Colorado Total Health Cost and Geographic Study

Prepared by Miller & Newberg (MN) Consulting Actuaries
Project Manager: Michael Brown, FSA, MAAA, Managing Director
Gene Blobaum, FSA, MAAA, Senior Actuary
Spencer Loudon, Actuarial Analyst

MILLER & NEWBERG
CONSULTING ACTUARIES

Overview

- Introduction
- Purpose of Study
- Total Cost Review and Regional Cost Variations
- Geographic Region Review
- Questions and discussion

NOTE: For illustration and general understanding, it is recommended to view the report and this power point in color

Division of Insurance (DOI) Requests

- Purpose
  - Broadly examine health costs trends
  - Improve State's ability to access, analyze and utilize information about health care costs
  - Evaluate geographic rating area options

Purpose of Report

- Review and report on Total Cost for Commercial Major Medical + Pharmacy Products
  - Report on detail levels, Cost per Service, Utilization of Services, Detail Categories, Cost by Geographic Location
- Review current and optional geographic rating regions for these products

This study does not…..

- Make any opinions on what current or future premiums should or will be
  - Depends on multiple factors and DOI approval
- Make any projections about future changes in geographic factors
  - No available credible and quantitative data illustrating why particular region or county cost will significantly change

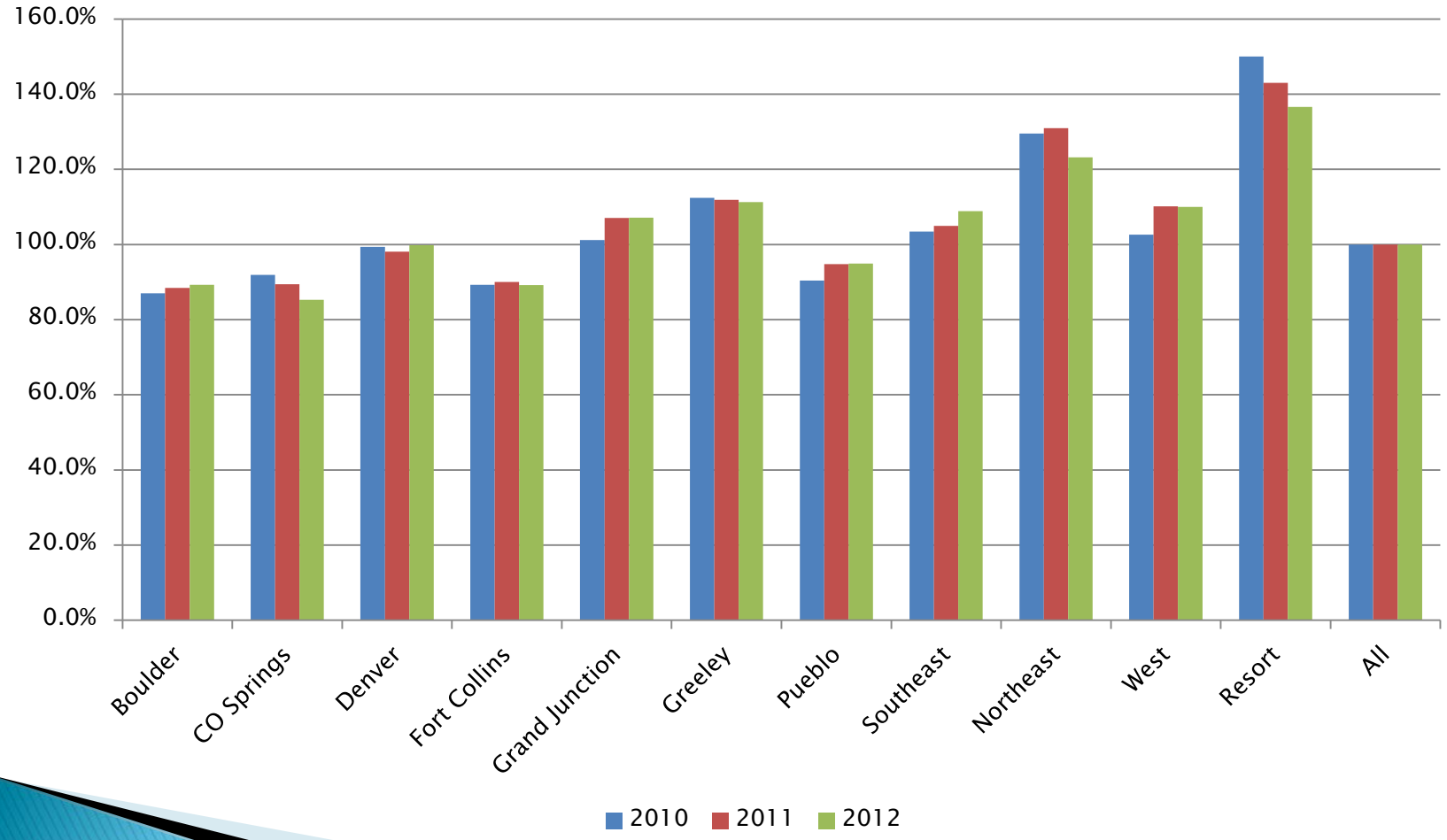
This study does…

- Review Historical Data with thorough detail and validation processes
  - Primary data source: All Payer Claims Database (APCD) – 2010-2012
- Analyze and Report data so it applies to study
  - Use commercial major medical + pharmacy plans (can't use Medicaid or Medicare)
  - Regional costs attributed to local (non-visitor) population
- Review for consistent/reasonable patterns
- Follow Actuarial Standards of Practice (ASOP)

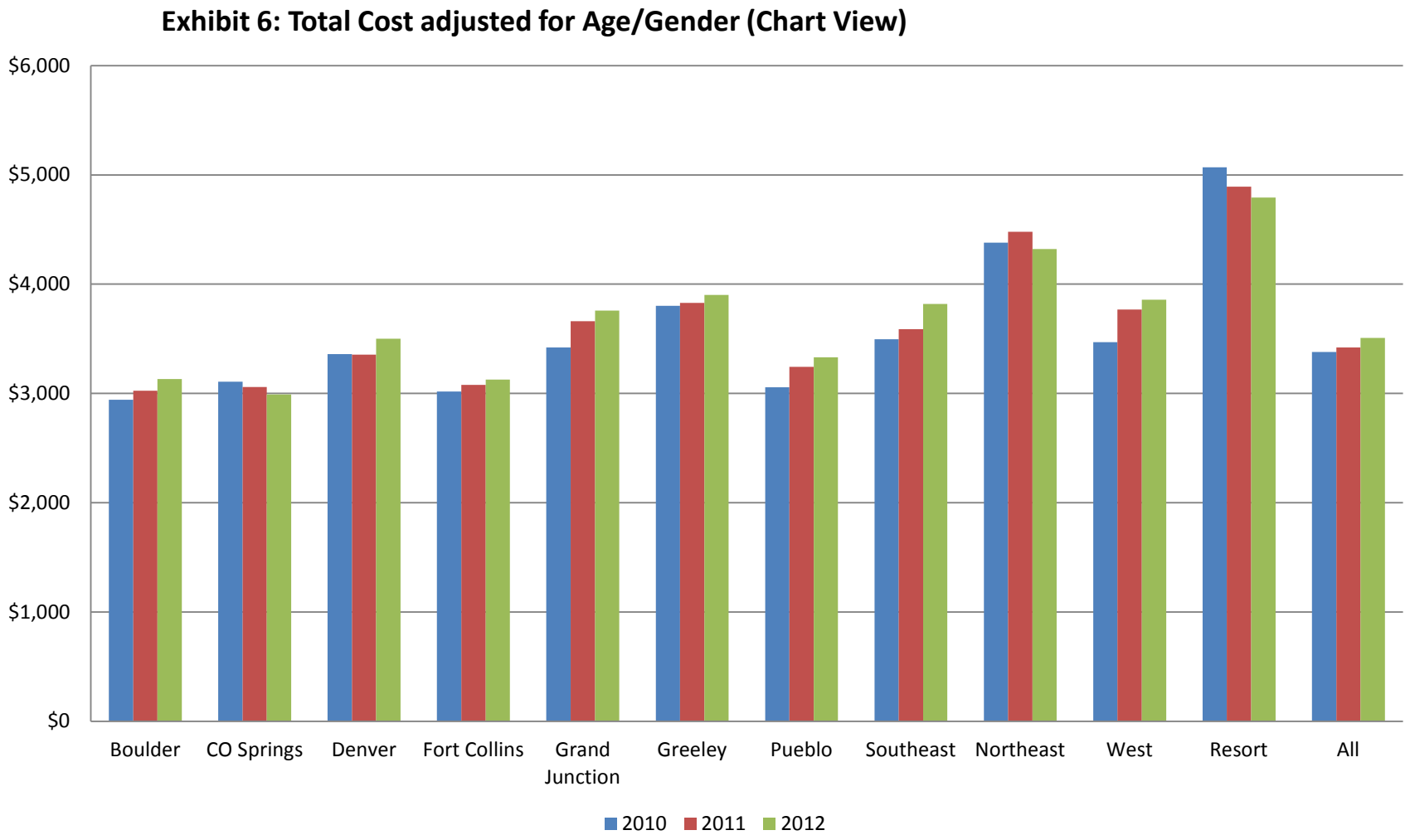
TOTAL COST REVIEW and REGIONAL COST VARIATIONS

Total Cost % Example: Boulder = 88.3% (Average of 87.0%, 88.4%, 89.3%)

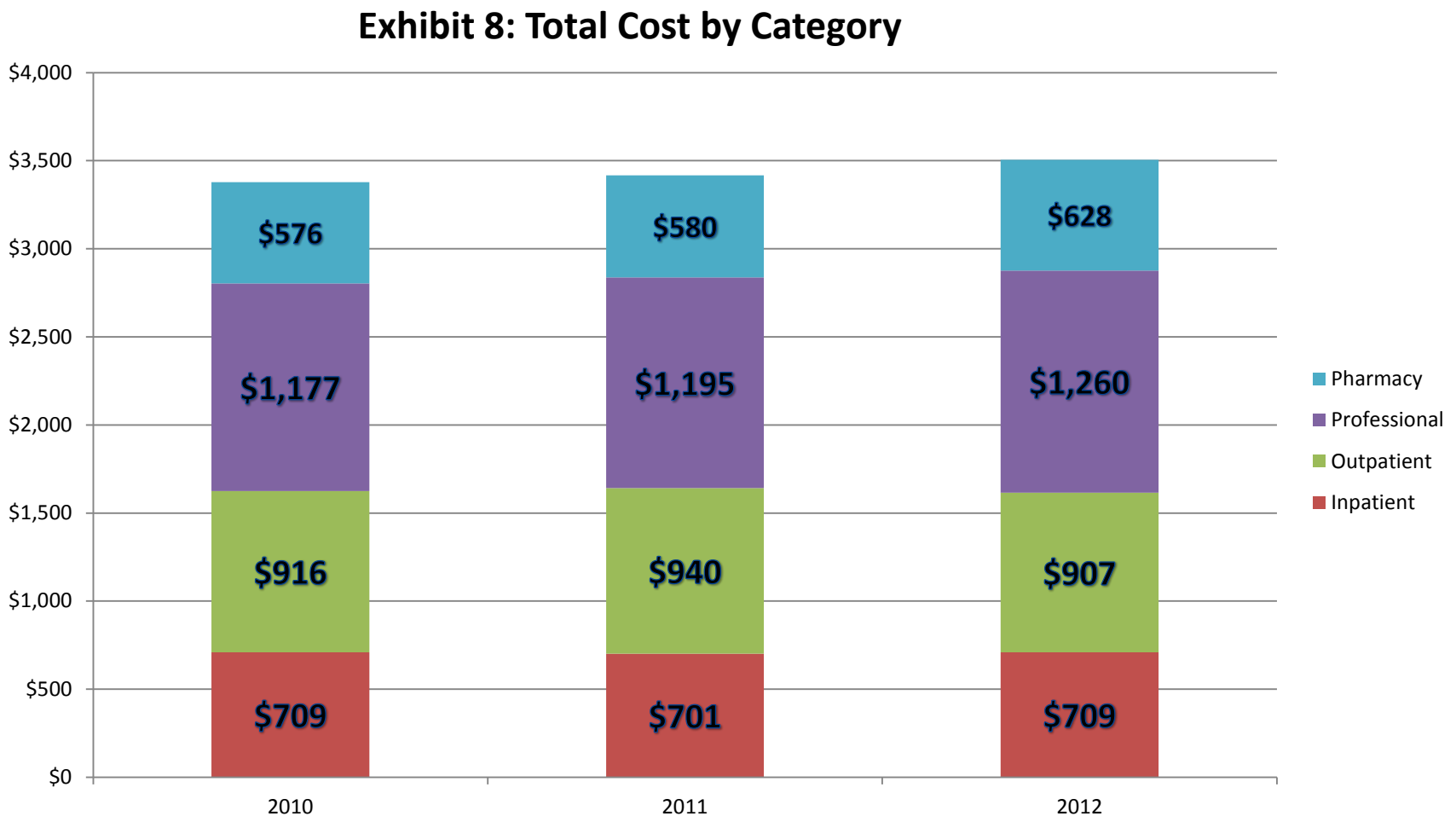
Exhibit 7: Total Cost as a Percent of Average



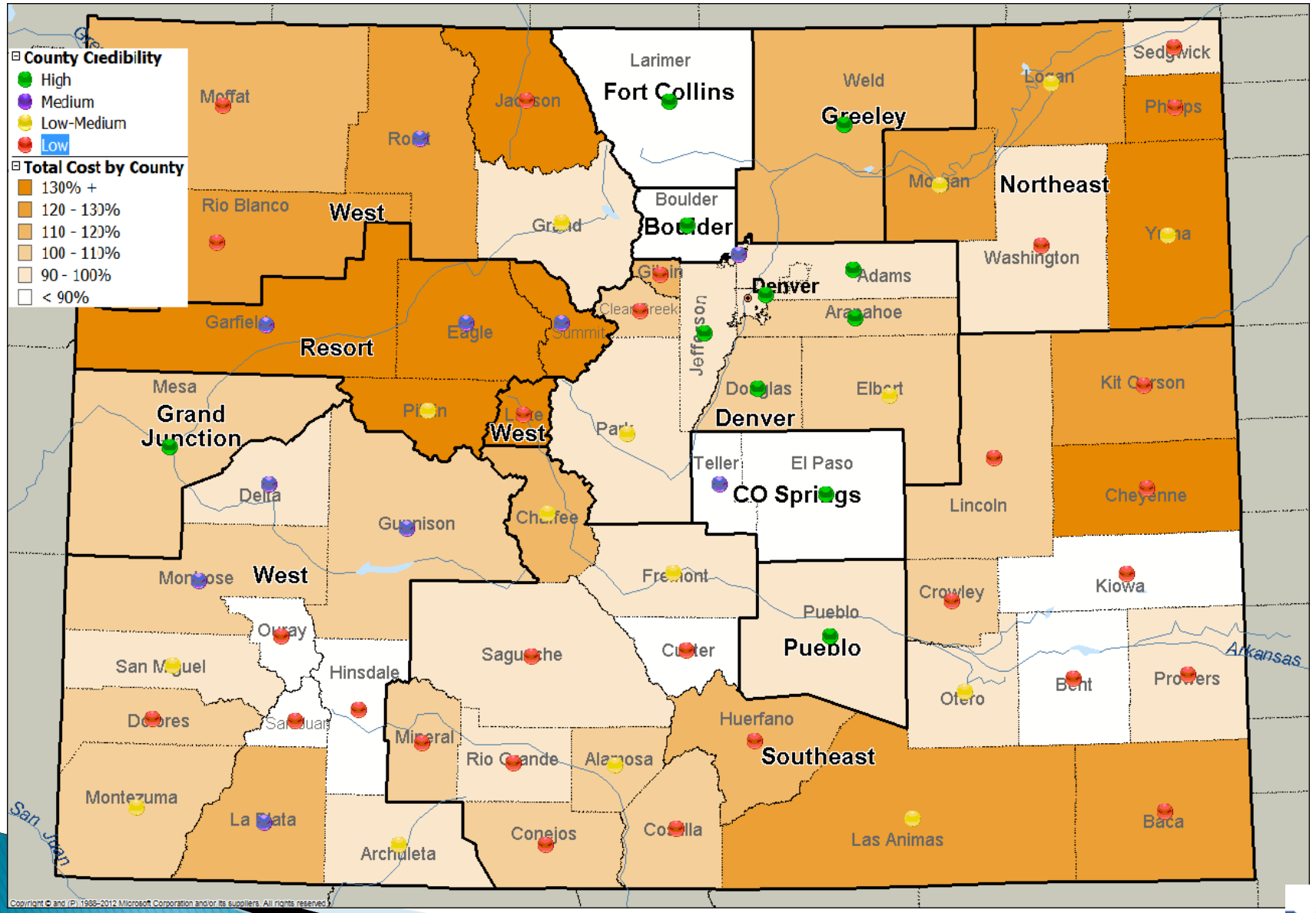
Regional Costs Vary Dramatically Across Region



