



2013 Colorado School District Cost of Living Analysis

Colorado Legislative Council

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2013 COLORADO SCHOOL DISTRICT COST OF LIVING ANALYSIS

CONDUCTED FOR THE COLORADO LEGISLATIVE COUNCIL

SECTION 1: INTRODUCTION

Corona Insights is pleased to present this report to the Colorado Legislative Council. The following report provides the 2013 cost of living index for each of Colorado's 178 school districts, along with a description of the project design and research methodology.

BACKGROUND

In July of 2013, Corona Insights was retained to conduct the 2013 Colorado School District Cost of Living Study for the Colorado Legislative Council. This study measures the differences in the cost to purchase a typical "market basket" of goods among the 178 public school districts in the State of Colorado. Final cost of living factors detailed within this study reflect the relative cost differences for all notable site-specific living expenses (i.e., housing, transportation, goods, services and taxes) among Colorado's school districts. The cost of living index developed herein is used as one component of each district's per pupil funding formula.

This report is the latest in a series of biennial reports that were first conducted as a result of the Public School Finance Act of 1994.

SECTION 2: OVERVIEW OF RESEARCH DESIGN

The goal of the study is to develop comparative cost of living figures for each of the 178 school districts in the state. Five major questions guide the project:

1. What is a “typical” (archetypal) Colorado household in terms of size and income?
2. What types of goods and services does that archetypal household buy?
3. Where do they buy those goods and services?
4. How much do those goods and services cost in differing geographic locations?
5. If an archetypal household lives in each of the 178 school districts, what is the difference between their costs to buy those goods, based on the prices where they shop?

The cost of living estimates are developed using the following process to answer the questions listed above:

RESEARCH STRUCTURE

- ⇒ We begin with an archetypal household of three people with a total household income of \$49,100, which is the average teacher income for 2012 in Colorado;
- ⇒ Then we place that household in each school district in Colorado;
- ⇒ That household then spends their income on the same suite of goods and services that are purchased by the average household of that size and income level throughout the United States;
- ⇒ The archetypal household then shops inside and outside their district in a pattern that emulates the geographic shopping patterns of all households in that district;
- ⇒ The price for goods and services in each district where they shop may differ, even if the good or service is identical, based on market factors;
- ⇒ The final cost of living index is then calculated. This final index details the differences in costs of living for the archetypal household in each district to purchase a standard suite of goods and services.

An overview of the methodology is provided in Section 4 of this report, with additional detail provided in [Appendix B](#). [Appendix C](#) denotes notable methodological changes between the 2011 study and the 2013 study.

SECTION 3: 2013 COLORADO SCHOOL DISTRICT COST OF LIVING RESULTS

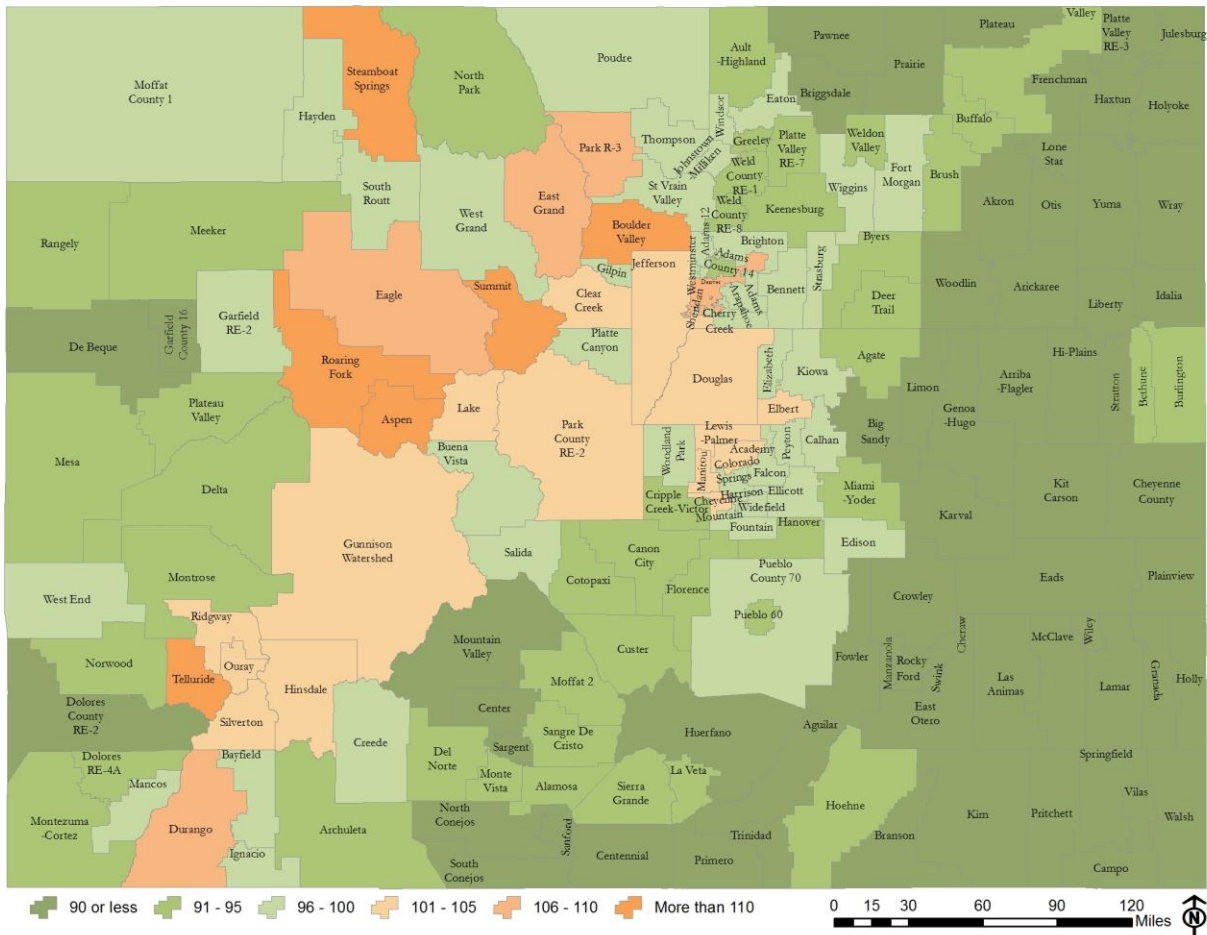
The table that extends across the following several pages provides the overall cost of living in each of Colorado's 178 school districts, as calculated in 2013. Figures are reported in order by District number (and alphabetically by County name), along with appropriate rankings, ratings, and comparisons.

Cost of living figures relate to the cost of buying a market basket of goods and services that represents the spending patterns in the United States of the average archetypal household. (See [Section 4](#) for more discussion of the archetypal household.) More detailed results by expense category may be seen in [Appendix A](#). Raw data for selected goods may be seen in [Appendix D](#).

The findings are largely consistent with previous years. Once again, Aspen has the highest cost of living, however its disparity is somewhat less extreme in 2013 than it was in 2011, largely because of declines in the housing market. Other mountain resort districts make up the top of the list, including Telluride, Summit County, and Steamboat Springs districts. Boulder continued to climb in the rankings in 2013, moving to #5, up from #8 in 2011, and #11 in 2009. The districts with the lowest costs of living are primarily located in the southeastern corner of the state.

