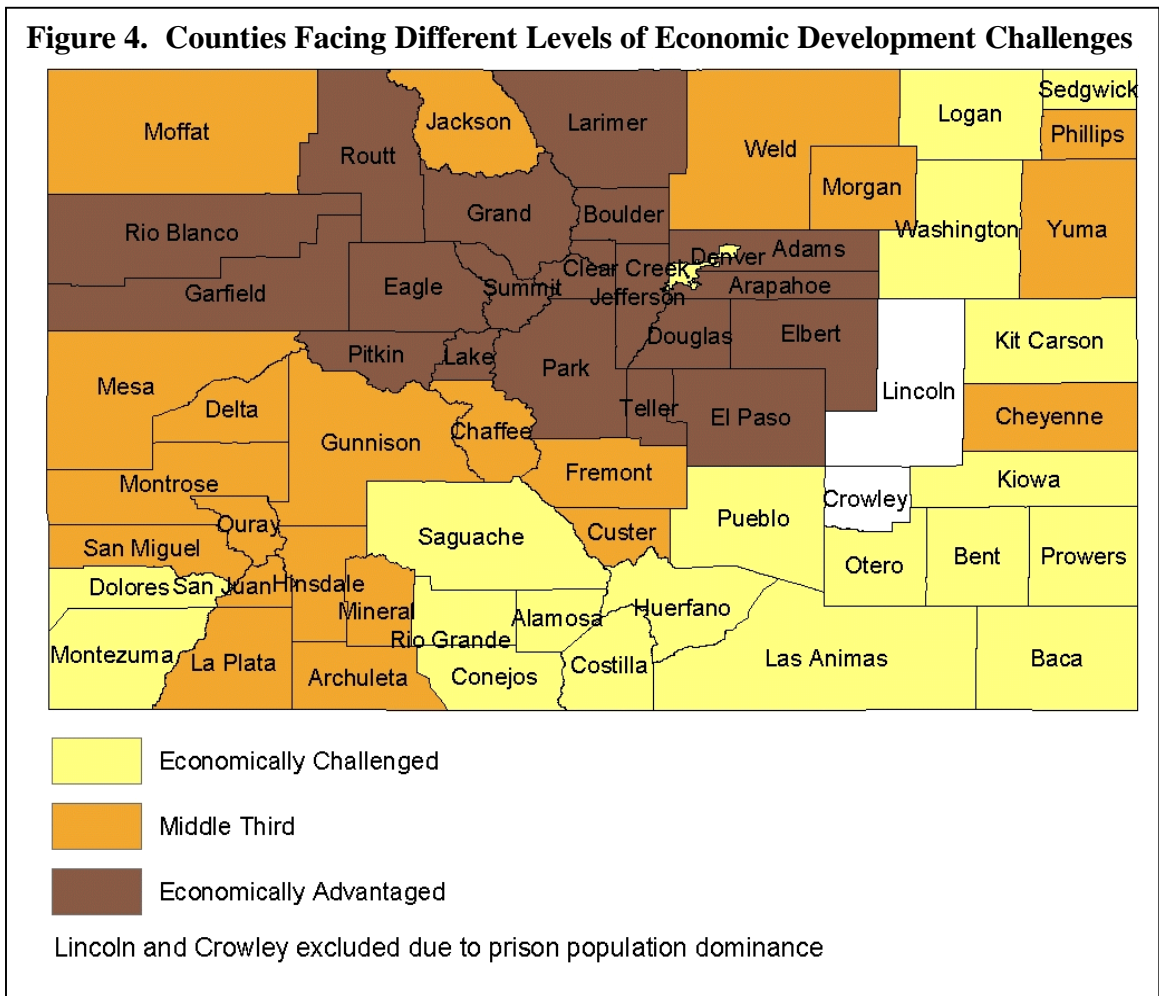
### Conclusions

Data show the individual counties in Colorado to be a diverse lot in terms of several socio-economic measures. Examining a simple measure of income inequality at the county level led to several preliminary conclusions. First, inequality is negatively associated with median incomes. Poorer counties tend to be counties with the most unequally distributed incomes and a disproportionately large percent of households living in poverty. A second group was also characterized by a greater than average numbers of poor and a much higher numbers of rich households referred to as Bi-Polar Inequality (BPI). The large numbers of economically advantaged counties contain populations characterized by a robust middle class with relatively low numbers of either the very rich or the very poor.

Finally, income inequality measures were combined with other socio-economic measures of challenge or achievement to construct an ordinal ranking of counties ranked by level of

economic challenge. This exercise identified 20 counties which not only have unequally distributed incomes, they are relatively poor, with high portions of their populations living in poverty, and with educational attainments of roughly only half of that measured for the most advantaged comparative group.

This study is a glimpse into the need to place greater emphasis on economic development policy and programs to portions of Colorado. The conclusions are tentative and additional research is needed to identify these indicators so appropriate intervention strategies can be designed.



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