Total Cost by Category



Study Data: Total Cost by County with Credibility



Utilization per 1,000 Members: (State Total / Low / High Region)

	All Regions	Low Value	High Value	Low Region	High Region
Inpatient Surgery	10	7	16	Fort Collins	Southeast
Inpatient Total	37	29	46	Fort Collins	Southeast
Emergency Room	108	84	136	Fort Collins	Southeast
Outpatient Surgery	102	92	136	Boulder	Pueblo
Advanced Imaging	30	11	63	CO Springs	West
Outpatient Total	660	487	1,350	CO Springs	Grand Junction
Professional Surgical Visit	167	139	211	Boulder	Grand Junction
Professional Non-Facility Visit	895	736	1,090	Fort Collins	Southeast
Professional Total	6,151	5,184	6,459	Northeast	Denver
Pharmacy Specialty	95	53	113	West	Denver
Pharmacy Total	7,665	5,588	8,352	West	Denver

Cost per Service (State Total / Low Region / High Region)

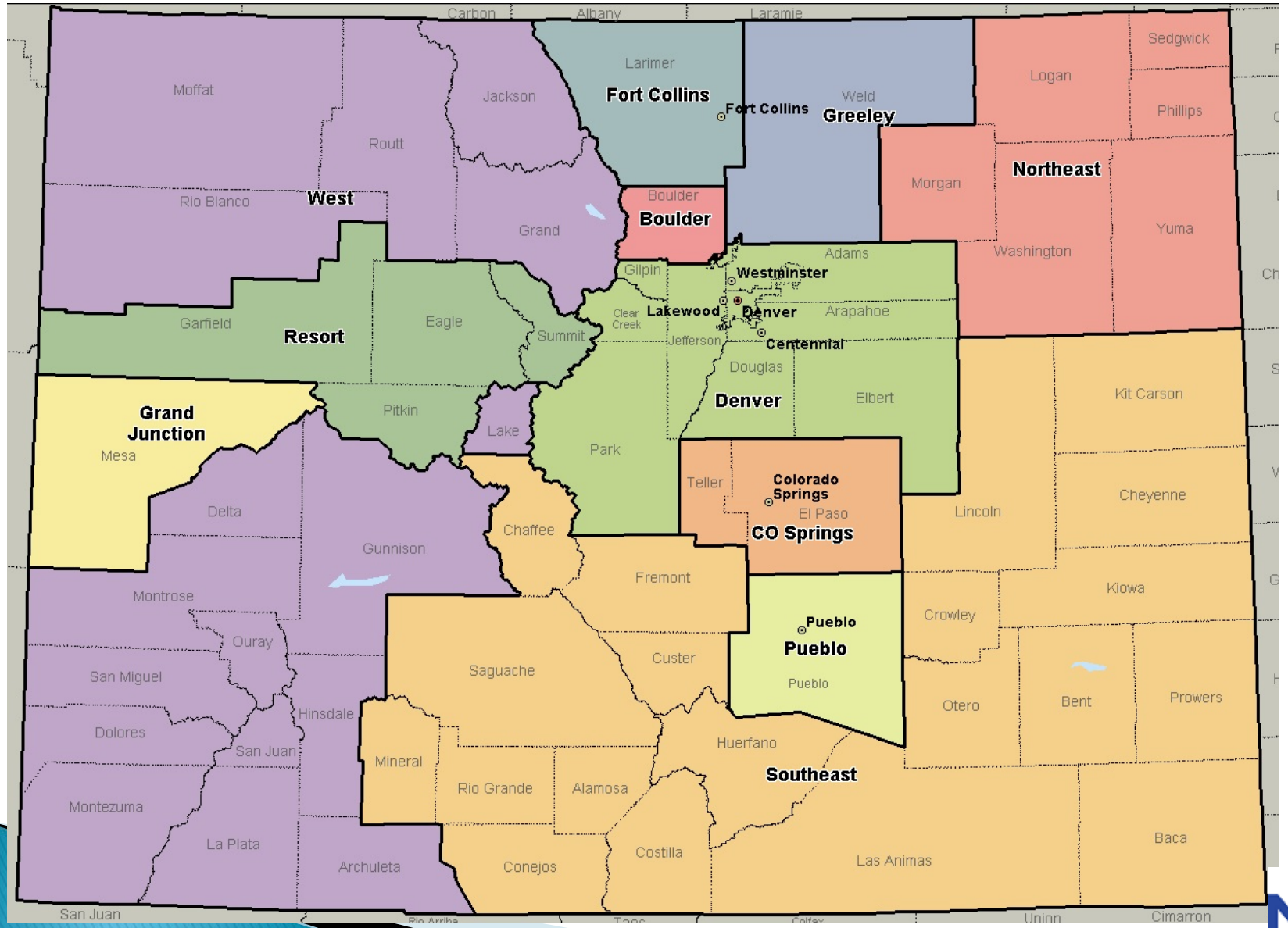
	All Regions	Low Value	High Value	Low Region	High Region
Inpatient Surgery	36,998	31,098	65,034	Pueblo	Greeley
Inpatient Total	19,298	13,663	29,147	CO Springs	Greeley
Emergency Room	1,992	1,405	2,413	Boulder	Resort
Outpatient Surgery	3,624	2,404	8,146	CO Springs	Northeast
Advanced Imaging	2,168	1,433	3,434	Pueblo	Fort Collins
Outpatient Total	1,381	883	1,907	Grand Junction	Resort
Professional Surgical Visit	972	751	1,823	Pueblo	Resort
Professional Non-Facility Visit	291	191	767	Pueblo	Resort
Professional Total	205	172	338	Pueblo	Resort
Pharmacy Specialty	1,750	1,220	1,945	Grand Junction	Fort Collins
Pharmacy Total	82	61	89	West	Denver

GEOGRAPHIC RATING OPTIONS

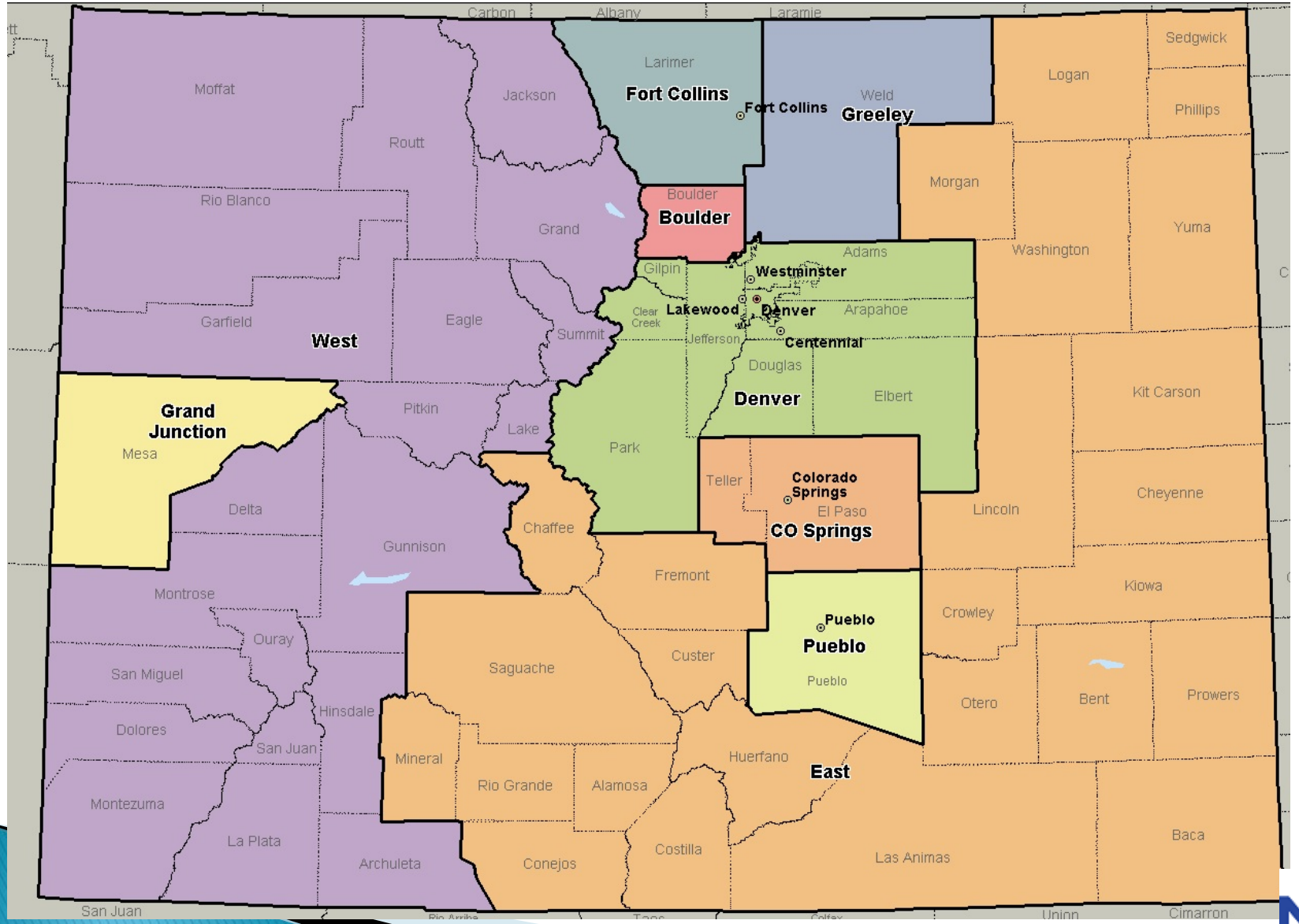
Geographic Factor Analysis

- DOI requests 5 options be studied
- All options must meet federal criteria:
  - Actuarially justified
  - Not unfairly discriminatory
  - Reflect significant differences in health care unit costs
  - Lead to stability in rates over time
  - Apply uniformly to all issuers in market
  - Based on geographic boundaries of counties or zip codes