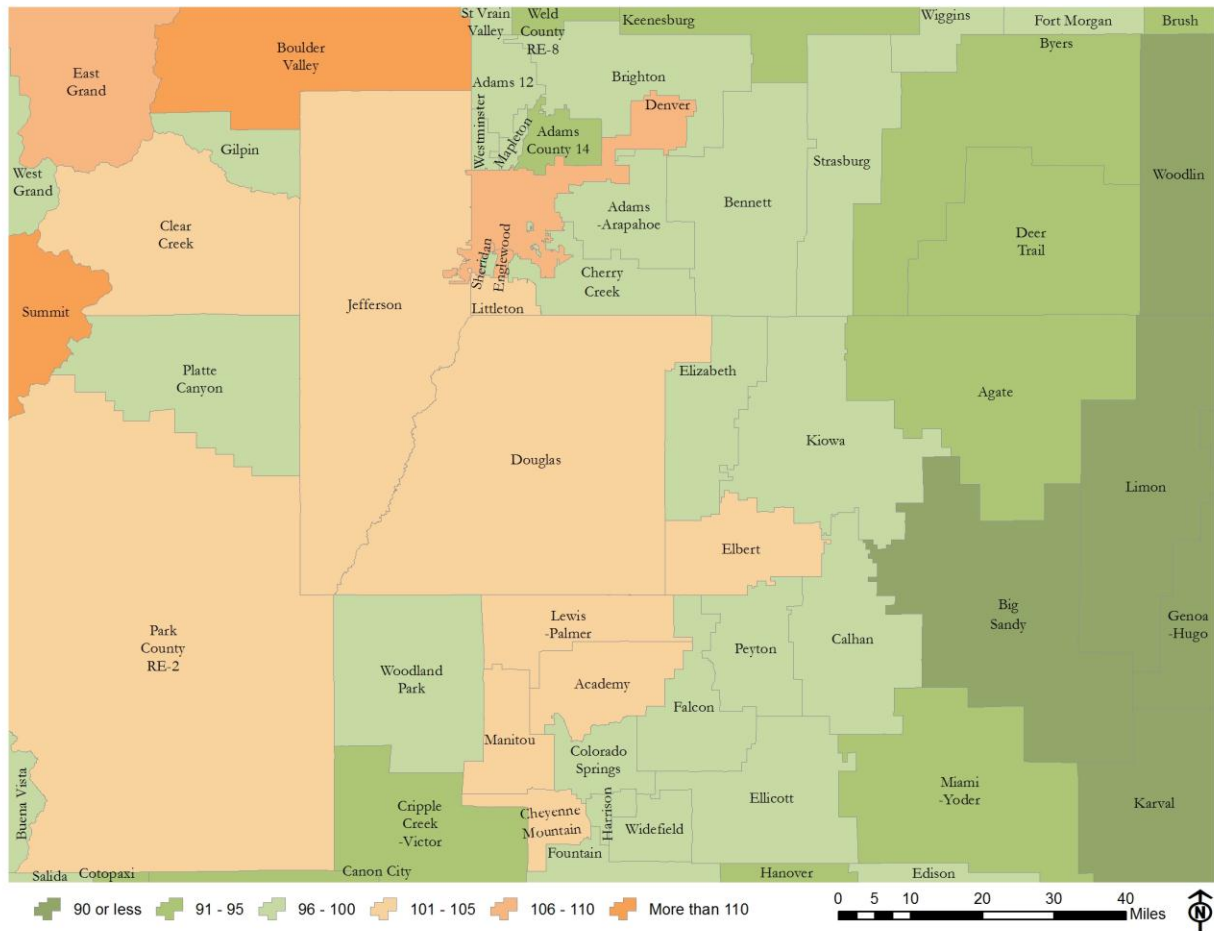
Below, two maps provide a visual summary of the cost of living index for the 178 school districts. The first map is a statewide view and the second is a detailed view of the Denver and Colorado Springs metro areas. Statewide maps for each major expenditure category are provided in [Appendix A](#).

EXHIBIT 3-1: MAP OF COST OF LIVING INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



Note. The index value is the ratio of the cost of the market basket in each district to the statewide average cost of the market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT 3-2: DETAILED MAP OF COST OF LIVING INDEX FOR SCHOOL DISTRICTS IN THE DENVER AND COLORADO SPRINGS METRO AREAS, 2013



Note. The index value is the ratio of the cost of the market basket in each district to the statewide average cost of the market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT 3-3: 2013 COST OF LIVING INDEX FOR COLORADO SCHOOL DISTRICTS

District ID	County	District	Total	Index	Rank
		State	\$49,100	100	
10	Adams	MAPLETON 1	\$46,782	95.3	69
20	Adams	ADAMS 12 FIVE STAR SCHOOLS	\$47,855	97.5	46
30	Adams	ADAMS COUNTY 14	\$46,195	94.1	78
40	Adams	BRIGHTON 27J	\$46,694	95.1	71
50	Adams	BENNETT 29J	\$47,193	96.1	59
60	Adams	STRASBURG 31J	\$47,366	96.5	54
70	Adams	WESTMINSTER 50	\$48,630	99.0	35
100	Alamosa	ALAMOSA RE-11J	\$45,307	92.3	98
110	Alamosa	SANGRE DE CRISTO RE-22J	\$45,634	92.9	93
120	Arapahoe	ENGLEWOOD 1	\$52,018	105.9	11
123	Arapahoe	SHERIDAN 2	\$48,985	99.8	29
130	Arapahoe	CHERRY CREEK 5	\$48,496	98.8	37
140	Arapahoe	LITTLETON 6	\$50,802	103.5	16
170	Arapahoe	DEER TRAIL 26J	\$44,611	90.9	109
180	Arapahoe	ADAMS-ARAPAHOE 28J	\$47,012	95.7	62
190	Arapahoe	BYERS 32J	\$45,381	92.4	97
220	Archuleta	ARCHULETA COUNTY 50 JT	\$44,540	90.7	111
230	Baca	WALSH RE-1	\$40,444	82.4	172
240	Baca	PRITCHETT RE-3	\$40,190	81.9	176
250	Baca	SPRINGFIELD RE-4	\$41,145	83.8	164
260	Baca	VILAS RE-5	\$40,434	82.4	173
270	Baca	CAMPO RE-6	\$40,238	82.0	175
290	Bent	LAS ANIMAS RE-1	\$41,611	84.7	160
310	Bent	MC CLAVE RE-2	\$40,625	82.7	168
470	Boulder	ST VRAIN VALLEY RE 1J	\$48,310	98.4	42
480	Boulder	BOULDER VALLEY RE 2	\$54,210	110.4	5
490	Chaffee	BUENA VISTA R-31	\$47,390	96.5	52
500	Chaffee	SALIDA R-32	\$47,253	96.2	56
510	Cheyenne	KIT CARSON R-1	\$40,637	82.8	167
520	Cheyenne	CHEYENNE COUNTY RE-5	\$42,425	86.4	143
540	Clear Creek	CLEAR CREEK RE-1	\$49,949	101.7	22
550	Conejos	NORTH CONEJOS RE-1J	\$41,772	85.1	157
560	Conejos	SANFORD 6J	\$42,042	85.6	147
580	Conejos	SOUTH CONEJOS RE-10	\$41,846	85.2	155

Note. The rank value orders the districts from the most expensive (#1) to the least expensive (#178). The index value is the ratio of the cost of the market basket in each district to the statewide average cost of the market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average.

EXHIBIT 3-3(CONTINUED): 2013 COST OF LIVING INDEX FOR COLORADO SCHOOL DISTRICTS

District ID	County	District	Total	Index	Rank
		State	\$49,100	100	
640	Costilla	CENTENNIAL R-1	\$42,661	86.9	140
740	Costilla	SIERRA GRANDE R-30	\$44,549	90.7	110
770	Crowley	CROWLEY COUNTY RE-1-J	\$41,447	84.4	163
860	Custer	CUSTER COUNTY SCHOOL DISTRICT C-1	\$46,346	94.4	76
870	Delta	DELTA COUNTY 50(J)	\$46,514	94.7	73
880	Denver	DENVER COUNTY 1	\$53,797	109.6	8
890	Dolores	DOLORES COUNTY RE NO.2	\$43,943	89.5	121
900	Douglas	DOUGLAS COUNTY RE 1	\$49,722	101.3	24
910	Eagle	EAGLE COUNTY RE 50	\$53,910	109.8	7
920	Elbert	ELIZABETH C-1	\$47,523	96.8	48
930	Elbert	KIOWA C-2	\$48,380	98.5	40
940	Elbert	BIG SANDY 100J	\$44,067	89.7	119
950	Elbert	ELBERT 200	\$49,643	101.1	25
960	Elbert	AGATE 300	\$45,797	93.3	86
970	El Paso	CALHAN RJ-1	\$47,441	96.6	51
980	El Paso	HARRISON 2	\$47,206	96.1	58
990	El Paso	WIDEFIELD 3	\$47,369	96.5	53
1000	El Paso	FOUNTAIN 8	\$47,485	96.7	49
1010	El Paso	COLORADO SPRINGS 11	\$48,409	98.6	38
1020	El Paso	CHEYENNE MOUNTAIN 12	\$51,209	104.3	14
1030	El Paso	MANITOU SPRINGS 14	\$51,440	104.8	13
1040	El Paso	ACADEMY 20	\$49,466	100.7	27
1050	El Paso	ELLCOTT 22	\$47,117	96.0	60
1060	El Paso	PEYTON 23 JT	\$48,857	99.5	32
1070	El Paso	HANOVER 28	\$45,081	91.8	102
1080	El Paso	LEWIS-PALMER 38	\$50,614	103.1	17
1110	El Paso	FALCON 49	\$47,650	97.0	47
1120	El Paso	EDISON 54 JT	\$47,014	95.8	61
1130	El Paso	MIAMI/YODER 60 JT	\$45,650	93.0	92
1140	Fremont	CANON CITY RE-1	\$45,395	92.5	96
1150	Fremont	FLORENCE RE-2	\$44,952	91.6	106
1160	Fremont	COTOPAXI RE-3	\$45,872	93.4	84
1180	Garfield	ROARING FORK RE-1	\$54,066	110.1	6
1195	Garfield	GARFIELD RE-2	\$46,791	95.3	68
1220	Garfield	GARFIELD 16	\$44,157	89.9	117
1330	Gilpin	GILPIN COUNTY RE-1	\$47,252	96.2	57

**EXHIBIT 3-3(CONTINUED): 2013 COST OF LIVING INDEX FOR COLORADO
SCHOOL DISTRICTS**

District ID	County	District	Total	Index	Rank
		State	\$49,100	100	
1340	Grand	WEST GRAND 1-JT.	\$48,329	98.4	41
1350	Grand	EAST GRAND 2	\$52,961	107.9	9
1360	Gunnison	GUNNISON WATERSHED RE1J	\$50,350	102.5	18
1380	Hinsdale	HINSDALE COUNTY RE 1	\$51,031	103.9	15
1390	Huerfano	HUERFANO RE-1	\$42,159	85.9	145
1400	Huerfano	LA VETA RE-2	\$46,321	94.3	77
1410	Jackson	NORTH PARK R-1	\$44,834	91.3	107
1420	Jefferson	JEFFERSON COUNTY R-1	\$50,107	102.1	19
1430	Kiowa	EADS RE-1	\$40,520	82.5	171
1440	Kiowa	PLAINVIEW RE-2	\$40,134	81.7	177
1450	Kit Carson	ARRIBA-FLAGLER C-20	\$43,364	88.3	126
1460	Kit Carson	HI-PLAINS R-23	\$43,572	88.7	123
1480	Kit Carson	STRATTON R-4	\$43,962	89.5	120
1490	Kit Carson	BETHUNE R-5	\$44,209	90.0	114
1500	Kit Carson	BURLINGTON RE-6J	\$45,053	91.8	103
1510	Lake	LAKE COUNTY R-1	\$49,745	101.3	23
1520	La Plata	DURANGO 9-R	\$51,565	105.0	12
1530	La Plata	BAYFIELD 10 JT-R	\$48,810	99.4	33
1540	La Plata	IGNACIO 11 JT	\$46,960	95.6	63
1550	Larimer	POUDRE R-1	\$48,537	98.9	36
1560	Larimer	THOMPSON R-2J	\$47,471	96.7	50
1570	Larimer	PARK (ESTES PARK) R-3	\$52,654	107.2	10
1580	Las Animas	TRINIDAD 1	\$43,256	88.1	127
1590	Las Animas	PRIMERO REORGANIZED 2	\$43,099	87.8	130
1600	Las Animas	HOEHNE REORGANIZED 3	\$44,286	90.2	113
1620	Las Animas	AGUILAR REORGANIZED 6	\$41,893	85.3	153
1750	Las Animas	BRANSON REORGANIZED 82	\$40,920	83.3	166
1760	Las Animas	KIM REORGANIZED 88	\$41,818	85.2	156
1780	Lincoln	GENOA-HUGO C113	\$41,974	85.5	150
1790	Lincoln	LIMON RE-4J	\$43,386	88.4	125
1810	Lincoln	KARVAL RE-23	\$41,456	84.4	162
1828	Logan	VALLEY RE-1	\$45,786	93.3	87
1850	Logan	FRENCHMAN RE-3	\$42,769	87.1	137
1860	Logan	BUFFALO RE-4	\$44,197	90.0	115
1870	Logan	PLATEAU RE-5	\$42,752	87.1	138

**EXHIBIT 3-3(CONTINUED): 2013 COST OF LIVING INDEX FOR COLORADO
SCHOOL DISTRICTS**

District ID	County	District	Total	Index	Rank
		State	\$49,100	100	
1980	Mesa	DE BEQUE 49JT	\$42,883	87.3	135
1990	Mesa	PLATEAU VALLEY 50	\$45,974	93.6	82
2000	Mesa	MESA COUNTY VALLEY 51	\$46,004	93.7	81
2010	Mineral	CREEDE CONSOLIDATED 1	\$48,222	98.2	43
2020	Moffat	MOFFAT COUNTY RE:NO 1	\$47,874	97.5	45
2035	Montezuma	MONTEZUMA-CORTEZ RE-1	\$45,171	92.0	101
2055	Montezuma	DOLORES RE-4A	\$45,837	93.4	85
2070	Montezuma	MANCOS RE-6	\$46,873	95.5	65
2180	Montrose	MONTROSE COUNTY RE-1J	\$45,489	92.6	94
2190	Montrose	WEST END RE-2	\$47,350	96.4	55
2395	Morgan	BRUSH RE-2(J)	\$46,057	93.8	80
2405	Morgan	FORT MORGAN RE-3	\$46,848	95.4	66
2505	Morgan	WELDON VALLEY RE-20(J)	\$45,954	93.6	83
2515	Morgan	WIGGINS RE-50(J)	\$46,950	95.6	64
2520	Otero	EAST OTERO R-1	\$42,165	85.9	144
2530	Otero	ROCKY FORD R-2	\$41,911	85.4	152
2535	Otero	MANZANOLA 3J	\$40,622	82.7	169
2540	Otero	FOWLER R-4J	\$41,719	85.0	158
2560	Otero	CHERAW 31	\$41,611	84.7	159
2570	Otero	SWINK 33	\$42,957	87.5	134
2580	Ouray	OURAY R-1	\$49,488	100.8	26
2590	Ouray	RIDGWAY R-2	\$50,100	102.0	20
2600	Park	PLATTE CANYON 1	\$48,405	98.6	39
2610	Park	PARK COUNTY RE-2	\$50,057	101.9	21
2620	Phillips	HOLYOKE RE-1J	\$43,534	88.7	124
2630	Phillips	HAXTUN RE-2J	\$44,119	89.9	118
2640	Pitkin	ASPEN 1	\$94,573	192.6	1
2650	Prowers	GRANADA RE-1	\$39,687	80.8	178
2660	Prowers	LAMAR RE-2	\$41,541	84.6	161
2670	Prowers	HOLLY RE-3	\$40,256	82.0	174
2680	Prowers	WILEY RE-13 JT	\$40,595	82.7	170
2690	Pueblo	PUEBLO CITY 60	\$45,250	92.2	99
2700	Pueblo	PUEBLO COUNTY RURAL 70	\$46,716	95.1	70
2710	Rio Blanco	MEEKER RE1	\$45,785	93.2	88
2720	Rio Blanco	RANGELY RE-4	\$46,127	93.9	79