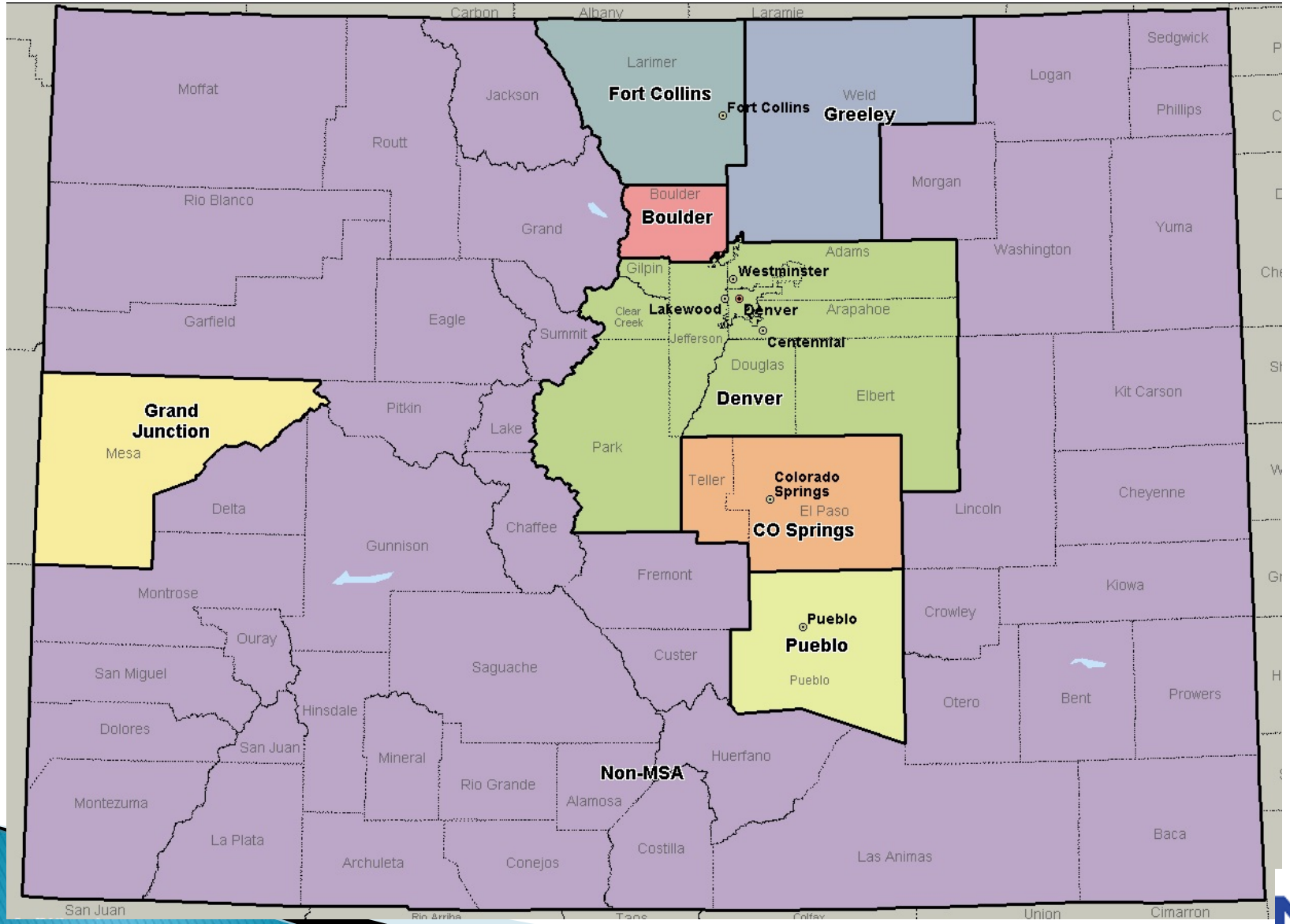
Current: 7 MSA + 4 Non-MSA



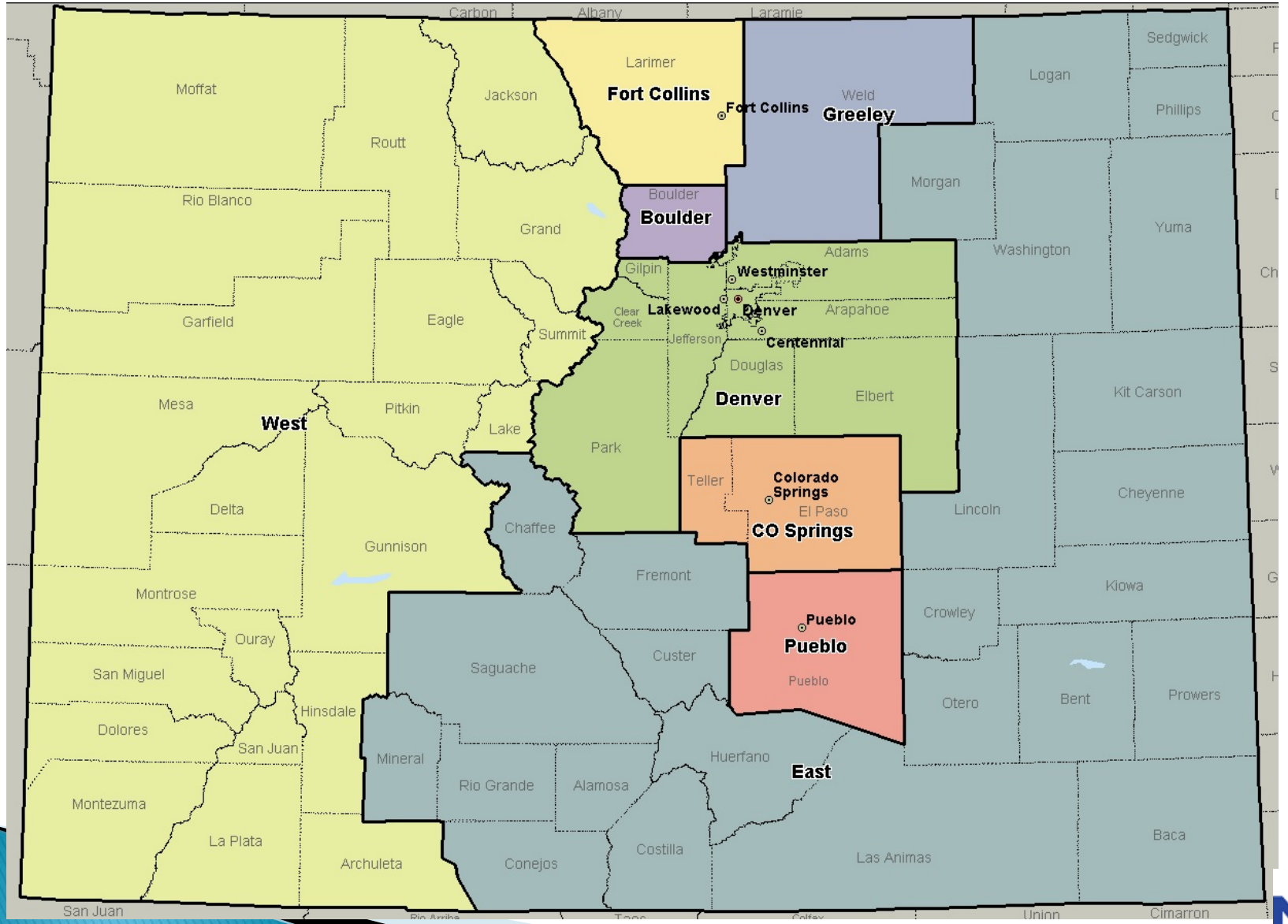
7 MSA + 2 Non-MSA



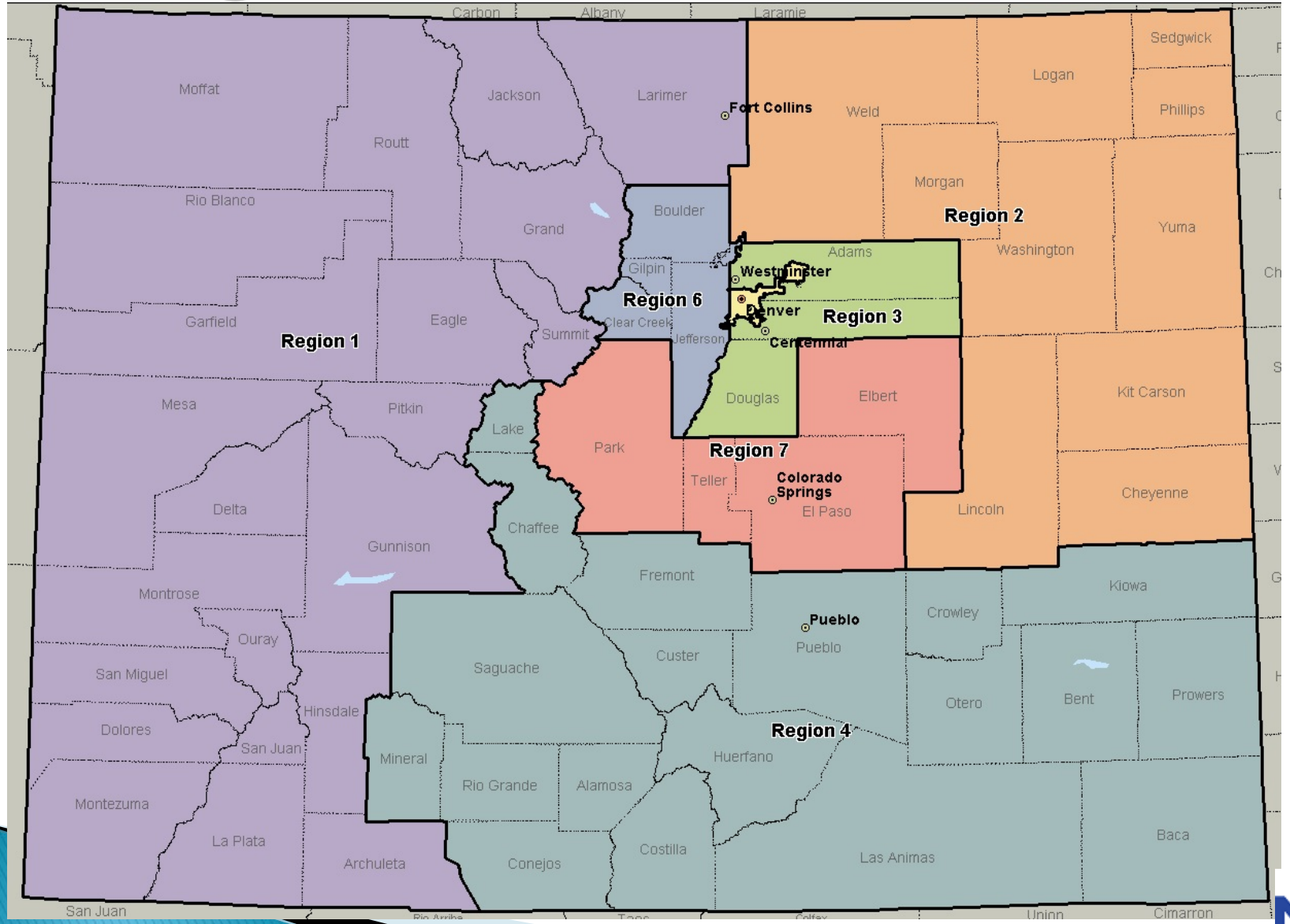
7 MSA + 1 Non-MSA



6 MSA + 2 Non-MSA



RCCO Regions



Miller & Newberg Geographical Scoring Method

Metric	Primary Applicable Component of Law	Applicable Component of Law
Variability of Total Cost: How do counties differ?	Not Unfairly Discriminatory	All
Stability in Utilization & Migration: How many services? Where?	Lead to Stability in rates over time	All
Cost per Unit: How many people? (sample size)	Reflect significant differences in health care unit costs	All
Credible Membership: What kind of care? How much?	All	All

FACTOR #1 – VARIABILITY OF COST

Less variation (low number) = Counties within region have similar costs

	Total Cost Variability Scores			Credibility
	Min	Max	Standard Deviation	Standard Deviation
7 MSA + 4 Non-MSA				
Southeast	0.78	1.36	0.14	0.08
Northeast	0.71	1.19	0.18	0.10
West	0.64	1.67	0.26	0.15
Resort	0.96	1.10	0.06	0.03
All Co.			0.06	0.04
7 MSA + 2 Non-MSA				
East	0.73	1.35	0.16	0.09
West	0.58	1.52	0.24	0.15
All Co.			0.07	0.04

	Total Cost Variability Scores			Credibility
	Min	Max	Standard Deviation	Standard Deviation
7 MSA + 1 Non-MSA				
Non-MSA	0.59	1.54	0.20	0.12
All Co.			0.06	0.04
6 MSA + 2 Non-MSA				
Grand Junction	1.00	1.00	0.00	0.00
East	0.73	1.35	0.16	0.09
West	0.60	1.58	0.25	0.15
All Co.			0.07	0.05
RCCO				
All Co.			0.11	0.07

Factor 1 Variability Metrics: West Example

County*	2010	2011	2012	Percent of Total Region			
				2010	2011	2012	Combined
Delta	$3,355	$3,256	$3,348	97%	86%	87%	90%
Dolores	$3,348	$3,686	$4,189	97%	98%	109%	101%
Gunnison	$3,323	$3,416	$3,876	96%	91%	100%	96%
Jackson	$3,753	$6,625	$8,289	108%	176%	215%	166%
Lake	$2,914	$9,317	$4,691	84%	247%	122%	151%
Hinsdale	$2,608	$1,391	$3,102	75%	37%	80%	64%
Routt	$3,958	$4,181	$4,510	114%	111%	117%	114%
Total	$3,469	$3,767	$3,858	100%	100%	100%	100%
Standard deviation							0.26
Standard deviation – Colorado Total							0.06

Max = 1.66 (166%)
Min = 0.64 (64%)
Standard Deviation = 0.06 – Lower Measure = More Stability
*Only a sample of Counties in Region Illustrated

Factor 1: Variability Metrics: Resort Example

County	2010	2011	2012	Percent of Total Region			
				2010	2011	2012	Combined
Eagle	$4,919	$4,860	$5,147	97%	99%	107%	101%
Garfield	$5,021	$4,979	$4,324	99%	102%	90%	97%
Pitkin	$6,011	$4,965	$5,257	119%	102%	110%	110%
Summit	$4,688	$4,761	$4,641	92%	97%	97%	96%
Total	$5,071	$4,891	$4,792	100%	100%	100%	100%
Standard deviation – Resort							0.06
Standard deviation – Colorado Total							0.06

Max = 1.10 (110%)
Min = 0.96 (96%)
Standard Deviation = 0.06 . Lower Measure = More Stability

FACTOR # 2 – Utilization and Migration Patterns

- How many health services used – what categories
  - Four High Levels (Inpatient, Outpatient, Professional, Pharmacy)
  - 24 Detail Levels (Surgery, Advanced Imaging, Office Visit, Specialty Rx, etc.)
  - Use Procedure, Revenue, BETOS, Place of Service Codes
- Where did people receive those services (migration)

- Ranking: If 2 credible regions have different utilization patterns and/or migration patterns, combining will lead to less stability

Non-MSA Admits (or Visits)/1,000 and Trend

		Visits/1,000			Trend	
		2010	2011	2012	2011	2012
Inpatient	Southeast	49	46	46	-7.2%	1.1%
	Northeast	45	42	39	-4.7%	-8.5%
	West	43	45	44	4.1%	-1.1%
	Resort	38	35	37	-7.7%	4.0%
	All Colorado	38	36	37	-3.5%	1.3%
Outpatient	Southeast	1,165	1,154	1,092	-1.0%	-5.4%
	Northeast	1,111	1,127	1,076	1.4%	-4.6%
	West	1,073	1,124	1,074	4.8%	-4.5%
	Resort	843	833	728	-1.1%	-12.6%
	All Colorado	764	746	659	-2.4%	-11.6%
Professional	Southeast	5,340	5,256	5,535	-1.6%	5.3%
	Northeast	5,215	5,144	5,184	-1.4%	0.8%
	West	5,480	5,579	5,729	1.8%	2.7%
	Resort	5,490	5,361	5,679	-2.4%	5.9%
	All Colorado	6,195	6,067	6,152	-2.1%	1.4%

Exhibit 16 = Current Region Total Cost Migration Patterns

Member Area	Provider Region --->											
Current Region	Boulder	CO Springs	Denver	Fort Collins	Grand Junction	Greeley	Pueblo	South-east	North-east	West	Resort	Total
Boulder	60.2%	0.3%	34.9%	2.3%	0.1%	0.5%	0.1%	0.1%	0.0%	0.4%	1.1%	100.0%
CO Springs	0.4%	77.4%	18.9%	0.8%	0.2%	0.2%	0.9%	0.5%	0.0%	0.3%	0.5%	100.0%
Denver	3.7%	0.6%	93.5%	0.5%	0.2%	0.2%	0.2%	0.2%	0.0%	0.2%	0.7%	100.0%
Fort Collins	3.0%	0.2%	12.5%	78.3%	0.1%	4.7%	0.1%	0.1%	0.1%	0.4%	0.5%	100.0%
Grand Junct.	0.2%	0.2%	6.3%	0.2%	89.3%	0.1%	0.0%	0.0%	0.0%	0.8%	2.7%	100.0%
Greeley	11.4%	0.2%	21.4%	20.8%	0.2%	45.0%	0.1%	0.1%	0.4%	0.2%	0.2%	100.0%
Pueblo	0.4%	8.0%	41.7%	0.3%	0.0%	0.2%	47.7%	1.4%	0.0%	0.1%	0.1%	100.0%
Southeast	0.7%	9.4%	31.9%	1.2%	0.3%	0.5%	10.8%	41.4%	0.3%	1.0%	2.6%	100.0%
Northeast	1.2%	0.2%	16.4%	14.9%	0.3%	19.5%	0.0%	0.3%	46.9%	0.1%	0.1%	100.0%
West	0.5%	0.5%	25.9%	0.9%	9.1%	0.1%	0.1%	0.3%	0.0%	59.1%	3.4%	100.0%
Resort	0.8%	0.3%	30.1%	0.2%	3.4%	0.1%	0.1%	0.3%	0.0%	0.4%	64.3%	100.0%
All	6.9%	8.9%	57.3%	6.8%	5.8%	2.9%	1.6%	1.4%	0.7%	4.6%	3.2%	100.0%

Factor # 3: Unit Cost Scoring

- If 2 credible regions have different unit cost patterns –combining will lead to less stability

Exhibit 24: Unit Cost as a Percent of State Average

Region	Region	Combined 2010	2011	2012	Average
7 MSA + 4	Boulder	95.0%	99.3%	90.9%	95.1%
7 MSA + 4	CO Springs	98.0%	96.5%	91.0%	95.2%
7 MSA + 4	Denver	98.6%	98.0%	102.8%	99.8%
7 MSA + 4	Fort Collins	106.8%	109.3%	100.9%	105.7%
7 MSA + 4	Grand Junction	84.7%	87.1%	88.7%	86.9%
7 MSA + 4	Greeley	117.2%	114.1%	114.7%	115.4%
7 MSA + 4	Pueblo	92.8%	98.1%	93.3%	94.7%
7 MSA + 4	Southeast	91.4%	92.3%	94.7%	92.8%
7 MSA + 4	Northeast	115.0%	116.1%	111.9%	114.3%
7 MSA + 4	West	97.3%	98.3%	97.7%	97.8%
7 MSA + 4	Resort	152.4%	146.8%	139.6%	146.3%
7 MSA + 2	East	98.1%	99.2%	99.6%	99.0%
7 MSA + 2	West	112.8%	111.0%	108.7%	110.9%
7 MSA + 1	Non-MSA	108.5%	107.6%	106.1%	107.4%
6 MSA + 2	West	103.2%	102.8%	101.9%	102.6%

FACTOR #4: Credibility Measure

- Credibility: larger population groups provide more stability/credibility
  - Examples:
    - Greeley County has a high credibility score (many members)
    - Mineral County has a low credibility score (fewer members in data)

Final Scorecard = Rank each category (1=best)

Metric and ACA Geographic Law Component	Metric	Credible Membership	Stability in Utilization Patterns[1]	Standard Deviation of Total Cost	Cost per Unit Factor	Accept-able Grouping
	Primary Applicable Component of Law (In general all apply)	All	Leads to Stability in rates over time[1]	Not Unfairly Discriminatory	Reflect significant differences in health care unit costs	
Rank (Score) – Description	7 MSA + 4	2	1	1	1	Yes
	7 MSA + 2	1	2	2	2	Yes
	7 MSA + 1	1	3	2	3	Yes (Default ACA)
	6 MSA + 2	1	4	Fails test.	Not considered, fails other test	No
	RCCO	1	Not considered, fails other test	Fail test.	Not considered, fails other test	No

Questions and Discussion

Colorado Total Health Cost and Geographic Study

Prepared by Miller & Newberg, Consulting Actuaries for the Colorado Division of Insurance

May 2, 2014

Table of Contents:

Introduction and purpose of study ……Page 3

Report Summary……Page 3

Total Cost: Summary of Methods and Data ……Page 5

Geographic Study…… Page 14

Appendices…… Page 24

Introduction and purpose of study:

The Colorado Division of Insurance (DOI) set forth a proposal for health actuarial services in December 2013. The proposal was to perform an actuarial study of Health costs in the state using the Colorado All Payers Claims Database (APCD). The APCD is administered by the Center for Improving Value in Health Care (CIVHC). Miller & Newberg Inc. (MN), Consulting Actuaries, was awarded the contract. This report adheres to Actuarial Standards of Practice (ASOP's), in particular ASOP 5 (Incurred Health and Disability Claims), ASOP 23 (Data Quality) and ASOP 41 (Actuarial Communications).