**EXHIBIT 3-3(CONTINUED): 2013 COST OF LIVING INDEX FOR COLORADO
SCHOOL DISTRICTS**

District ID	County	District	Total	Index	Rank
		State	\$49,100	100	
2730	Rio Grande	DEL NORTE C-7	\$46,437	94.6	75
2740	Rio Grande	MONTE VISTA C-8	\$44,972	91.6	105
2750	Rio Grande	SARGENT RE-3J	\$44,168	90.0	116
2760	Routt	HAYDEN RE-1	\$48,792	99.4	34
2770	Routt	STEAMBOAT SPRINGS RE-2	\$56,191	114.4	4
2780	Routt	SOUTH ROUNTT RE 3	\$48,870	99.5	31
2790	Saguache	MOUNTAIN VALLEY RE 1	\$43,030	87.6	131
2800	Saguache	MOFFAT 2	\$45,003	91.7	104
2810	Saguache	CENTER 26 JT	\$42,038	85.6	148
2820	San Juan	SILVERTON 1	\$49,197	100.2	28
2830	San Miguel	TELLURIDE R-1	\$56,864	115.8	3
2840	San Miguel	NORWOOD R-2J	\$46,470	94.6	74
2862	Sedgwick	JULESBURG RE-1	\$43,193	88.0	128
2865	Sedgwick	PLATTE VALLEY RE-3	\$41,993	85.5	149
3000	Summit	SUMMIT RE-1	\$59,895	122.0	2
3010	Teller	CRIPPLE CREEK-VICTOR RE-1	\$45,723	93.1	89
3020	Teller	WOODLAND PARK RE-2	\$47,946	97.7	44
3030	Washington	AKRON R-1	\$42,999	87.6	133
3040	Washington	ARICKAREE R-2	\$42,703	87.0	139
3050	Washington	OTIS R-3	\$42,492	86.5	142
3060	Washington	LONE STAR 101	\$43,021	87.6	132
3070	Washington	WOODLIN R-104	\$42,778	87.1	136
3080	Weld	WELD COUNTY RE-1	\$45,192	92.0	100
3085	Weld	EATON RE-2	\$46,683	95.1	72
3090	Weld	KEENESBURG RE-3(J)	\$45,408	92.5	95
3100	Weld	WINDSOR RE-4	\$48,872	99.5	30
3110	Weld	JOHNSTOWN-MILLIKEN RE-5J	\$46,816	95.3	67
3120	Weld	GREELEY 6	\$45,656	93.0	91
3130	Weld	PLATTE VALLEY RE-7	\$44,694	91.0	108
3140	Weld	WELD COUNTY S/D RE-8	\$45,700	93.1	90
3145	Weld	AULT-HIGHLAND RE-9	\$44,454	90.5	112
3146	Weld	BRIGGS DALE RE-10	\$43,915	89.4	122
3147	Weld	PRAIRIE RE-11	\$41,856	85.2	154
3148	Weld	PAWNEE RE-12	\$41,135	83.8	165
3200	Yuma	YUMA 1	\$42,623	86.8	141
3210	Yuma	WRAY RD-2	\$43,147	87.9	129
3220	Yuma	IDALIA RJ-3	\$42,103	85.7	146
3230	Yuma	LIBERTY J-4	\$41,925	85.4	151

SECTION 4: METHODOLOGY

As described in Section 2, the project was structured around five distinct research questions. These research questions included:

1. What is a typical (archetypal, or benchmark) Colorado household?

(See [“Identifying the Benchmark Household”](#) in this section)

2. What types of goods and services does that archetypal household buy?

(See [“Identifying the Market Basket of Goods and Services”](#) in this section)

3. Where do they buy those goods and services?

(See [“Identifying and Measuring Geographic Shopping Patterns”](#) in this section)

4. How much do those goods and services cost in each geographic location?

(See [“Data Collection”](#) in this section)

5. If an archetypal household lives in each of the 178 school districts, what is the difference between their costs to buy those goods, based on the prices where they shop?

(See [“Developing Final Cost of Living Measures”](#) in this section)

Corona’s methodological approach to answering each of these research questions is presented in this section of the report. [Appendix B](#) provides additional detail for each methodological section of the study for interested readers.

IDENTIFYING THE BENCHMARK HOUSEHOLD

The characteristics of the 2013 benchmark household mirrored the benchmark households used in the previous Colorado School District Cost of Living studies. The benchmark household used in past studies has typically been a household of average size for the state, with an income related to typical teaching incomes. The 2013 benchmark household was defined by the Colorado Legislative Council to be a three-person household with a total household income of \$49,100, which is the average teacher income for 2012 in Colorado.

Over the past studies, the household size has remained constant, and the household income has increased at a moderate rate. The exhibit provided below details the current and previous benchmark households used for the study:

EXHIBIT 4-1: DEFINITION OF THE ARCHETYPAL HOUSEHOLD

Year	Size of the Benchmark Household	Household Income of Benchmark Household
2013 Study (Current)	3 people	\$49,100
2011 Study	3 people	\$49,200
2009 Study	3 people	\$47,500
2007 Study	3 people	\$44,500
2005 Study	3 people	\$43,000
2003 Study	3 people	\$40,000

IDENTIFYING THE MARKET BASKET OF GOODS AND SERVICES

Methodology at a Glance

Goal: Develop a list of specific goods and services that collectively serve as a proxy for all spending by the archetype household.

1. *The Bureau of Labor Statistics compiles annual data on consumer spending habits through Consumer Expenditures Surveys.*
2. *Corona Insights examined the most recent Consumer Expenditure Survey Data (2011 - 2012) to identify major categories of spending (housing, food at home, etc.) for a three person household with the target income level. A total of 18 categories were defined.*
3. *Corona Insights and the Colorado Legislative Council jointly identified a “market basket” of individual items that represent each major category of spending. For example, a variety of goods such as milk, bread, and other foods were identified to represent grocery expenditures.*
4. *All items that were selected to be included in the “market basket” were identified with as much specificity as possible in terms of size and quality, so that directly comparable data could be gathered in every school district where that item was sold.*
5. *Some items, such as energy costs, are monopolistic goods or services. These items were merely measured on a per-unit cost in each district.*
6. *The market basket was designed to be consistent with the 2011 study where possible and appropriate. In fact, only two notable items were changed from 2011: a woman’s cardigan sweater replaced a woman’s polo shirt, and for pricing vehicle insurance and repairs, a Ford F-150 replaced a Ford Ranger. See [Appendix C](#) for more detail.*
7. *The average expenditures per major category were calculated and set aside for the final calculations, as the collected data was weighted in proportion to those average expenditures.*

The goal of this step of the process is to develop a list of goods and services that, in combination, can represent the full range of purchases for the archetypal household. The primary data source for this type of analysis is Consumer Expenditure Surveys (CES) that are compiled by the Bureau of Labor Statistics. Data was used from the 2011-2012 Consumer Expenditure Survey, which was the most recently published CES available at the time of analysis.

Data in the Consumer Expenditure Surveys are available by household size and year. Corona used the data for three-person households, and interpolated between the results for three-person household incomes of \$40,000 to \$49,999 and three-person household incomes of \$50,000 to \$69,999 (from CES Table 38) to estimate expenditures for a household with an income of \$49,100.

Two key types of data are produced from this analysis: 1) a set of categories that reflect major types of expenditures and 2) average spending levels for the archetypal household within each of those categories. That data is shown in the following exhibit. Also shown in the exhibit are individual items that were selected jointly by the Corona Insights team and the Colorado Legislative Council as being representative of each major expenditure category. Prices gathered for these items (with statistical weightings to ensure that their pricing matches total spending) formed the basis of 2013 Cost of Living estimates.

EXHIBIT 4-2: SPENDING PATTERNS BY CATEGORY OF THE ARCHETYPAL HOUSEHOLD

Consumer Expenditure Survey Categories and Specific Weights Utilized in Cost of Living Index (Weight as a percentage of income)	
Expenditure Category	% of Income
Food	13.59%
Alcoholic beverages	0.65%
Housing	33.77%
Apparel and services	3.30%
Transportation	19.25%
Healthcare	7.34%
Entertainment	4.45%
Personal care products and services	1.11%
Tobacco	1.22%
Personal taxes	1.49%
Other	13.83%
Total	100.00%

EXHIBIT 4-3: SPENDING PATTERNS OF THE ARCHETYPAL HOUSEHOLD

Consumer Expenditure Survey Categories and Specific Weights Utilized in Cost of Living Index (Weight as a percentage of income)		
Expenditure Category	% of Income	Representative Market Basket Items
Food	13.59%	
Food at home	8.51%	
Cereals and bakery products	1.26%	White Bread, Spaghetti
Meats, poultry, fish, and eggs	1.92%	
Beef	1.22%	Ground Beef
Poultry	0.69%	Whole Fryer Chicken
Dairy products	0.90%	Milk
Fruits and vegetables	1.43%	
Fresh fruits	0.50%	Bananas
Fresh vegetables	0.43%	Potatoes
Processed fruits	0.23%	Canned Peaches
Processed vegetables	0.26%	Canned Green Beans
Other food at home	3.01%	Coffee, Soup, Frozen Waffles
Food away from home	5.08%	Cheeseburger Meal, Cheese Pizza Meal, Steak Meal
Alcoholic beverages	0.65%	Beer
Housing	33.77%	
Mortgage interest and charges	14.06%	Mortgage Payment
Property taxes	2.83%	Property Taxes
Maintenance, repairs, insurance, other expenses	1.56%	Homeowner's Insurance
Utilities, fuels, and public services	8.68%	
Natural gas	0.88%	Natural Gas
Electricity	3.51%	Electric
Telephone services	3.19%	Telephone
Water and other public services	1.11%	Water & Wastewater
Household operations	2.44%	Day Care Services
Housekeeping supplies	1.37%	Laundry Soap
Household furnishings and equipment	2.83%	Refrigerator
Apparel and services	3.30%	
Men and boys	0.77%	Men's Dress Shirt, Men's T-Shirt
Women and girls	1.56%	Women's Cardigan Sweater, Women's Pantyhose
Footwear	0.96%	Men's Canvas Lace-up Shoes
Transportation	19.25%	
Vehicle purchases (net outlay)	7.05%	Car Payment / Auto Financing
Gasoline and motor oil	7.00%	Gasoline: 85 Unleaded
Other vehicle expenses	5.70%	
Vehicle finance charges	0.59%	Interest Rate, Bank Financing Fees
Maintenance and repairs	1.90%	Oil Change, Front End Alignment
Vehicle insurance	3.31%	Insurance Premiums
Healthcare	7.34%	Health Insurance Premium
Entertainment	4.45%	
Fees and admissions	0.77%	Movie Ticket (First Run, Full Length Film)
Audio and visual equipment and services	2.06%	Television
Pets, toys, hobbies, and playground equipment	1.05%	Pet Food
Other entertainment supplies, equipment, and services	0.56%	AA Batteries
Personal care products and services	1.11%	Women's Haircut, Men's Haircut, Toothpaste, Tampons, Shaving Cream
Reading	0.15%	
Education	1.91%	
Tobacco products and smoking supplies	1.22%	Cigarettes
Miscellaneous	1.45%	
Cash contributions	2.08%	
Personal insurance and pensions	8.23%	
Personal taxes	1.49%	Income Tax with Itemized Deductions for Mortgage Interest
Total (bold level)	100.00%	

Note. Disaggregated results for the cost of living by major category are provided in Section 5 and detailed raw data are provided in Appendix D.

IDENTIFYING AND MEASURING GEOGRAPHIC SHOPPING PATTERNS

The shopping patterns database was not updated in 2013, so the shopping patterns data used for the 2013 Cost of Living Study was the same as that used for the 2011 study. Below we provide a brief description of the database.

If every resident in a school district made all of their purchases within a school district, calculating the cost of living in that district would be straightforward. However, this is not the case. Often, residents leave their district to make purchases, either because they can obtain a better price, better selection, more convenience, or some other benefit. Because prices will vary across district boundaries (sometimes notably), it is necessary to understand these geographic shopping patterns in order to develop the actual cost of living in each school district.

In 2007, 2009, and 2011, Corona Insights conducted a survey of residents of each district to gather input about where they most recently purchased a series of goods. The data from these surveys, in conjunction with mathematical modeling methods, were used to construct a geographic shopping matrix describing where the residents of each school district typically purchase particular products (i.e., what proportion of purchases are made in the home district, in each neighboring district, online, etc.).

DATA COLLECTION PROCEDURES

Methodology at a Glance

Goal: Gather pricing data for a large variety of goods and services in all school districts where those goods and services are sold.

Note. Different data collection techniques were used to collect the various items in the market basket. Below we provide a very short summary of the methodological approaches that were used to obtain prices for each category of goods. Additional overview information is provided in this section of the report, and detailed information is provided in [Appendix B](#).

1. **Retail Purchases** – Pricing for a number of basic retail items was gathered on-site at retail stores across the state. These included all “food at home” items (perishables, non-perishables, and produce), alcoholic beverages, household goods, pet food, personal care products, tobacco, clothing, shoes, furniture, entertainment (TV), electronics, and restaurant meals.
2. **Service Purchases** – Pricing for a number of services was gathered by making telephone calls to a stratified random sample of businesses across the state. This included prices for men’s and women’s haircuts; auto repair services, including an oil and filter change and front-end alignment; movie tickets; and auto loan rates. Gasoline prices are also gathered by telephone because all prices must be gathered on a single day.
3. **Housing** – Average home values for a home with specified characteristics were provided by the Colorado Legislative Council as a product of a separate research contract with another consulting firm.
4. **Property Taxes** – County and school district mill levies for each district are applied to the home values to obtain property tax costs for each school district.
5. **Homeowner’s Insurance** – Pricing data for a home with specified characteristics was provided by a large insurance company that provides coverage throughout the state.
6. **Utilities** - Data on utility prices was gathered from the Colorado Association of Municipal Utilities (CAMU) and the Public Utilities Commission via 2012 annual reports and/or sales reports filed by electric, telephone, and gas utility providers. (Some adjustment and estimation was required above and beyond the report data.)
7. **Water/Wastewater** – Data was gathered via phone calls from Corona Insights to over 250 cities and towns throughout the state, as well as visits to municipal web sites. Rates were then applied to specified “typical” usage rates.
8. **Day Care** – Information by county was obtained from the 2013 Market Rate Survey of Child Care Providers, conducted by Qualistar Colorado as part of a contract with the Colorado Department of Human Services, Division of Child Care. These rates were then combined with data on the population of children in each age group and the proportion of children in day care in each age group obtained from the U.S. Census Bureau and the Department of Health and Human Services, and then applied to specific school districts.
9. **Transportation** – Vehicle financing rates and fees were gathered for a specified vehicle (a 2011 Honda Civic) from local lending institutions throughout the state. Using the standard blue book value for purchase price, local sales taxes, payment costs (principal and interest), and registration and ownership taxes, costs were estimated by county and then mapped to school districts.

10. **Vehicle Insurance** – Pricing data for two vehicles with specified characteristics was provided by a large vehicle insurance company that provides coverage throughout the state.
11. **Health Insurance** – Prices from four of the largest health insurance providers in the state – the top two most popular health plans for each company – were used to develop pricing for a three-person family of a specified age and gender profile.
12. **Personal Taxes** – Income taxes for the benchmark family are calculated for each district itemizing deductions for mortgage interest and property taxes.
13. **Other Expenses** – Some types of expenses that were deemed to be more or less constant across geographic areas were not analyzed. These include reading, education, “miscellaneous expenses”, contributions, personal insurance, and pension payments. However, it should be noted that sales taxes were added to all of the previous categories where applicable.

For each category of market basket items listed below, we describe how the cost of those items was collected, and also summarize the amount of data that was collected in the 2013 study. Additional data collection details for each category are presented in [Appendix B](#).

Methodology Note

Corona developed a sophisticated sampling plan for data collection efforts where onsite collection was required at retail establishments. Using a list of firms compiled by InfoUSA, Corona examined revenue data by store and then developed an algorithm to sample firms within each district in a manner that ensured that a representative variety of stores were being sampled, based on their market share. The algorithm first identified the preferred number of stores to be sampled, and then identified specific stores based on their revenue size compared to their competitors. This approach ensured that high-sales outlets were sampled in proportion to their sales, as opposed to a random sampling approach that would oversample smaller stores.

FOOD AT HOME

Food at home items consisted of potatoes, bananas, canned green beans, canned peaches, ground beef, whole fryer chicken, milk, white bread, spaghetti, coffee, soup, and frozen waffles. Prices for these items were gathered by in-person visits to grocery stores throughout the state. The number of grocery stores visited (and in metro areas, the selection of stores to visit) were determined with a sampling algorithm developed by Corona Insights, applied to a database of business listings provided by InfoUSA, that was supplemented with lists of Walmart Supercenters and Super Targets. This was the same sampling methodology used in the three previous studies, to ensure comparability. All sampling for items making up the food at home category was done at the school district level after geo-coding business listings within the appropriate school district locations. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey to produce final prices for each district.