The purpose of the study is to:

- Review the Total Health Cost for Commercial Major Medical and Pharmacy products in Colorado. The review is to be developed in such a way that costs can be analyzed by many segments including cost per service, utilization, claim categories, and cost by geographic location
- Review current and optional geographic rating regions;
- Develop the study with the intent for ongoing monitoring of health cost trends and geographic health costs;
- Assist the state with the review of rate filings (Major medical and pharmacy; individual, small group and large group)

This report's focus is on the first two bullet points.

Report Summary

The Total Cost section of the report focuses on cost by many segments (cost per service, utilization, claim categories, and cost by geographic location). Refer to that section and appendix for detail.

The next section focuses on geographic rating regions. A high level summary is provided here. Under the ACA, a state has the option to default the rating areas to the Metropolitan Statistical Areas (MSA) plus one Non-MSA for all other areas (refer to this as MSA + 1). The state has the option to expand upon those areas as long as the regions:

- are actuarially justified;
- are not unfairly discriminatory;
- reflect significant differences in health care unit costs;
- lead to stability in rates over time;
- apply uniformly to all issuers in a market;
- and are based on the geographic boundaries of counties, three-digit zip codes, or metropolitan statistical areas and non-metropolitan statistical areas.
- Must be actuarially justified if other than MSA + 1 is used. In the case of Colorado, this will lead to increased transparency in health costs.

In order to justify geographic regions, MN used the four metrics as listed below.

Metric	Primary Applicable Component of Law	Primary Applicable Component of Law
Credible Membership	All	All
Stability in Utilization patterns (migration patterns)	Lead to Stability in rates over time	All
Standard Deviation/Variability of Total Cost	Not Unfairly Discriminatory	All
Cost per Unit	Reflect significant differences in health care unit costs	All

The DOI has asked MN to consider 5 possible regions, including the current, in the geographic study.

The regions considered are:

- 7 MSA + 4: current 2014 rating regions
- 7 MSA + 2: new west region combines current Resort + West
- 7 MSA + 1: combines all current Non-MSA regions into one (ACA default)
- RCCO regions: Regional Care Collaborative Organization Regions (see exhibit 13)
- 6 MSA + 2: Remove Grand Junction as MSA and combine with west region

The results of the scorecard finds 7 MSA + 4, 7 MSA +2 and 7 MSA +1 as acceptable geographic regional groupings, and ranks 7 MSA + 4 as the best grouping, followed by 7 MSA + 2 and then 7 MSA + 1. RCCO and 6 MSA + 2 failed as acceptable groupings.

Details of the ratings are illustrated in the table below. Further detail is provided in the body of the report.

(remainder of page intentionally blank)

Geographic Rating Region Score Card (Rank each category, 1 = best score)

Metric and ACA Geographic Law Component	Metric	Credible Membership	Stability in Utilization Patterns[1]	Standard Deviation of Total Cost	Cost per Unit Factor	
	Primary Applicable Component of Law (In general all apply)	All	Leads to Stability in rates over time[1]	Not Unfairly Discriminatory	Reflect significant differences in health care unit costs	Acceptable Grouping
Rank (Score) - Description	**7 MSA + 4**	2 - Northeast region is the only region that does not have high credibility	1	1	1	Yes
	7 MSA + 2	1 - All regions have credible member months	2	2 - Slight Increase in disparity measurement when Resort is combined with West	2 – Unit cost varies reasonably between the 4 Non-MSA's. More variation in units cost occurs with combining regions	Yes
	7 MSA + 1	1 - All regions have credible member months	3	2 - Slight Increase in disparity measurement when combining regions	3 – Unit cost varies reasonably between the 4 Non-MSA's. More variation in units cost occurs with combining regions	Yes (Default ACA)
	6 MSA + 2	1 - All regions have credible member months	4	Fails test. Slight increase in variability from 7 MSA + 1, however, Grand Junction is credible on its own with a very high migration rating. Grand Junction should stand on its own.	Not considered, fails other test	No
	RCCO	1 - All regions have credible member months	Not considered, fails other test	Fail test - Disparity measures increase too much when compared to other regions	Not considered, fails other test	No

1 - Members within each region utilize providers within that region at a high rate which leads to stability. However, for each non-MSA region, utilization patterns vary significantly for providers outside of the members region leading to instability. Therefore the rank drops as non-MSAs are combined.

Total Cost: Summary of Methods and Data:

Claims data were provided using the APCD. CIVHC provided 16 files with a total of 816 Million lines of data. The files contained data for medical claims, pharmacy claims, provider information and member information. Strict HIPAA compliance procedures were in place to ensure adherence to privacy regulations.

The data provided included the following products: commercial major medical + pharmacy, major medical only, pharmacy only, indemnity products, supplemental medical products, Medicare advantage, Medicare Part D and Medicaid. The study applies to commercial major medical + pharmacy products, so only members with those benefits were studied. The data include carriers with complete claims data and carriers with incomplete claims data, only those with complete claims data were reported, we use the phrase "complete carriers" to reference this group. The Non-MSA regions are highly represented by the complete carriers, so results are credible when comparing Non-MSA regions.

Data were also compiled and reported in a manner that is consistent with how these products are priced. Health insurance premiums are determined by when services are rendered (service date). This is very often different to when the services are paid for (paid date). It is common for a claim to be paid 1 – 3 months after it's occurrence (lag payment). In some cases, however less frequently, claims are paid 4 – 24 months later. When insurance premiums are determined, the claims driving those premiums must be adjusted for estimated lag payments, this is sometimes referred to as "actuarial completion". Data were provided with paid dates through March 2013. There is sufficient data to predict actuarial completion (and therefore Total claims) for the year 2012. Data is not sufficient enough to predict 2013 costs, so 2013 was not reported on. Claims in 2011 were increased 0.1% and claims in 2012 were increased 1.6% to account for completion. Total cost is defined as health expenses paid for by the carrier plus expenses paid by the member in the form of deductibles, coinsurance and copays. See Exhibit 1 for detail. For further detail on completion see appendix 2.

Exhibit 1: Modeled data and completion adjustment

Service Year[1]	Total Members	Total Member Months	Total Cost (Billions)	Actuarial Factor to Complete Annual Claims	Actuarially Completed Total Cost (Billions)	Total Cost per Member per Year[2]
2010	644,565	6,108,616	$1,717	0.0%	$1,717	**$3,373**
2011	593,725	5,699,940	$1,632	0.1%	$1,633	**$3,438**
2012	576,480	5,454,472	$1,591	1.6%	$1,616	**$3,555**
2013	474,821	1,338,353	$341	Not credible for study purposes		

1) Claims provided with claim paid dates through March 2013. Service date is quite often different than paid date. Many claims that were paid in 2013 were for service dates in 2012. Data was analyzed on a service date basis as this is how insurance premiums are determined.

2) Total Cost per Member per Year calculated by weighting how many months the member is present during the year. Total Cost per member per year = (Total Cost /(Total Member Months))X12.

Data were compared to benchmarks. The benchmarks include 2012 data from Colorado 2013 public rate filings and results from the 2012 Health Care Cost and Utilization Report developed by the Health Care Cost Institute (HCCI). HCCI performs a detailed claim cost and utilization report using carrier data for employer sponsored insurance (ESI) across the country (www.healthcostinstitute.org). See Exhibit 2 below for detail.

Exhibit 2: 2012 Total Cost Benchmarks

Description	Total Cost
This Study (APCD Individual and Large Group; Major Medical + Pharmacy Benefits; Complete Carriers)	**$3,555**
Colorado APCD Website[1]	$2,708
Colorado Public Rate Filings Small Group (Complete Carriers)	$4,515
Colorado Public Rate Filings Individual (Complete Carriers)	$2,261
Colorado Public Rate Filings (Individual + Small Group; Complete Carriers)	$3,614
Colorado Public Rate Filings (Individual + Small Group; All Carriers)	$3,464
Health Care Cost Institute: Northeast (Employer Sponsored Plans)	$4,868
Health Care Cost Institute: Midwest (Employer Sponsored Plans)	$4,735
Health Care Cost Institute: South (Employer Sponsored Plans)	$4,790
Health Care Cost Institute: West (Employer Sponsored Plans)	$4,382
Health Care Cost Institute: Total (Employer Sponsored Plans)	$4,701

1. The differences between the APCD website value and the study value is: APCD reports on claims per member per year, this study reports on claims per member adjusted for how long the member was present in the year. The study restricted the choice of plans to be those similar to ACA exchange plans, commercial major medical insurance with Medical and Pharmacy Benefits. APCD website value includes other types of insurance such as supplemental and indemnity plans and plans that only include Medical or Pharmacy, but not both.

Data were adjusted for age gender impacts. Age/gender factors provide an index for the cost due to age and gender. As an example, health care costs gradually increase as a member ages, so age/gender factors increase with age. It is appropriate to adjust for age/gender as this is input into geographic factor determination and in effect, treats all regions as if they have the same demographics. As an example, Denver Region total cost is $3,492 for 2012 and Denver age gender factor is 0.997 (99.7% of Colorado's average – implies, among other things, that Denver has most likely, a slightly younger population). The appropriate cost to report is $3,492 ÷ 0.997 = $3,502. The Resort region, on the other hand, has an older than average population with 2012 total cost $4,998 and an age gender factor of 1.043 (104.3% of the average). The appropriate cost to report is $4,998 ÷ 1.043 = $4,792. Data in this section are reported by current geographical area (exhibit 3). See exhibit 4 for age/gender factors by region. Exhibit 4 illustrates that the population studied has total cost increases, due to demographic changes, of 0.8% in 2011 and 1.0% in 2012. For every portion of this report, excluding this paragraph, total cost will imply age gender adjusted total cost. Exhibits 5 – 9 provide tables and charts summarizing total cost by current region.

Exhibit 3 – Current Regions

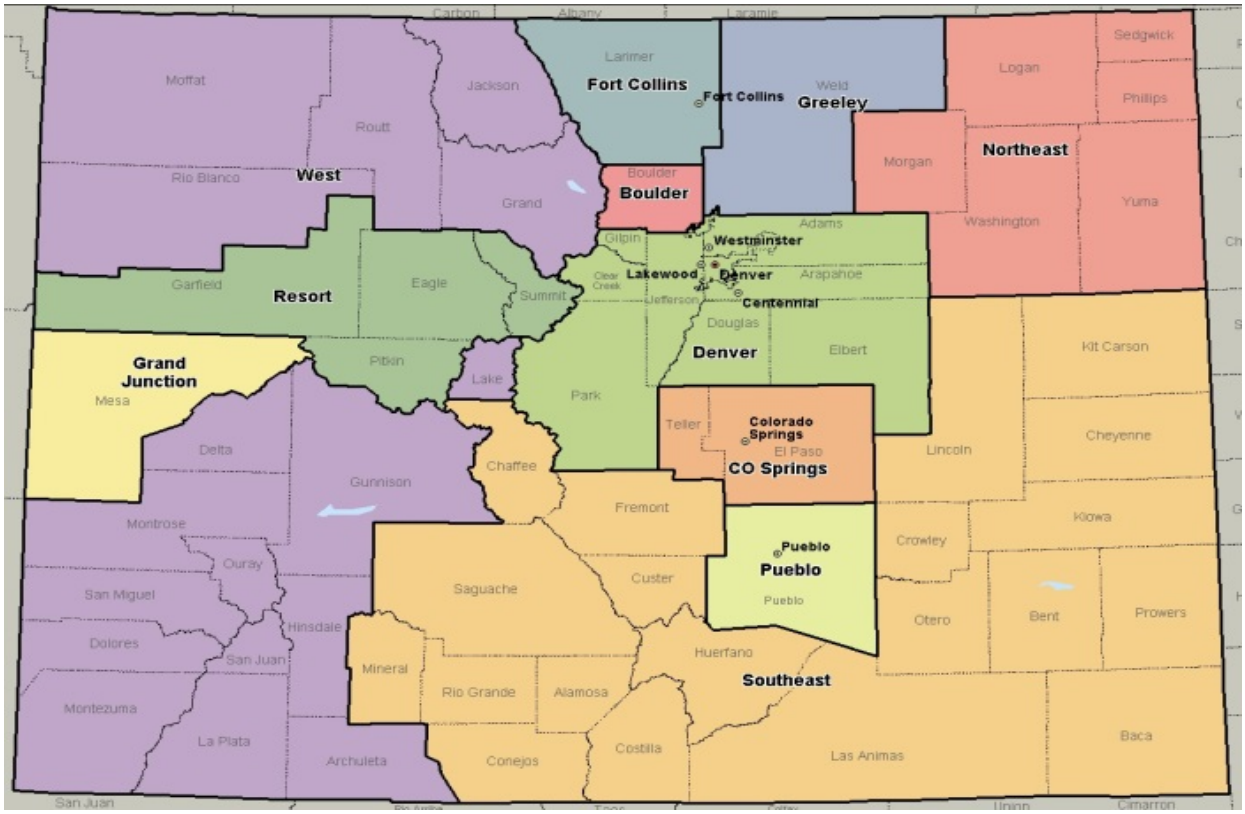


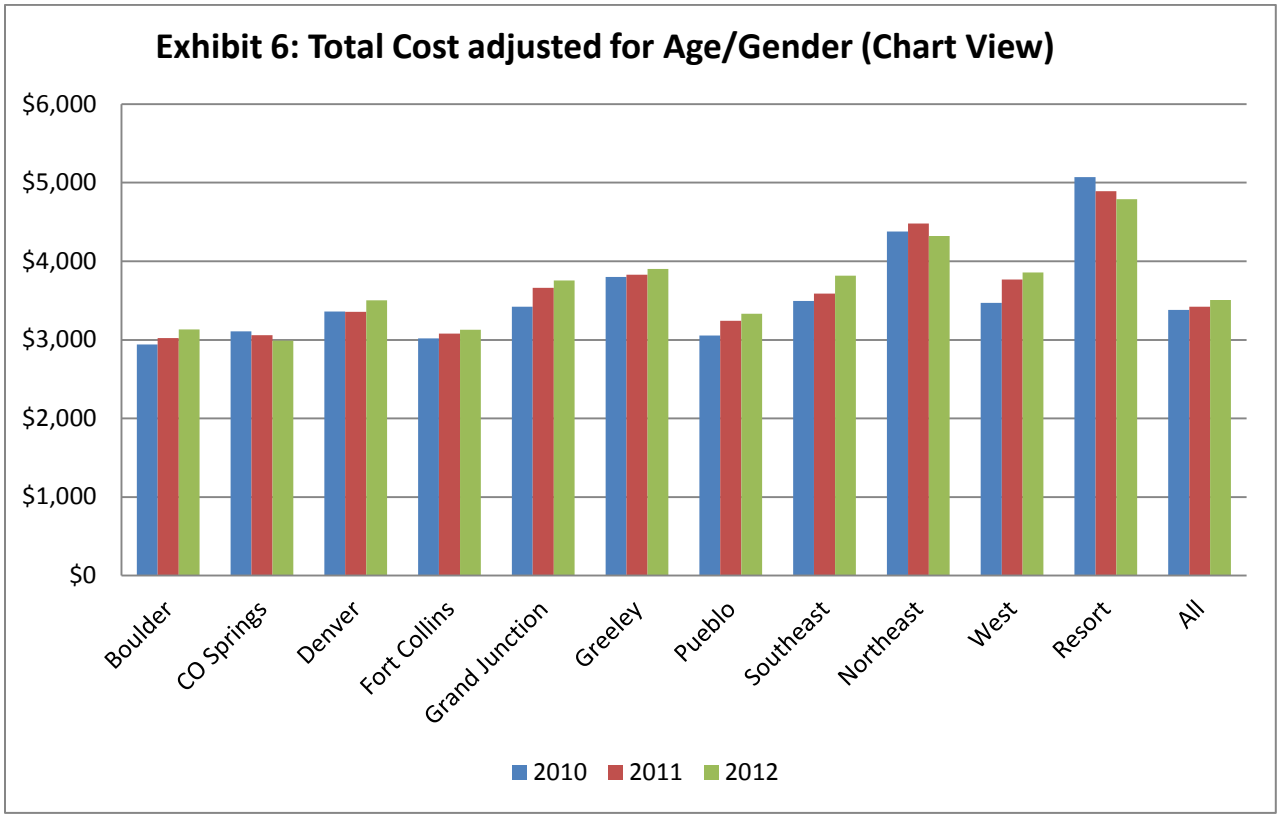
Exhibit 4 – Age Gender Factors (Colorado Experience)

Age/Gender Factor

Reg #	Member Region	Total Cost 2010	Total Cost 2011	Total Cost 2012	Trends 2011	Trends 2012
1	Boulder	0.984	0.998	1.009	1.5%	1.0%
2	CO Springs	0.997	1.001	1.016	0.4%	1.5%
3	Denver	0.985	0.990	0.997	0.5%	0.7%
4	Fort Collins	0.983	0.994	1.013	1.1%	1.9%
5	Grand Junction	1.019	1.030	1.036	1.1%	0.6%
6	Greeley	0.967	0.983	1.010	1.6%	2.8%
7	Pueblo	1.030	1.044	1.060	1.3%	1.6%
8	Southeast	1.074	1.075	1.086	0.1%	1.0%
9	Northeast	0.986	0.986	0.994	0.0%	0.8%
10	West	1.044	1.055	1.064	1.0%	0.9%
11	Resort	1.003	1.029	1.043	2.6%	1.4%
All	**All**	0.995	1.003	1.014	**0.8%**	**1.0%**

Exhibit 5- Total Cost adjusted for Age/Gender

		Total Cost			Total Cost as a percent of average				Member
Reg	Region Name	2010	2011	2012	2010	2011	2012	Combined	Credibility
1	Boulder	$2,941	$3,024	$3,132	87.0%	88.4%	89.3%	88.3%	High
2	CO Springs	$3,107	$3,059	$2,990	91.9%	89.5%	85.3%	88.9%	High
3	Denver	$3,359	$3,356	$3,502	99.4%	98.1%	99.8%	99.1%	High
4	Fort Collins	$3,017	$3,079	$3,128	89.2%	90.0%	89.2%	89.5%	High
5	Grand Junction	$3,421	$3,662	$3,757	101.2%	107.1%	107.1%	105.1%	High
6	Greeley	$3,801	$3,828	$3,902	112.5%	111.9%	111.3%	111.9%	High
7	Pueblo	$3,057	$3,243	$3,330	90.4%	94.8%	94.9%	93.4%	High
8	Southeast	$3,495	$3,589	$3,818	103.4%	104.9%	108.9%	105.7%	High
9	Northeast	$4,379	$4,479	$4,321	129.6%	131.0%	123.2%	127.9%	Medium
10	West	$3,469	$3,767	$3,858	102.6%	110.1%	110.0%	107.6%	High
11	Resort	$5,071	$4,891	$4,792	150.0%	143.0%	136.6%	143.2%	High
All	**All**	$3,380	$3,420	$3,508	100.0%	100.0%	100.0%	100.0%	



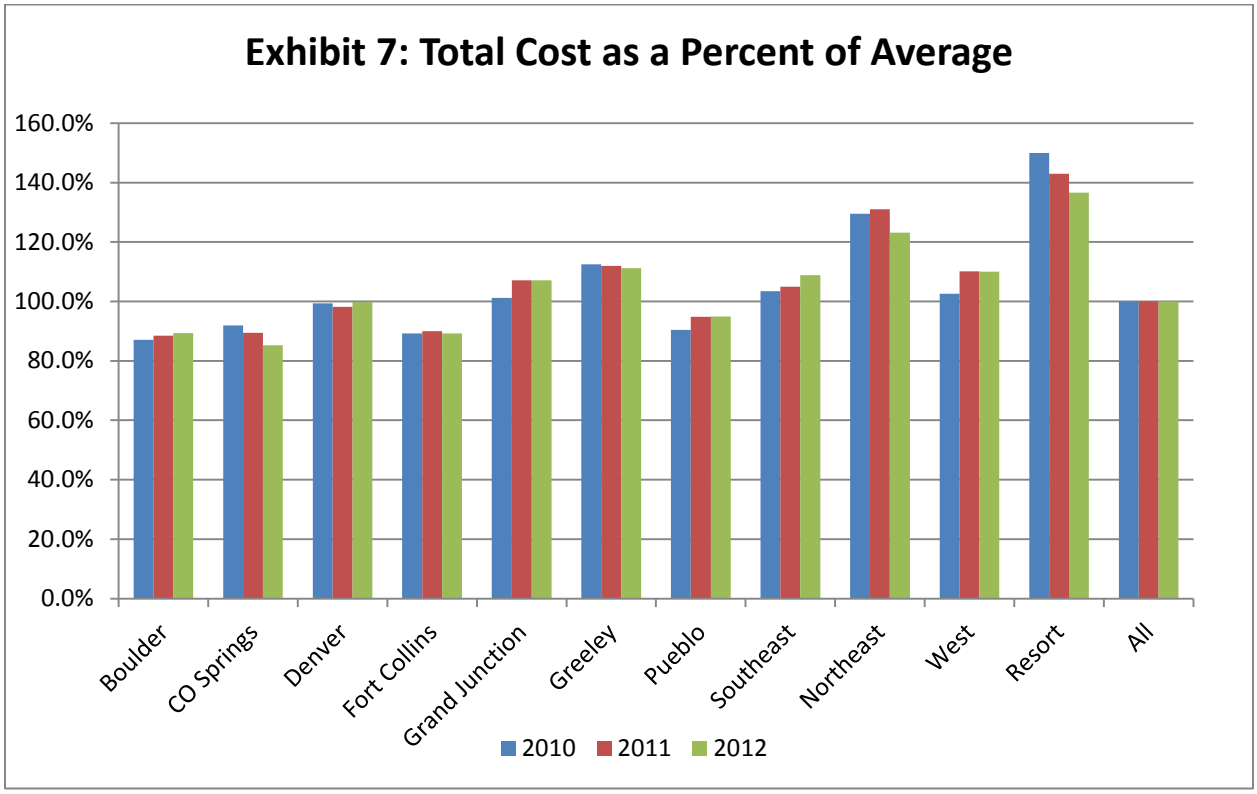


Exhibit 7: Total Cost as a Percent of Average
160.0%
140.0%
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Boulder
CO Springs
Denver
Fort Collins
Grand Junction
Greeley
Pueblo
Southeast
Northeast
West
Resort
All
2010
2011
2012

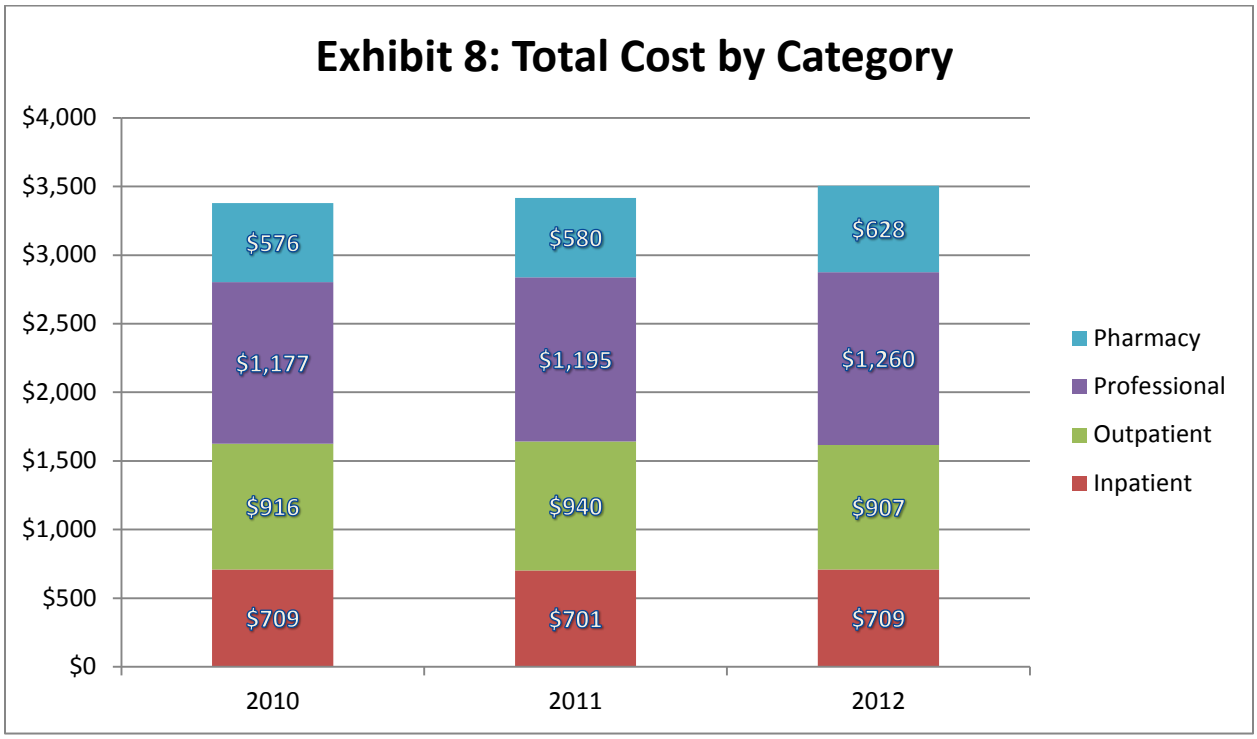
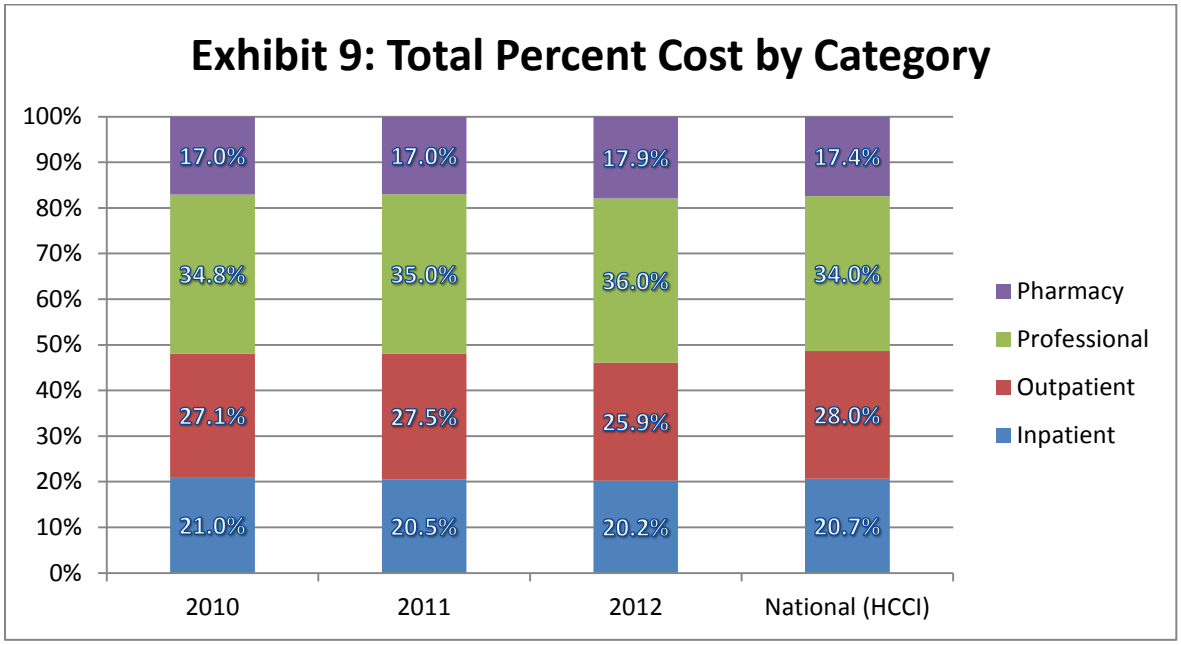


Exhibit 8: Total Cost by Category
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
$576
$1,177
$916
$709
$580
$1,195
$940
$701
$628
$1,260
$907
$709
2010
2011
2012
Pharmacy
Professional
Outpatient
Inpatient



For a region (or county) to be credible to stand on its own it must have a large enough membership base providing more stability in health cost. Credibility in health care is very often measured through member months. Here we define credibility to be the number of member months required in a county, such that the total cost in that county remains stable over the three year period. Credibility is a qualitative score that will assist in the comparison of regions. This metric does not imply complete stability for geographic factors. For example, if a county has had significant improvements in managing health cost, then its cost may decrease by more than 5%. This report considers other metrics to measure geographic cost that would account for this variability.

Exhibit 10: Credibility

Member Months in Data required so metric is satisfied	Credibility Score	Credibility Metric
Greater than 420,000	High	County cost for each year remains within 0%-5% of average for all years
Between 100,000 and 420,000	Medium	County cost for each year remains within 0%-12% of average for all years
Between 44,000 and 100,000	Low-Medium	County cost for each year remains within 0%-18% of average for all years
Less than 44,000	Low	County cost can vary higher than 18% of average

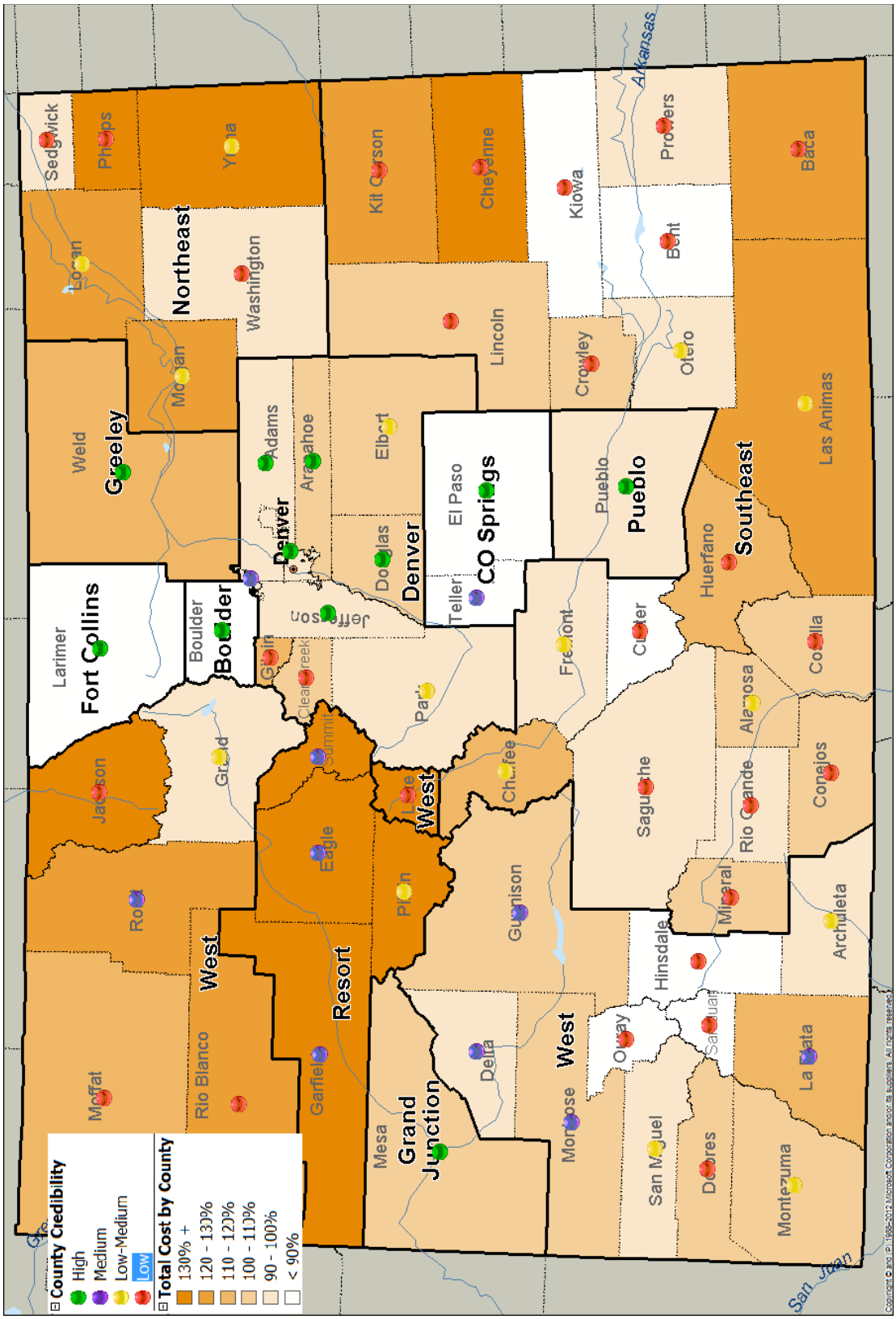
As an example, Greeley County has a credibility score of high and the most consistent total cost percents of 112%, 112% and 111% of the average (2010, 2011 and 2012 respectively). This implies that Greeley County may be credible enough to stand on its own.