Detailed descriptions of the food at home items used in the 2013 market basket and the number of prices collected for each market basket item is provided in the table below:

Food At Home				
CES Category	Specific Item	Description	Collection Method	N of Observations
Fruits and vegetables	Potatoes	Price for a 10 lb. bag of lowest price Russet potatoes. If 10 lb. bag is not available, substitute nearest sack size and note size. If potatoes only sold individually, record price per pound and note. If sold individually, regardless of weight, record price and weigh potato. DO NOT USE PRICE OF POTATOES BY THE POUND IF SOLD IN ANY SIZE SACK.	On-Site	362
Fruits and vegetables	Bananas	Price per pound. If bananas are priced by the bag or by the banana, report the price and weigh a bunch, note weight and number of bananas in bunch. DO NOT PRICE ORGANIC.	On-Site	352
Fruits and vegetables	Canned Green Beans	Price of store brand cut green beans, 14.5 oz. If no store brand, collect the cheapest brand and note brand.	On-Site	465
Fruits and vegetables	Canned Peaches	Price of store brand sliced peaches in heavy syrup, 15 to 15.25 oz. If no store brand, collect the cheapest brand and note brand.	On-Site	387
Meats, poultry fish and eggs	Ground Beef	Price per pound of prepackaged, regular ground beef, 80% lean or most comparable, from a 1 to 2 pound package of loose ground beef. Note if different percent lean. DO NOT PRICE FAMILY PACK. DO NOT PRICE PRE-FORMED BEEF PATTIES OR TUBE PACKAGING.	On-Site	332
Meats, poultry fish and eggs	Chicken, whole fryer	Price per pound of one whole fryer chicken, least expensive brand. If whole fryer not available, price whole fryer chicken, cut up and note.	On-Site	299
Dairy	Milk	Price for one gallon (128 Fl. oz.) 2% milk, store brand. If no store brand, collect cheapest price and note. If no 2%, then price (in order of preference) 1%, skim, whole. Note if not 2%. NO ORGANIC, NO SOY, NO FLAVORED MILKS (e.g. chocolate, etc.). DO NOT PRICE HALF GALLON.	On-Site	518
Cereals and bakery products	White Bread	Price for store brand 24 oz. (1.5 lb.) loaf of sliced white bread. If store brand not available, record price of lowest priced brand with a 24 oz. loaf. Note any differences in brand or loaf size. (Safeway store brand is 22 oz. - record this price and note difference.)	On-Site	383
Cereals and bakery products	Spaghetti	Price of store brand spaghetti noodles, 16 oz. package. If store brand is not available, record price of lowest priced brand and note brand. DO NOT PRICE PREMIUM STORE BRANDS.	On-Site	456
Other food at home	Coffee	Price for a 11.3 oz. can of Folgers Classic Roast Coffee, ground, red can. If Folgers Classic Roast not available, price other ground Folgers in similar sizing (approx. 11 oz.). If not Folgers, price Maxwell House 11.5 oz. or nearest size. Note brand, product, and any size differences. DO NOT PRICE DECAFFINATED OR WHOLE BEAN. DO NOT PRICE ANY OTHER BRANDS.	On-Site	557
Other food at home	Soup	Price for a 10 ¾ oz. can of Campbell's Original Chicken Noodle Soup. If no Campbell's (rare), price store brand and note brand and any size difference. DO NOT PRICE "HomeStyle" or "Classic" PACKAGING OR OTHER VARIATIONS.	On-Site	531
Other food at home	Frozen Waffles	Price of store brand frozen waffles, buttermilk or plain flavored, prebaked, 10 pack, 12.3 oz. If store brand not available, record price of lowest priced brand and note brand and any differences in size. (Walmart store brand only has 8 pack - record price and note quantity.)	On-Site	286

FOOD AWAY FROM HOME

Food away from home items consisted of a cheeseburger meal, a pizza, and a steak meal. Prices for these items were gathered by in-person visits to restaurants throughout the state. The number of restaurants to be visited was determined with a sampling algorithm developed by Corona Insights, applied to a database of business listings provided by InfoUSA that was supplemented with online directory listings. All sampling for food away from home items was done at the school district level after coding the business listings to the appropriate school district. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

Detailed descriptions of the food away from home items in the market basket and the number of prices collected are provided in the table below:

Food Away From Home				
CES Category	Specific Item	Description	Collection Method	N of Observations
Restaurants	Lunch	Price for a McDonald's quarter pounder with cheese meal (including fries and a regular 21 oz Coke). If you're not collecting at a McDonald's, price a cheeseburger with a medium fries, and a coke (the most similar type meal to a quarter pounder with cheese meal).	On-Site	813
Restaurants	Dinner	Price for a Pizza Hut cheese pizza, regular or thin crust, 14" diameter (note size if other).	On-Site	367
Restaurants	Dinner	Price for 12 oz. Ribeye steak and two sides (potato, vegetable, soup or salad). If only one side is included, then add a side (potato or vegetable) or side salad. Note differences. If 12 oz. not available, price Ribeye in different size (note size). If Ribeye not available, price a New York Strip. If the NY Strip is not available, price a Sirloin. Note size of steak if not 12 oz. (Price this item at Applebees and Chilis, where available; price the 10 oz Sirloin at TGI Fridays.) DO NOT PRICE CHOPPED SIRLOIN.	On-Site	418

ALCOHOLIC BEVERAGES

Alcoholic beverage prices were collected for a 6-pack of beer. Prices were gathered by in-person visits to grocery and liquor stores throughout the state. Beer was treated as a grocery item and so the initial sample of stores were the grocery stores selected by the food at home sampling. However, because not all grocery stores sell beer, the sample of stores was supplemented with a list of Liquor Stores from InfoUSA. All sampling for alcoholic beverages was done at the school district level after coding the business listings to the appropriate school district. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

A detailed description of the alcoholic beverage item in the market basket and the number of prices collected are provided in the table below:

Alcoholic Beverages				
CES Category	Specific Item	Description	Collection Method	N of Observations
Alcoholic beverages	Beer	Price for a 6-pack of 12 oz. bottles Corona Extra or Light beer, 3.2% alcohol by volume or higher. If Corona not available, then price (in order of preference) Pacifico, Modelo, Budweiser - all in 6-packs of 12 oz. bottles. Note brand. DO NOT PRICE CANS.	On-Site	662

HOUSING

Shelter – Mortgage payment/Property taxes

Similar to previous Cost of Living studies, home values were provided by an outside consultant. Corona Insights calculated an annual mortgage payment (principal and interest) based on a 30-year fixed rate mortgage for 80 percent of the home value with the current mortgage interest rate for Colorado on the day the home values were scheduled to be delivered to Corona Insights. Then property tax estimates were calculated based on the current assessment rate obtained from the 2013-2014 Final Residential Assessment Rate Study at Colorado.gov, and county and school district mill levies obtained from the 2012 Annual Report from the Colorado Department of Local Affairs.

Shelter – Homeowner’s Insurance

In obtaining homeowner’s insurance rates, hazard insurance was sought for a \$100,000 frame dwelling built in 1970 with \$80,000 contents coverage, \$100,000 liability/medical payments, and a \$1,000 deductible. These are the same specifications used in previous studies. One homeowner’s insurance company (with a market share in the top three of all homeowner’s insurers in Colorado) was willing to provide homeowner insurance rates by zip code to Corona Insights to be used in the study. To calculate the school district rate, zip code rates were weighted by the population of that zip within the district to calculate a weighted average. The school district rates were then weighted by the home value for each district to obtain the final spending on insurance in each district.

Utilities - Electric

In order to calculate the average monthly electric bill for residents around the state, Corona Insights utilized data gathered in 2013 by the Colorado Association of Municipal Utilities (CAMU). CAMU collects billing rates, based on 700-megawatt usage, from every Colorado electric utility in January and July. We averaged the January and July rates to determine an average monthly billing rate for each utility. Rates from each utility were then applied to municipalities using the Franchise-Log Workbook from the Colorado Public Utility Commission. Finally, district average rates were computed using a global information system (GIS) to overlay each of these municipalities onto one or more school districts and to determine the proportion of the municipal population within each school district, and calculating a weighted average of the municipal rates by population within the district.

Utilities - Gas

In order to calculate the average monthly natural gas bill for residents around the state, Corona Insights examined the 2012 Annual Reports filed by natural gas providers from around the state with the Colorado Public Utilities Commission (PUC). Every natural gas provider operating in the state of Colorado is required to file natural gas sales figures by community with the Public Utilities Commission (PUC). These detailed reports were used to calculate an average bill for each service area. After all of the 2012 annual reports were

gathered and analyzed, natural gas monthly rates were assigned to school districts based on the service areas for all natural gas providers. It should also be noted that some service areas do not utilize natural gas, but instead depend on propane for their heating needs. In specific cases where services areas (and the school districts residing within those areas) used propane, Corona used data from the Energy Information Administration to calculate the relative cost of using propane for energy instead of natural gas, based on the actual energy output for each fuel in BTU's and the 2012 average cost for each fuel in Colorado. After determining this "conversion factor," the cost of propane service for each school district without natural gas service was computed by averaging the natural gas bills of the surrounding districts and inflating that average based on the analysis described above.