Contrast this with Mineral County which has a credibility score of low and total cost percent of 71%, 70% and 183%. These vast differences can occur without credible membership and are usually due to a few large claims. This county must be grouped with other counties to gain credibility.

See exhibit 11 on the next page for a map of total cost and credibility by county. See appendix 1 for more detail.

(remainder of page intentionally left blank)

Exhibit 11: Map - Total Cost by County with Credibility



Geographic Study:

Prior to the Affordable Care Act, insurance carriers in Colorado (and many other states) were able to develop their own geographic rating areas (and rating factors) for individual, small group and large group markets. These regions are typically developed by analyzing: unit cost structures (depends on provider contracts); utilization patterns; and credible membership base in defined regions.

Under the ACA, a state has the option to default the rating areas to the Metropolitan Statistical Areas (MSA) plus one Non-MSA for all other areas (refer to this as MSA + 1). The state has the option to expand upon those areas as long as the regions:

- are actuarially justified;
- are not unfairly discriminatory;
- reflect significant differences in health care unit costs;
- lead to stability in rates over time;
- apply uniformly to all issuers in a market;
- and are based on the geographic boundaries of counties, three-digit zip codes, or metropolitan statistical areas and non-metropolitan statistical areas.

In theory, the only two major changes post ACA are:

- Regions apply uniformly to all carriers (before carrier had option to define based on their own experience and contracts.
- Must be actuarially justified if other than MSA + 1 is used.

In order to justify geographic regions, MN used three metrics as listed below.

Exhibit 12: Miller & Newberg Geographical Scoring Method

Metric	Primary Applicable Component of Law	Primary Applicable Component of Law
Credible Membership	All	All
Stability in Utilization patterns (migration patterns)	Lead to Stability in rates over time	All
Standard Deviation/Variability of Total Cost	Not Unfairly Discriminatory	All
Cost per Unit	Reflect significant differences in health care unit costs	All

The DOI has asked MN to consider 5 possible regions, including the current, in the geographic study.

The regions considered are:

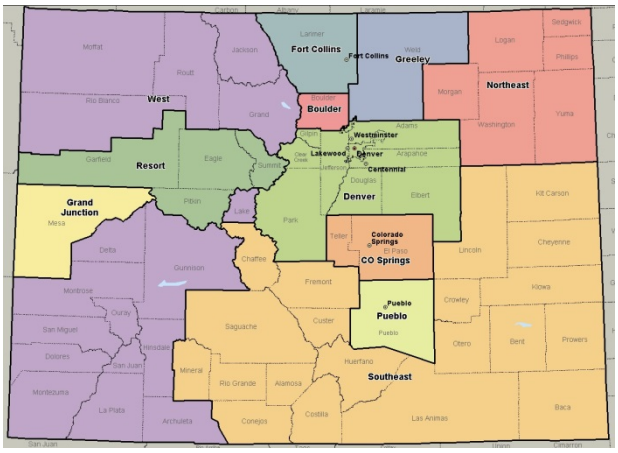
- 7 MSA + 4: current 2014 rating regions
- 7 MSA + 2: new west region combines current Resort + West
- 7 MSA + 1: combines all current Non-MSA regions into one (ACA default)
- RCCO regions: Regional Care Collaborative Organization Regions (see exhibit X)
- 6 MSA + 2: Remove Grand Junction as MSA and combine with west region

See Exhibit 13 for a map of regions.

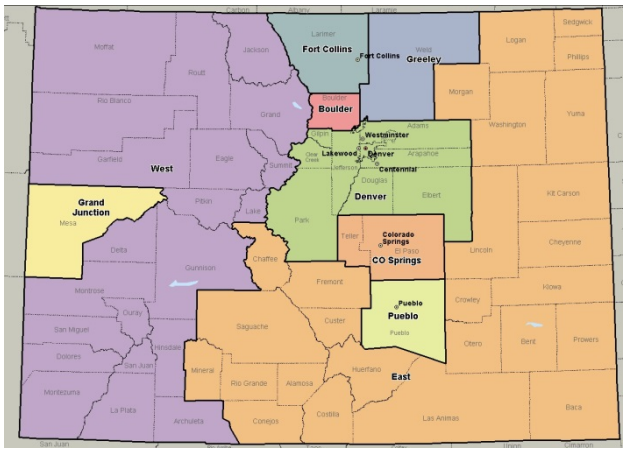
(remainder of page intentionally left blank)

Exhibit 13: Geographical Areas Considered:

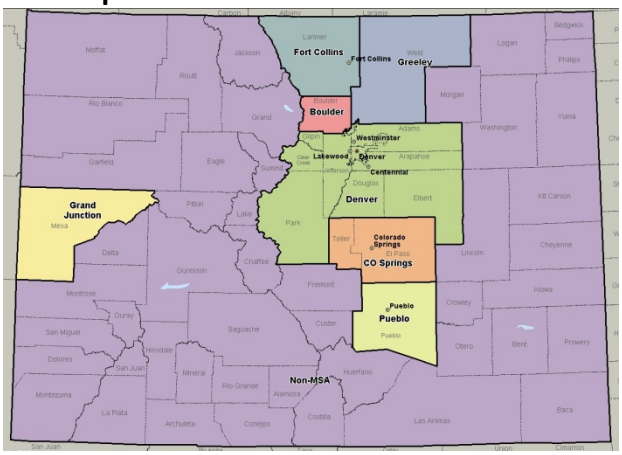
Current Rating Areas (7 MSA plus 4 Non-MSA)



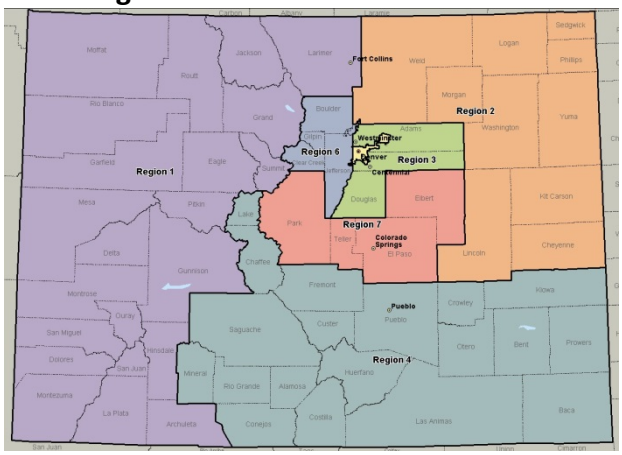
7 MSA plus 2 Non-MSA



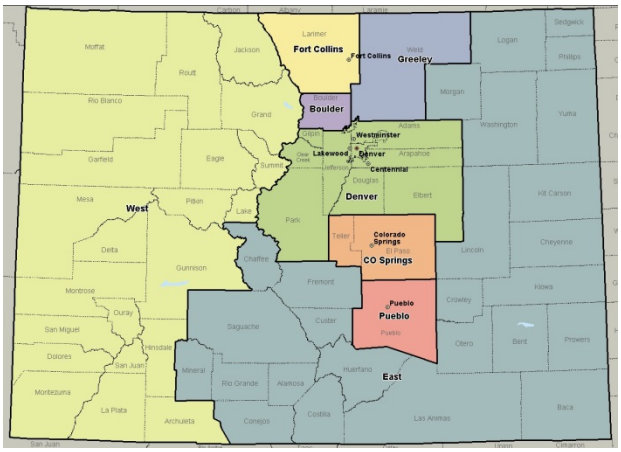
7 MSA plus 1 Non-MSA



RCCO Regions



6 MSA plus 2 Non-MSA



Credibility of Regions

Credibility is defined by member months in the study data (combines all carriers). Credibility for a particular carrier may be less. Credibility for future studies will be enhanced as CIVHC works to enhance the number of complete carriers and adds small group data to their experience.

The northeast region in the 7 MSA + 4 region has medium credibility. This is the only regional grouping in all geographic areas considered that is not high. Therefore, 7 MSA + 4 ranks as the second best regional grouping with all others having rank 1.

Exhibit 14: Credibility Scorecard

Region	Rank
All except 7 MSA + 4	1
7 MSA + 4	2

Utilization and Migration Patterns

Utilization and migration patterns drive stability in rates. For example, provider contracts in the northeast have the potential to be very different from provider contracts in the west due to the natural occurrence of different providers in the region. In addition, you'll see in the charts below that members in the northeast do not utilize services west and vice versa. Grouping these regions could lead to instability in current costs and/or future costs as contracts change in those regions.

Migration charts were developed. These charts illustrate the region where the member lives, the region where the member incurred services, and the percent of total cost in that region.

Approximately 19% of provider zip codes are invalid or out of state with the majority of those estimated to be invalid. These claim dollars are not illustrated in the charts. In addition, the accuracy of the carrier submitted provider physical address was not validated, however, the utilization patterns are reasonable enough to be considered as part of a the geographic score.

See exhibits 16 - 20 for migration patterns for the various groupings. Ranking migration patterns involves two main concepts:

- Do the members utilize services in their current region more than any other region (the diagonal in the chart)? If so, the migration pattern passes this test.
- When combining regions, do the regions, prior to combining, have similar utilization patterns in the other regions?

All regions satisfy the first bullet point. When considering the current regions, the non-MSA regions all have varied utilization patterns off the diagonal and any combination of non-MSA regions lessens the stability in utilization. Therefore, the non-RCCO regions rank the following way:

Utilization / Migration Scorecard:

Exhibit 15: Utilization/Migration Scorecard

Region	Rank
7 MSA + 4	1
7 MSA + 2	2
7 MSA + 1	3
6 MSA + 2	3
RCCO	Not Scored / Fails Discriminatory Test

Exhibit 16 = Current Region Total Cost Migration Patterns

Member Area	Provider Region --->											
Current Region	Boulder	CO Springs	Denver	Fort Collins	Grand Junction	Greeley	Pueblo	South-east	North-east	West	Resort	Total
Boulder	60.2%	0.3%	34.9%	2.3%	0.1%	0.5%	0.1%	0.1%	0.0%	0.4%	1.1%	100.0%
CO Springs	0.4%	77.4%	18.9%	0.8%	0.2%	0.2%	0.9%	0.5%	0.0%	0.3%	0.5%	100.0%
Denver	3.7%	0.6%	93.5%	0.5%	0.2%	0.2%	0.2%	0.2%	0.0%	0.2%	0.7%	100.0%
Fort Collins	3.0%	0.2%	12.5%	78.3%	0.1%	4.7%	0.1%	0.1%	0.1%	0.4%	0.5%	100.0%
Grand Junct.	0.2%	0.2%	6.3%	0.2%	89.3%	0.1%	0.0%	0.0%	0.0%	0.8%	2.7%	100.0%
Greeley	11.4%	0.2%	21.4%	20.8%	0.2%	45.0%	0.1%	0.1%	0.4%	0.2%	0.2%	100.0%
Pueblo	0.4%	8.0%	41.7%	0.3%	0.0%	0.2%	47.7%	1.4%	0.0%	0.1%	0.1%	100.0%
Southeast	0.7%	9.4%	31.9%	1.2%	0.3%	0.5%	10.8%	41.4%	0.3%	1.0%	2.6%	100.0%
Northeast	1.2%	0.2%	16.4%	14.9%	0.3%	19.5%	0.0%	0.3%	46.9%	0.1%	0.1%	100.0%
West	0.5%	0.5%	25.9%	0.9%	9.1%	0.1%	0.1%	0.3%	0.0%	59.1%	3.4%	100.0%
Resort	0.8%	0.3%	30.1%	0.2%	3.4%	0.1%	0.1%	0.3%	0.0%	0.4%	64.3%	100.0%
All	6.9%	8.9%	57.3%	6.8%	5.8%	2.9%	1.6%	1.4%	0.7%	4.6%	3.2%	100.0%

Exhibit 17 = 7 MSA + 2 Total Cost Migration Patterns

Member Area	Provider Region --->									
7 MSA + 2 Region	Boulder	CO Springs	Denver	Fort Collins	Grand Junction	Greeley	Pueblo	East	West	Total
Boulder	60.4%	0.3%	34.9%	2.3%	0.1%	0.5%	0.1%	0.1%	1.3%	100.0%
CO Springs	0.4%	77.5%	18.9%	0.8%	0.2%	0.2%	0.9%	0.5%	0.7%	100.0%
Denver	3.7%	0.6%	93.4%	0.5%	0.2%	0.2%	0.2%	0.2%	0.9%	100.0%
Fort Collins	3.0%	0.2%	12.5%	78.4%	0.1%	4.7%	0.1%	0.2%	0.8%	100.0%
Grand Junction	0.2%	0.2%	6.3%	0.2%	89.2%	0.1%	0.0%	0.1%	3.7%	100.0%
Greeley	11.4%	0.2%	21.4%	20.8%	0.2%	45.0%	0.1%	0.6%	0.4%	100.0%
Pueblo	0.4%	8.0%	41.7%	0.3%	0.0%	0.2%	47.7%	1.3%	0.3%	100.0%
East	0.8%	6.1%	25.5%	5.3%	0.3%	6.1%	7.0%	46.3%	2.6%	100.0%
West	0.5%	0.4%	24.2%	0.6%	6.5%	0.1%	0.1%	0.3%	67.3%	100.0%
All	6.9%	8.9%	57.2%	6.8%	5.8%	2.9%	1.6%	2.1%	7.8%	100.0%

Exhibit 18 = 7 MSA + 1 Total Cost Migration Patterns

Member Area	Provider Region --->								
MSA + 1 Region	Boulder	CO Springs	Denver	Fort Collins	Grand Junction	Greeley	Pueblo	Non-MSA	Total
Boulder	60.2%	0.3%	34.9%	2.3%	0.1%	0.5%	0.1%	1.6%	100.0%
CO Springs	0.4%	77.4%	18.9%	0.8%	0.2%	0.2%	0.9%	1.3%	100.0%
Denver	3.7%	0.6%	93.5%	0.5%	0.2%	0.2%	0.2%	1.1%	100.0%
Fort Collins	3.0%	0.2%	12.5%	78.3%	0.1%	4.7%	0.1%	1.1%	100.0%
Grand Junction	0.2%	0.2%	6.3%	0.2%	89.3%	0.1%	0.0%	3.6%	100.0%
Greeley	11.4%	0.2%	21.4%	20.8%	0.2%	45.0%	0.1%	0.9%	100.0%
Pueblo	0.4%	8.0%	41.7%	0.3%	0.0%	0.2%	47.7%	1.7%	100.0%
Non-MSA	0.6%	1.9%	24.6%	1.9%	4.8%	1.7%	1.9%	62.6%	100.0%
All	6.9%	8.9%	57.3%	6.8%	5.8%	2.9%	1.6%	9.9%	100.0%

Exhibit 19 = RCCO Total Cost Migration Patterns

Member Area	Provider Region --->							
RCCO Region	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Total
Region 1	78.2%	1.2%	4.8%	0.2%	13.1%	2.1%	0.3%	100.0%
Region 2	19.3%	50.2%	9.8%	0.2%	10.9%	9.1%	0.4%	100.0%
Region 3	1.4%	0.4%	55.0%	0.3%	33.6%	8.7%	0.7%	100.0%
Region 4	3.8%	0.3%	19.3%	51.5%	14.6%	1.6%	8.9%	100.0%
Region 5	1.8%	0.1%	30.8%	0.3%	58.7%	7.9%	0.4%	100.0%
Region 6	2.4%	0.4%	19.4%	0.3%	34.3%	42.9%	0.4%	100.0%
Region 7	1.9%	0.2%	9.2%	1.4%	12.8%	1.9%	72.5%	100.0%
All	21.4%	4.1%	23.9%	2.9%	26.6%	13.0%	8.0%	100.0%

Exhibit 20 = 6 MSA + 2 Total Cost Migration Patterns

Member Area	Provider Region --->								
6 MSA + 2 Region	Boulder	CO Springs	Denver	Fort Collins	Greeley	Pueblo	East	West	Total
Boulder	60.4%	0.3%	34.9%	2.3%	0.5%	0.1%	0.1%	1.4%	100.0%
CO Springs	0.5%	77.3%	18.9%	0.8%	0.2%	0.9%	0.5%	1.0%	100.0%
Denver	3.7%	0.6%	93.5%	0.5%	0.2%	0.2%	0.2%	1.1%	100.0%
Fort Collins	3.4%	0.2%	12.5%	78.0%	4.7%	0.1%	0.2%	1.0%	100.0%
Greeley	10.3%	0.2%	21.7%	21.1%	45.6%	0.1%	0.5%	0.6%	100.0%
Pueblo	0.4%	8.0%	41.7%	0.3%	0.2%	47.7%	1.4%	0.3%	100.0%
East	0.8%	6.1%	25.5%	5.3%	6.1%	7.0%	46.3%	2.9%	100.0%
West	0.4%	0.3%	18.3%	0.5%	0.1%	0.1%	0.2%	80.1%	100.0%
All	7.4%	9.4%	60.7%	7.2%	3.0%	1.7%	2.3%	8.3%	100.0%

Standard Deviation/Variability of Total Cost

Exhibit 21 below measures the variability within a region. For example, consider the Southeast region in the 7 MSA + 4 segment (table directly below). Within this region, the county with the highest cost (max factor = 1.36) is 36% higher in cost than the average for that region, likewise the county with the lowest cost (min factor = 0.78) is 22% lower than average for that region. The standard deviation column measures how much the individual counties vary from the county average, so a higher standard deviation typically corresponds to higher max and min. In addition, a county with low credibility should be weighted less. The credibility variability score columns adjust for this. Regions with lower standard deviation scores have less variability and therefore have less potential for discrimination.

Exhibit 21: Total Cost Variability Score

	Total Cost Variability Scores			Credibility Variability Score		
Current Region	Max	Min	St Deviation	Max	Min	St Deviation
Boulder	1.00	1.00	0.00	1.00	1.00	0.00
CO Springs	1.01	1.00	0.00	1.01	1.00	0.00
Denver	1.18	0.93	0.07	1.11	0.93	0.05
Fort Collins	1.00	1.00	0.00	1.00	1.00	0.00
Grand Junction	1.00	1.00	0.00	1.00	1.00	0.00
Greeley	1.00	1.00	0.00	1.00	1.00	0.00
Pueblo	1.00	1.00	0.00	1.00	1.00	0.00
Southeast	1.36	0.78	0.14	1.22	0.87	0.08
Northeast	1.19	0.71	0.18	1.11	0.83	0.10
West	1.67	0.64	0.26	1.40	0.78	0.15
Resort	1.10	0.96	0.06	1.04	0.96	0.03
All			0.06			0.04

	Total Cost Variability Scores			Credibility Variability Score		
7 MSA + 2	Max	Min	St Deviation	Max	Min	St Deviation
Boulder	1.00	1.00	0.00	1.00	1.00	0.00
CO Springs	1.01	1.00	0.00	1.01	1.00	0.00
Denver	1.18	0.93	0.07	1.11	0.93	0.05
Fort Collins	1.00	1.00	0.00	1.00	1.00	0.00
Grand Junction	1.00	1.00	0.00	1.00	1.00	0.00
Greeley	1.00	1.00	0.00	1.00	1.00	0.00
Pueblo	1.00	1.00	0.00	1.00	1.00	0.00
East	1.35	0.73	0.16	1.21	0.84	0.09
West	1.52	0.58	0.24	1.31	0.75	0.15
All			0.07			0.04

Exhibit 21 continued: Total Cost Variability Score

7 MSA + 1	Total Cost Variability Scores Max	Min	St Deviation	Credibility Variability Score Max	Min	St Deviation
Boulder	1.00	1.00	0.00	1.00	1.00	0.00
CO Springs	1.01	1.00	0.00	1.01	1.00	0.00
Denver	1.18	0.93	0.07	1.11	0.93	0.05
Fort Collins	1.00	1.00	0.00	1.00	1.00	0.00
Grand Junction	1.00	1.00	0.00	1.00	1.00	0.00
Greeley	1.00	1.00	0.00	1.00	1.00	0.00
Pueblo	1.00	1.00	0.00	1.00	1.00	0.00
Non-MSA	1.54	0.59	0.20	1.32	0.75	0.12
All			0.06			0.04

RCCO	Total Cost Variability Scores Max	Min	St Deviation	Credibility Variability Score Max	Min	St Deviation
Region 1	1.69	0.64	0.25	1.41	0.79	0.16
Region 2	1.31	0.79	0.17	1.19	0.87	0.10
Region 3	1.03	0.97	0.02	1.03	0.97	0.02
Region 4	1.65	0.83	0.18	1.39	0.90	0.11
Region 5	1.00	1.00	0.00	1.00	1.00	0.00
Region 6	1.23	0.93	0.10	1.14	0.93	0.07
Region 7	1.15	0.99	0.06	1.06	0.99	0.03
All			0.11			0.07

6 MSA + 2	Total Cost Variability Scores Max	Min	St Deviation	Credibility Variability Score Max	Min	St Deviation
Boulder	1.00	1.00	0.00	1.00	1.00	0.00
CO Springs	1.01	1.00	0.00	1.01	1.00	0.00
Denver	1.18	0.93	0.07	1.11	0.93	0.05
Fort Collins	1.00	1.00	0.00	1.00	1.00	0.00
Greeley	1.00	1.00	0.00	1.00	1.00	0.00
Pueblo	1.00	1.00	0.00	1.00	1.00	0.00
East	1.35	0.73	0.16	1.21	0.84	0.09
West	1.58	0.60	0.25	1.35	0.76	0.15
All			0.07			0.05

Exhibit 22: Standard Deviation/Variability of Total Cost Scorecard

Region	Rank - Description
7 MSA + 4	1
7 MSA + 2	2 – Slight Increase in variability when combining regions
7 MSA + 1	2 - Minor differences in disparity scores from 7 MSA + 2
6 MSA + 2	Fails test. Slight increase in variability from 7 MSA + 1, however, Grand Junction is credible on its own with a very high migration rating. Grand Junction should stand on its own.
RCCO	Fail test - Disparity measures increase too much when compared to other regions

Unit Cost Analysis

Medical claims data were submitted by claim ID. Different claim IDs with the same member, beginning service date, provider ID and category (Inpatient, Outpatient or Professional) were rolled up into one unit, described here as an admit (inpatient) or a visit (outpatient and professional). Pharmacy claims were submitted by script count. A detail of unit costs by region and category are illustrated in Appendix 4. Units cost by category were then calculated as a percent of average. The unit cost amounts were then weighted by the percent dollars in that category (Exhibit 9). Overall unit cost percents are illustrated in exhibit 24 below.

The result (scorecard) is illustrated below.

Exhibit 23: Unit Cost Scorecard

Region	Rank - Description
7 MSA + 4	1
7 MSA + 2	2 – Unit cost varies reasonably between the 4 Non-MSA's. More variation in units cost occurs with combining regions
7 MSA + 1	3 – Unit cost varies reasonably between the 4 Non-MSA's. More variation in units cost occurs with combining regions
6 MSA + 2	Not considered, fails other tests
RCCO	Not considered, fails other tests

Exhibit 24: Unit Cost as a Percent of State Average

Region	Region	Combined 2010	2011	2012	Average
7 MSA + 4	Boulder	95.0%	99.3%	90.9%	95.1%
7 MSA + 4	CO Springs	98.0%	96.5%	91.0%	95.2%
7 MSA + 4	Denver	98.6%	98.0%	102.8%	99.8%
7 MSA + 4	Fort Collins	106.8%	109.3%	100.9%	105.7%
7 MSA + 4	Grand Junction	84.7%	87.1%	88.7%	86.9%
7 MSA + 4	Greeley	117.2%	114.1%	114.7%	115.4%
7 MSA + 4	Pueblo	92.8%	98.1%	93.3%	94.7%
7 MSA + 4	Southeast	91.4%	92.3%	94.7%	92.8%
7 MSA + 4	Northeast	115.0%	116.1%	111.9%	114.3%
7 MSA + 4	West	97.3%	98.3%	97.7%	97.8%
7 MSA + 4	Resort	152.4%	146.8%	139.6%	146.3%
7 MSA + 2	East	98.1%	99.2%	99.6%	99.0%
7 MSA + 2	West	112.8%	111.0%	108.7%	110.9%
7 MSA + 1	Non-MSA	108.5%	107.6%	106.1%	107.4%
6 MSA + 2	West	103.2%	102.8%	101.9%	102.6%
RCCO	Region 1	103.9%	103.5%	101.4%	102.9%
RCCO	Region 2	115.8%	113.0%	112.6%	113.8%
RCCO	Region 3	102.3%	101.6%	104.9%	102.9%
RCCO	Region 4	90.2%	96.2%	93.3%	93.2%
RCCO	Region 5	88.9%	89.9%	97.3%	92.0%
RCCO	Region 6	98.4%	99.5%	98.9%	98.9%

Appendix 1: Total Cost by County Detail

County	Region Name	Total Cost 2010	Total Cost 2011	Total Cost 2012	Total Cost Percent of Average 2010	Total Cost Percent of Average 2011	Total Cost Percent of Average 2012	Total Cost Percent of Average Combined	Member Credibility
Adams	Denver	$3,401	$3,339	$3,482	100.6%	97.6%	99.3%	99.2%	High
Alamosa	Southeast	$3,395	$3,761	$3,582	100.4%	110.0%	102.1%	104.2%	Low-Medium
Arapahoe	Denver	$3,476	$3,442	$3,578	102.8%	100.6%	102.0%	101.8%	High
Archuleta	West	$3,324	$3,162	$3,620	98.4%	92.5%	103.2%	98.0%	Low-Medium
Baca	Southeast	$4,115	$2,352	$6,974	121.8%	68.8%	198.8%	129.8%	Low
Bent	Southeast	$2,358	$3,341	$3,480	69.8%	97.7%	99.2%	88.9%	Low
Boulder	Boulder	$2,941	$3,024	$3,132	87.0%	88.4%	89.3%	88.3%	High
Broomfield	Denver	$3,140	$3,500	$3,654	92.9%	102.3%	104.2%	99.8%	Medium
Chaffee	Southeast	$4,109	$3,605	$4,149	121.6%	105.4%	118.3%	115.1%	Low-Medium
Cheyenne	Southeast	$6,917	$4,930	$2,968	204.6%	144.2%	84.6%	144.5%	Low
Clear Creek	Denver	$3,444	$3,829	$3,305	101.9%	112.0%	94.2%	102.7%	Low
Conejos	Southeast	$3,391	$3,793	$3,882	100.3%	110.9%	110.7%	107.3%	Low
Costilla	Southeast	$2,883	$2,437	$5,274	85.3%	71.3%	150.4%	102.3%	Low
Crowley	Southeast	$3,465	$3,344	$3,788	102.5%	97.8%	108.0%	102.8%	Low
Custer	Southeast	$2,812	$2,751	$2,969	83.2%	80.4%	84.7%	82.8%	Low
Delta	West	$3,355	$3,256	$3,348	99.3%	95.2%	95.4%	96.6%	Medium
Denver	Denver	$3,087	$3,145	$3,244	91.3%	92.0%	92.5%	91.9%	High
Dolores	West	$3,348	$3,686	$4,189	99.1%	107.8%	119.4%	108.8%	Low
Douglas	Denver	$3,601	$3,539	$3,725	106.5%	103.5%	106.2%	105.4%	High
Eagle	Resort	$4,919	$4,860	$5,147	145.5%	142.1%	146.8%	144.8%	Medium
El Paso	CO Springs	$3,117	$3,048	$2,988	92.2%	89.1%	85.2%	88.8%	High
Elbert	Denver	$3,079	$3,326	$4,184	91.1%	97.2%	119.3%	102.5%	Low-Medium
Fremont	Southeast	$2,991	$3,608	$2,949	88.5%	105.5%	84.1%	92.7%	Low-Medium
Garfield	Resort	$5,021	$4,979	$4,324	148.5%	145.6%	123.3%	139.1%	Medium
Gilpin	Denver	$3,653	$3,772	$4,684	108.1%	110.3%	133.5%	117.3%	Low
Grand	West	$3,515	$3,125	$3,608	104.0%	91.4%	102.9%	99.4%	Low-Medium
Gunnison	West	$3,323	$3,416	$3,876	98.3%	99.9%	110.5%	102.9%	Medium
Hinsdale	West	$2,608	$1,391	$3,102	77.2%	40.7%	88.4%	68.8%	Low
Huerfano	Southeast	$3,520	$4,382	$3,628	104.2%	128.1%	103.4%	111.9%	Low
Jackson	West	$3,753	$6,625	$8,289	111.0%	193.7%	236.3%	180.4%	Low
Jefferson	Denver	$3,352	$3,353	$3,496	99.2%	98.0%	99.7%	99.0%	High
Kiowa	Southeast	$2,043	$3,919	$2,945	60.4%	114.6%	84.0%	86.3%	Low
Kit Carson	Southeast	$3,818	$4,320	$4,535	113.0%	126.3%	129.3%	122.9%	Low
La Plata	West	$3,440	$3,816	$4,265	101.8%	111.6%	121.6%	111.7%	Medium
Lake	West	$2,914	$9,317	$4,691	86.2%	272.4%	133.7%	164.1%	Low
Larimer	Fort Collins	$3,017	$3,079	$3,128	89.2%	90.0%	89.2%	89.5%	High
Las Animas	Southeast	$3,484	$4,320	$4,760	103.1%	126.3%	135.7%	121.7%	Low-Medium
Lincoln	Southeast	$4,184	$3,478	$3,463	123.8%	101.7%	98.7%	108.1%	Low
Logan	Northeast	$4,381	$4,179	$4,789	129.6%	122.2%	136.5%	129.4%	Low-Medium