Utilities - Telephone

In order to calculate the average monthly telephone bill for residents around the state, Corona obtained the most current telephone rates from the Public Utilities Commission. This dataset detailed the monthly base rates being charged by each incumbent local exchange carrier (ILEC) around the state. The methodology used to calculate the average monthly telephone bill within each school district mirrored the methodology described for electricity providers. The monthly base rates were assigned to each of the school districts based on the providers' coverage areas. In addition to the base rates found in each school district, a variety of other fees (unique to each area and provider) were incorporated into the final total monthly telephone bill for an area (and ultimately school district). Final monthly telephone rates were calculated for each district depending on the service providers in a district's area and the fees attached to those providers operating within a specific school district.

Utilities – Water/Wastewater

In order to determine the average monthly payments for water and wastewater bills in each school district, Corona Insights conducted a telephone survey of over 250 cities throughout the state of Colorado in order to collect water/wastewater rate information for municipalities located within Colorado's school districts. Corona also gathered water/wastewater rate information from provider/city websites where available. An attempt was made to collect data from each of the 258 agencies contacted in previous studies, but in certain municipalities or areas where no contact information could be found, or in towns that used only wells or septic tanks, proxy values were used based on the rates charged in another town in the same school district. In some cases where this method was not applicable, proxy values were used based on the rates charged in another school district in the same county or those charged in the nearest town. Once all water/wastewater rate information was collected, final district averages were calculated and weighted based on the total populations of cities and municipalities located within a school district.

Household Operations – Day Care

The average cost of child day care for the 2013 Cost of Living study was based on day care costs in each county in Colorado. Average day care cost information was obtained from the 2013 Market Rate Survey of Child Care Providers, conducted by Qualistar Colorado. The Market Rate Survey of Child Care Providers provides full-time weekly rates of caring for children between 0 and 12 months, 1 to 2 years, and between 2 to 5 years in all 64 Colorado counties.

In determining the average weekly costs for childcare services, an average rate was calculated for each age group across child care centers (CCC's), family care centers (FCC's). The averages were then weighted based on the proportion of children in day care in each age group obtained from the Department of Health and Human Services data on children participating in CCDF-funded programs. Final district average day care

costs were then reallocated from the county level to the final district level using a weighted average method to aggregate based on the population of the counties in each district.

Housekeeping Supplies – *Laundry Soap*

Expenditures for housekeeping supplies were gathered by collecting prices for laundry soap. Prices were gathered by in-person visits to grocery stores throughout the state. Laundry soap was treated as a grocery item and so the stores sampled were the grocery stores selected by the food at home sampling, as well as discount department stores like Target and Walmart. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey to produce final prices for each district.

A detailed description of the housekeeping supplies item in the market basket and the number of prices collected are provided in the table at the end of this section (below).

Household Furnishings and Equipment - *Refrigerator*

Expenditures for household furnishings were gathered by collecting prices for refrigerators. Prices were gathered by in-person visits to department stores, home stores, and electronics stores throughout the state. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey to produce final prices for each district.

A detailed description of the household furnishings item in the market basket and the number of prices collected are provided in the table at the end of this section (below).

Housing				
CES Category	Specific Item	Description	Collection Method	N of Observations
Shelter	Mortgage Payment	Mortgage payment, including principal, interest, and property taxes, based on housing values provided by outside consultant.	Secondary Data & Online Sources	
Shelter	Homeowners' Insurance	\$100,000 frame dwelling built in 1970. \$80,000 contents coverage, \$100,000 liability/medical payments. \$1,000 deductible.	Calls to Insurance Providers	1 for each zip code (487)
Utilities	Utilities	Annual average bill for electric, natural gas, telephone, and water and wastewater services collected from utility providers throughout the state.	CAMU, CML, PUC Database & Calls to Providers	
Household Operations	Day Care Services	Weekly cost of child day care.	Database	1 per county
Housekeeping Supplies	Laundry Soap	Price for Tide Original liquid household laundry detergent, 50 Fl. oz. If Tide Original is not available, you may price Mountain Breeze or other scents in same size. Otherwise, price national brand (e.g., Cheer) in 50 oz. size. If nothing in 50 oz. size, price Tide in 100 oz. Note brand and size. (Walmart carries Tide Original in 40 oz. - record this price and note difference.) DO NOT PRICE HE, COLDWATER, TOTAL CARE, OR TIDE WITH BLEACH.	On-Site	356
Household furnishings and equipment	Refrigerator	Price of a stainless steel, side-by-side refrigerator, 26.5 cu. ft. (or closest available), standard depth (not counter depth), with an ice and water dispenser in the door. Price the cheapest brand and model they have in stock that meets the description. It is important to get the regular price and not any sale price that might be currently available. (Price Kenmore, Maytag, or Whirlpool if available. Do not price LG unless store only carries LG.)	On-Site	143

APPAREL

Apparel items consisted of men’s dress shirts, men’s T-shirts, women’s pantyhose, women’s cardigan sweaters, and men’s canvas lace-up shoes. Prices for these items were gathered by in-person visits to clothing stores throughout the state. The number of clothing stores visited was determined with a sampling algorithm developed by Corona Insights and applied to a database of business listings provided by InfoUSA. The business list was also supplemented with lists of Walmart Supercenters and Super Targets so that apparel prices would also be obtained at these supercenters. All sampling for clothing items was done at the school district level after coding the business listings to the appropriate school district. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

Detailed descriptions of the apparel items in the market basket and the number of prices collected are provided in the table below:

Apparel				
CES Category	Specific Item	Description	Collection Method	N of Observations
Men and Boys	Men's Dress Shirt	Price for white or solid color Oxford (button-down collar), long sleeve, button cuff shirt. Arrow brand where possible, poly/cotton blend. If store does not have Arrow, price comparable label that meets the same criteria. Try to get prices for shirts sized 15/32 through 16/34.	On-Site	216
Men and Boys	Men's T-Shirt	Price for one 3-pack of men's white t-shirts, v-neck. Hanes brand where possible, Fruit of the Loom or Jockey, otherwise, 100% cotton. Must be in a 3-pack.	On-Site	250
Women and Girls	Women's Pantyhose	Price of Legg Sheer Energy pantyhose, with control top and sheer toe design, size M. If not available, price the most similar type Legg pantyhose. If Legg pantyhose is not available, price the most similar available brand of pantyhose. Note brand and features.	On-Site	347
Women and Girls	Women's Cardigan Sweater	Price a women's solid color, long-sleeved v-neck, button front cardigan sweater, size M. 100% cotton or cotton/poly (or rayon/poly) blend. Price Old Navy brand, where available; at Target, price Mossimo brand; at Walmart, price Bella Bird brand; at JC Penny's price Worthington brand; at Sears price Route 66. Note if other brand. DO NOT PRICE CASHMERE OR OTHER WOOL.	On-Site	204
Footwear	Men's Canvas Lace-up Shoe	Price a men's canvas lace-up sneaker, flat bottom (no arch), with molded or ridged tread, size 9 - 11. Price the lowest priced men's canvas shoe that meets the described criteria.	On-Site	264

TRANSPORTATION

Vehicle Financing

Vehicle financing estimates were derived by contacting lending institutions in all possible districts and gathering data on finance rates and fees for a four-year loan for a 2011 Honda Civic LX Sedan. The Corona Insights team then calculated a monthly payment that included the purchase price, sales tax, loan charges, and any applicable taxes, title fees, or registration fees.

Vehicle insurance

Insurance companies with a large market share for vehicle insurance in Colorado were determined by analyzing the 2012 "Annual Report of the Commissioner of Insurance". Companies with the largest market share were then contacted to determine vehicle insurance rates by zip code. Corona was able to obtain vehicle insurance data (by zip code, for the entire state) from one willing insurance company. That insurance company had a large portion of the market share in Colorado (the company's name will not be released, in order to ensure pricing confidentiality of the company).