Mesa	Grand Junction	$3,421	$3,662	$3,757	101.2%	107.1%	107.1%	105.1%	High
Mineral	Southeast	$2,407	$2,380	$6,418	71.2%	69.6%	183.0%	107.9%	Low
Moffat	West	$3,794	$3,937	$4,201	112.3%	115.1%	119.8%	115.7%	Low
Montezuma	West	$3,550	$3,732	$3,615	105.0%	109.1%	103.1%	105.7%	Low-Medium
Montrose	West	$3,674	$3,861	$3,195	108.7%	112.9%	91.1%	104.2%	Medium
Morgan	Northeast	$4,097	$4,500	$4,411	121.2%	131.6%	125.8%	126.2%	Low-Medium
Otero	Southeast	$2,819	$3,517	$3,747	83.4%	102.8%	106.8%	97.7%	Low-Medium
Ouray	West	$2,273	$3,049	$2,850	67.2%	89.1%	81.3%	79.2%	Low
Park	Denver	$3,727	$2,783	$3,201	110.3%	81.4%	91.3%	94.3%	Low-Medium
Phillips	Northeast	$4,356	$6,794	$4,500	128.9%	198.6%	128.3%	151.9%	Low
Pitkin	Resort	$6,011	$4,965	$5,257	177.8%	145.2%	149.9%	157.6%	Low-Medium
Prowers	Southeast	$3,762	$2,679	$3,692	111.3%	78.3%	105.3%	98.3%	Low
Pueblo	Pueblo	$3,057	$3,243	$3,330	90.4%	94.8%	94.9%	93.4%	High
Rio Blanco	West	$3,681	$5,373	$3,817	108.9%	157.1%	108.8%	124.9%	Low
Rio Grande	Southeast	$3,062	$3,362	$3,290	90.6%	98.3%	93.8%	94.2%	Low
Routt	West	$3,958	$4,181	$4,510	117.1%	122.3%	128.6%	122.7%	Medium
Saguache	Southeast	$3,457	$2,746	$3,275	102.3%	80.3%	93.4%	92.0%	Low
San Juan	West	$3,189	$1,687	$2,805	94.4%	49.3%	80.0%	74.5%	Low
San Miguel	West	$2,966	$3,200	$3,410	87.8%	93.6%	97.2%	92.8%	Low-Medium
Sedgwick	Northeast	$3,888	$3,012	$2,454	115.0%	88.1%	70.0%	91.0%	Low
Summit	Resort	$4,688	$4,761	$4,641	138.7%	139.2%	132.3%	136.7%	Medium
Teller	CO Springs	$2,979	$3,227	$3,035	88.1%	94.3%	86.5%	89.7%	Medium
Washington	Northeast	$3,163	$3,344	$2,972	93.6%	97.8%	84.7%	92.0%	Low
Weld	Greeley	$3,801	$3,828	$3,902	112.5%	111.9%	111.3%	111.9%	High
Yuma	Northeast	$5,385	$4,573	$4,208	159.3%	133.7%	120.0%	137.7%	Low-Medium

Appendix 2

Completion: Inpatient, Outpatient, Professional, & Pharmacy:

Medical claims from the commercial major medical + pharmacy base were completed for this study. The standard actuarial completion factor method was used, with separate factors developed for inpatient, outpatient, and professional claims. Pharmacy claims were assumed to have enough hindsight be complete.

Table: Non-Completed vs. Completed Total Cost in millions

Service Year	2010	2011	2012	2013*
Inpatient Claims	$362	$336	$314	$55
Inpatient Completed	362	337	327	120
Outpatient Claims	467	450	414	94
Outpatient Completed	467	451	420	139
Professional Claims	598	570	574	117
Professional Completed	598	570	581	155
Pharmacy Claims	291	275	288	75
Total Claims	$1,717	$1,632	$1,591	$341
Total Completed	$1,717	$1,633	$1,616	$489

* Incomplete year, claims data only available through March 2013.

The study period was limited to claims incurred before 2013, in part due to the large effect completion had on the most recent months of claims data.

Appendix 3: Age Gender Factors (Colorado Experience)

Table: Age/Gender Factors

Age	Gender	Factor
0-1	M/F	1.340
2-19	M	0.488
20-24	M	0.553
25-29	M	0.570
30-34	M	0.600
35-39	M	0.691
40-44	M	0.858
45-49	M	1.018
50-54	M	1.310
55-59	M	1.634
60-64	M	2.061
65+	M	1.405
2-19	F	0.453
20-24	F	0.743
25-29	F	0.915
30-34	F	1.065
35-39	F	1.068
40-44	F	1.093
45-49	F	1.236
50-54	F	1.454
55-59	F	1.679
60-64	F	1.910
65+	F	1.114

Appendix 4: Cost per Unit (Inpatient Admits, Outpatient and Professional Visits, Pharmacy Scripts)

Cost per Admit (Inpatient), Cost per Visit (Outpatient and Professional), Cost per Script (Pharmacy)

		Inpatient			Outpatient			Professional			Pharmacy		
Region	Region	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
7 MSA + 4	Boulder	$19,400	$23,575	$17,062	$954	$1,001	$1,059	$184	$195	$198	$84	$84	$83
7 MSA + 4	CO Springs	17,917	15,700	13,663	1,224	1,341	1,336	183	188	194	78	81	80
7 MSA + 4	Denver	16,920	17,292	18,526	1,211	1,251	1,535	186	191	199	85	87	89
7 MSA + 4	Fort Collins	25,577	26,460	22,754	1,244	1,407	1,382	186	198	199	75	72	73
7 MSA + 4	Grand Junction	16,563	18,658	20,031	767	865	883	193	199	214	63	62	62
7 MSA + 4	Greeley	25,448	26,101	29,147	1,696	1,566	1,670	184	200	202	78	79	79
7 MSA + 4	Pueblo	17,220	20,683	16,293	1,278	1,446	1,605	159	167	172	72	71	72
7 MSA + 4	Southeast	17,763	18,205	19,067	1,016	1,152	1,188	192	195	220	63	62	62
7 MSA + 4	Northeast	25,962	27,388	24,993	1,605	1,632	1,582	197	213	233	64	64	68
7 MSA + 4	West	19,455	21,060	22,103	1,049	1,129	1,172	210	217	223	62	60	61
7 MSA + 4	Resort	30,204	28,195	27,730	2,301	2,242	1,907	283	301	338	69	69	70
7 MSA + 2	East	20,044	20,828	20,674	1,185	1,293	1,303	193	201	224	63	63	64
7 MSA + 2	West	22,553	22,884	23,544	1,379	1,399	1,333	233	242	256	64	63	64
7 MSA + 1	Non-MSA	21,773	22,269	22,691	1,318	1,366	1,324	222	230	247	64	63	64
6 MSA + 2	West	20,805	21,587	22,483	1,144	1,198	1,160	221	228	243	64	62	63
RCCO	Region 1	21,891	22,234	22,594	1,167	1,242	1,209	212	220	231	67	65	66
RCCO	Region 2	25,193	25,735	27,277	1,616	1,547	1,598	190	203	211	76	75	77
RCCO	Region 3	17,231	16,954	17,721	1,323	1,393	1,651	190	194	202	85	89	90
RCCO	Region 4	17,426	20,980	18,301	1,119	1,270	1,366	170	182	193	67	66	67
RCCO	Region 5	14,044	15,265	16,338	957	980	1,376	181	189	196	86	89	91
RCCO	Region 6	18,907	20,747	19,996	1,131	1,181	1,304	183	191	197	84	84	86

Appendix 5: Percent of Average Cost per Unit

Percent of Average: Cost per Admit (Inpatient), Cost per Visit (Outpatient and Professional), Cost per Script (Pharmacy)

		Inpatient			Outpatient			Professional			Pharmacy			Combined			
Region	Region	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012	Average
7 MSA + 4	Boulder	102.9%	122.1%	88.6%	79.6%	79.4%	77.0%	96.7%	99.0%	96.9%	106.4%	104.9%	101.5%	95.0%	99.3%	90.9%	95.1%
7 MSA + 4	CO Springs	95.1%	81.3%	70.9%	102.0%	106.3%	97.1%	96.4%	95.6%	94.6%	98.6%	100.8%	97.3%	98.0%	96.5%	91.0%	95.2%
7 MSA + 4	Denver	89.8%	89.6%	96.2%	100.9%	99.2%	111.6%	98.1%	97.1%	97.2%	106.8%	108.2%	108.8%	98.6%	98.0%	102.8%	99.8%
7 MSA + 4	Fort Collins	135.7%	137.1%	118.1%	103.7%	111.5%	100.4%	97.8%	100.6%	97.2%	94.7%	90.0%	89.6%	106.8%	109.3%	100.9%	105.7%
7 MSA + 4	Grand Junction	87.9%	96.7%	104.0%	63.9%	68.6%	64.2%	101.8%	101.0%	104.3%	79.1%	76.7%	75.9%	84.7%	87.1%	88.7%	86.9%
7 MSA + 4	Greeley	135.0%	135.2%	151.3%	141.4%	124.2%	121.3%	96.7%	101.7%	98.4%	98.9%	97.7%	96.8%	117.2%	114.1%	114.7%	115.4%
7 MSA + 4	Pueblo	91.4%	107.2%	84.6%	106.6%	114.6%	116.7%	83.7%	84.8%	84.2%	91.5%	87.8%	87.6%	92.8%	98.1%	93.3%	94.7%
7 MSA + 4	Southeast	94.2%	94.3%	99.0%	84.7%	91.3%	86.3%	100.9%	99.2%	107.6%	79.3%	77.1%	76.2%	91.4%	92.3%	94.7%	92.8%
7 MSA + 4	Northeast	137.8%	141.9%	129.7%	133.8%	129.4%	115.0%	103.4%	108.1%	113.8%	80.7%	79.8%	83.3%	115.0%	116.1%	111.9%	114.3%
7 MSA + 4	West	103.2%	109.1%	114.7%	87.4%	89.5%	85.1%	110.6%	110.3%	108.8%	78.4%	74.8%	74.4%	97.3%	98.3%	97.7%	97.8%
7 MSA + 4	Resort	160.3%	146.1%	143.9%	191.8%	177.8%	138.6%	149.1%	152.8%	165.2%	86.8%	85.3%	85.0%	152.4%	146.8%	139.6%	146.3%
7 MSA + 2	East	106.4%	107.9%	107.3%	98.8%	102.5%	94.7%	101.7%	101.8%	109.5%	79.7%	78.0%	78.3%	98.1%	99.2%	99.6%	99.0%
7 MSA + 2	West	119.7%	118.6%	122.2%	115.0%	110.9%	96.9%	122.6%	122.7%	125.1%	81.1%	78.1%	77.8%	112.8%	111.0%	108.7%	110.9%
7 MSA + 1	Non-MSA	115.5%	115.4%	117.8%	109.9%	108.3%	96.2%	116.8%	117.0%	120.7%	80.7%	78.0%	78.0%	108.5%	107.6%	106.1%	107.4%
6 MSA + 2	West	110.4%	111.8%	116.7%	95.3%	95.0%	84.3%	116.1%	115.8%	118.5%	80.3%	77.5%	77.0%	103.2%	102.8%	101.9%	102.6%
RCCO	Region 1	116.2%	115.2%	117.3%	97.3%	98.5%	87.9%	111.3%	111.6%	112.7%	84.2%	80.8%	80.4%	103.9%	103.5%	101.4%	102.9%
RCCO	Region 2	133.7%	133.3%	141.6%	134.7%	122.6%	116.1%	100.2%	103.1%	103.1%	95.4%	93.2%	94.1%	115.8%	113.0%	112.6%	113.8%
RCCO	Region 3	91.4%	87.8%	92.0%	110.3%	110.4%	120.0%	100.2%	98.6%	98.7%	107.0%	110.1%	110.0%	102.3%	101.6%	104.9%	102.9%
RCCO	Region 4	92.5%	108.7%	95.0%	93.3%	100.7%	99.3%	89.4%	92.2%	94.0%	84.0%	82.3%	81.5%	90.2%	96.2%	93.3%	93.2%
RCCO	Region 5	74.5%	79.1%	84.8%	79.8%	77.7%	100.0%	95.3%	96.1%	95.6%	108.1%	110.1%	110.7%	88.9%	89.9%	97.3%	92.0%
RCCO	Region 6	100.3%	107.5%	103.8%	94.3%	93.6%	94.8%	96.5%	96.8%	96.1%	106.4%	104.7%	104.6%	98.4%	99.5%	98.9%	98.9%

Appendix 6: Claim Categorization and Units Methodology:

High Level: Inpatient, Outpatient, Professional, & Pharmacy:

For the study medical claims were bucketed at a high level into inpatient, outpatient or professional. Claims where first split between those that included a revenue code and those that did not. Claims lacking a revenue code were bucketed as professional. Claims with a revenue code for a room and board charge (revenue codes: 100 – 219) or with a MS-DRG code or with a place of service as Inpatient Hospital (21) , Skilled Nursing Facility(31), Nursing Facility(32), Custodial Care Facility(33), Hospice(34), Inpatient Psychiatric Facility(51), Psychiatric Residential Treatment Center(56), or Comprehensive Inpatient Rehabilitation Facility(61) were marked as inpatient, with the remaining marked as outpatient.

The results of this high level bucketing were compared to the Claim_Type_Cd provided by the Center for Improving Value in Health Care (CIVHC). It was found for 99.91% of the claims the Miller & Newberg, high level bucketing agreed with CIVHC's Claim_Type_Cd, due to this high correlation the Claim_Type_Cd was deemed reasonable to be used in this study.

For pharmacy, all claims from CIVHC's pharmacy tables were categorized as Pharmacy.

Benefit Detail Bucketing:

Inpatient, outpatient, professional, and pharmacy claims where broken down into 26 benefit detail categories.

Inpatient claims were split into 4 categories using the MS-DRG descriptions from CMS version 27 table. A hierarchy was used to force a claim into only a single category in the cases were a claim had multiple MS-DRG codes.

Hierarchy	Category
1	Delivery/Newborn
2	Inpatient Surgery
3	Mental Health Inpatient
4	Inpatient Medical

Outpatient claims were split into 10 categories, using a mixture of revenue codes, procedure code, (Current Procedural Terminology (CPT) codes) and Health Care Financing Administration Common Procedure Coding System (HCPCS)), and Berenson-Eggers Type of Service (BETOS). A hierarchy was used to identify claims into a single category in the cases when a claim had multiple categories.

Hierarchy	Category	Coding Used
1	Emergency Room	Revenue/ Procedure
2	Outpatient Surgery	Revenue/ Procedure
3	Observation	Revenue/ Procedure
4	Advanced Imaging	BETOS

5	Imaging	BETOS
6	Lab/Pathology	Revenue/ Procedure
7	Therapy (PT/OT/ST)	Revenue/ Procedure
8	DME/Prosthetics/Supplies (OP)	BETOS
9	Mental Health Outpatient	Revenue/ Procedure
10	Other Outpatient	All Others

Professional claims were split into 9 categories, using a mixture of procedure codes, place of service codes, and BETOS. A hierarchy was used to identify a claim into a single category in cases where a claim satisfied multiple categories.

Hierarchy	Category	Coding Used
1	Ambulance - Air	Procedure
2	Ambulance - Land	Procedure
3	Mental Health Professional	Procedure OR Place of Service
4	DME/Prosthetics/Supplies (P)	BETOS
5	Facility Surgical Visit	Procedure AND Place of Service
6	Office Surgical Visit	Procedure AND Place of Service
7	Facility Visit	Place of Service
8	Office Visit	Place of Service
9	Other Professional	All Others

Pharmacy claims were split into 3 categories, specialty, brand, or generic. The 2012 Optum specialty drug list was used to define specialty category along with marking any National Drug Codes (NDC) where the cost per 30 days was greater than $1,000. Non-specialty drugs were than further identified between brand and generic using the Generic_Ind field provided by CIVHC.

Units Methodology:

For units, medical claims were combined such that all claims assigned to the same member composite ID, and admitted on the same date to the same service provider with the same high level categorization were counted as a single unit. Units for pharmacy claims were counted such that each script filled was counted as a single unit.