Insurance rates were gathered and averaged for the two vehicles types used throughout the study (a 2011 Honda Civic and a 2009 Ford F-150) at the zip code level and the reassigned to the proper school district (in order to determine final vehicle insurance costs per district).

Vehicle expenses – Oil Change & Front-End Alignment

Vehicle maintenance expense items consisted of oil changes and front-end alignments. Prices for these items were gathered by phone calls to auto repair shops throughout the state. The number of shops to

sample was determined with a sampling algorithm developed by Corona Insights which was applied to a database of business listings provided by InfoUSA. In areas where the list of businesses was insufficient, online yellow pages were utilized to create a more robust list of vehicle maintenance businesses. All sampling for vehicle maintenance items was done at the school district level after coding the business listings to the appropriate district. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added where applicable, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

Detailed descriptions of the vehicle maintenance items in the market basket and the number of prices collected are provided at the end of this section.

Gasoline

Gasoline prices were gathered on a single day via telephone calls to gas stations across the state. The number of shops to sample was determined with a sampling algorithm developed by Corona Insights which was applied to a database of business listings provided by InfoUSA. In areas where the list of gas stations was insufficient, online yellow pages were utilized to create a more robust list of gas stations. All sampling for gasoline prices was done at the school district level after coding the business listings to the appropriate district. After prices were collected, the dataset of prices for each item was screened for outliers, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

Detailed descriptions of the transportation items in the market basket and the number of prices collected are provided in the table below:

Transportation				
CES Category	Specific Item	Description	Collection Method	N of Observations
Transportation	Vehicle Payment	Payment calculated using Blue Book purchase value and interest rate on loan for full purchase price and bank charges, taxes and registration fees for 2011 Honda Civic for four years. (2011 Honda Civic LX Sedan, 4-door. Engine: 4-cyl. 1.8L. Trans: 5-speed manual. Mileage: 24,000. Amenities: air conditioning, pwr. steering, cruise control, air bags)	Online (Bluebook Values & Other Sources) Phone	388
Transportation	Vehicle Insurance	Insurance premiums for 2009 Ford F150 and 2011 Honda Civic (2009 Ford F150 XL 6.5 ft. Bed Pickup. Engine: V6 4.6L Trans: automatic, Drive: 2-wheel drive. Mileage: 60,000. Amenities: A/C, pwr. steering, air bags standard)	Phone Calls to Insurance Providers	2 for each zip code (974)
Transportation	Oil and Filter Change	Price of an oil and filter change for a 2009 Ford F150 pickup. Oil must not be synthetic; filter should be the least expensive available. DO NOT PRICE WITH TAX.	Phone	434
Transportation	Front-End Alignment	Price of front-end alignment for a 2009 Ford F150 pickup; 2 wheel drive.	Phone	277
Transportation	Gasoline	Price of self-serve, 85 Octane, unleaded gasoline.	Phone (one-day)	450

HEALTH CARE – HEALTH INSURANCE MONTHLY PREMIUM

In order to determine the average monthly health insurance premium rate in each school district, Corona Insights collected rate information from four of the largest health insurance providers in the state. Data was collected for PPO's from three of the companies, and an HMO from the remaining provider. Rates for the

two most popular plans for each of the four participating companies were obtained. Health insurance monthly premium rates were collected by zip code and/or county (depending on the provider) and weighted averages were created for each health care company (based on market share). Finally, district average rates were calculated by taking a weighted average of the county rates by population within the district.

Note. Final monthly health care costs were assessed with the assumption that monthly costs were for a family of three non-smokers who were all in good health. Criteria are detailed in the table below:

Health Care				
CES Category	Specific Item	Description	Collection Method	N of Observations
Health Care	Health Insurance Premium	Monthly cost of family health insurance coverage for a family of three, all non-smokers, all in good health.	Phone & Database	6-8 per county

ENTERTAINMENT

Entertainment items consisted of movie tickets, a television, batteries, and pet food. Prices for movie tickets were gathered by phone calls to movie theaters throughout the state. Prices for the television, batteries, and pet food were gathered by in-person visits to grocery and electronics stores throughout the state. The number of stores visited was determined with a sampling algorithm developed by Corona Insights that was applied to a database of business listings provided by InfoUSA. The business list was also supplemented with lists of Walmart Supercenters and Super Targets so that entertainment item prices would also be obtained at these supercenters. All sampling for entertainment items was done at the school district level after coding the business listings to the appropriate school district. After prices were collected, the dataset was screened for outliers, taxes were added where applicable, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

Detailed descriptions of the entertainment items in the market basket and the number of prices collected are provided in the table below:

Entertainment				
CES Category	Specific Item	Description	Collection Method	N of Observations
Fees and Admissions	Movie	Price of adult admission to a first-run, full-length movie.	Phone	69
Television, Radios, Sound Equipment	TV	Price of a 32" flat screen, LED TV: 720p, 60Hz HDTV. Samsung brand. If not available, LG brand, then Sony, then Panasonic. If exact options are not available, then price 120Hz (32", LED, 720p). If no 32" then price next largest TV with same specs. Note brand and any differences in size or features. Do not price Plasma, LCD, or 3D models.	On-Site	141
Other supplies, equipment, and services	Batteries	4 Pack AA Batteries. Energizer brand; if not available then Duracell, otherwise cheapest 4 pack of AA. DO NOT PRICE LITHIUM BATTERIES. DO NOT PRICE RECHARGEABLES.	On-Site	446
Pets, Toys, and Playground Equipment	Pet Food	Price for a 5.5 oz. can of Friskies Classic cat food. If Friskies not available, price of 9 Lives or Whiskas. Note brand and size. DO NOT PRICE MULTI PACKS.	On-Site	574

PERSONAL CARE PRODUCTS AND SERVICES

Personal care items consisted of haircuts, shaving cream, toothpaste, and tampons. Prices for men’s and women’s haircuts were gathered by phone calls to beauty and barber shops throughout the state. Prices for shaving cream, toothpaste, and tampons were gathered by in-person visits to grocery stores and drug stores throughout the state. The number of stores visited was determined with a sampling algorithm developed by Corona Insights that was applied to a database of business listings provided by InfoUSA. The business list was also supplemented with lists of Walmart Supercenters and Super Targets so that personal care product prices would also be obtained at these supercenters. All sampling for personal care items was done at the school district level after coding the business listings to the appropriate school district. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added where applicable, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

Detailed descriptions of the personal care items in the market basket and the number of prices collected are provided in the table below:

Personal Care Products and Services				
CES Category	Specific Item	Description	Collection Method	N of Observations
Personal Care Services	Man's Haircut	Price of man's wash, cut and dry.	Phone	493
Personal Care Services	Woman's Haircut	Price of woman's wash, cut and dry.	Phone	477
Personal Care Products	Shaving Cream	Price of Barbasol regular shaving cream 10.0 oz. If Barbasol not available, price Gillette Regular Foamy, 11.0 oz. If neither, go to other sizes of Barbasol, then Gillette before going to next similar brand. Note brand and size.	On-Site	452
Personal Care Products	Toothpaste	Price of Crest Regular Paste Tartar Protection 6.4 oz. If Crest not available, get Colgate 6.4 ounces. Note brand and size. DO NOT PRICE CREST PRO-HEALTH, WHITENING, WITH SCOPE, OR OTHER VARIETIES.	On-Site	391
Personal Care Products	Tampons	Price for one box of Tampax Regular Absorbency, 20 ct. Note if different size box. DO NOT PRICE SLENDER STYLE OR PEARL.	On-Site	299

TOBACCO

Tobacco and smoking expenditures were represented by a carton of cigarettes. Prices for cigarettes were gathered by in-person visits to grocery stores throughout the state. The number of stores visited was determined with a sampling algorithm developed by Corona Insights that was applied to a database of business listings provided by InfoUSA. The business list was also supplemented with lists of Walmart Supercenters and Super Targets so that tobacco prices would also be obtained at these supercenters. All sampling for tobacco items was done at the school district level after coding the business listings to the appropriate school district. After prices were collected, the dataset of prices for each item was screened for outliers, taxes were added, average prices were computed for each district, and then average prices were weighted using the shopping patterns survey results to produce final prices for each district.

A detailed description of the tobacco item in the market basket and the number of prices collected are provided in the table below:

Tobacco Products/Smoking Supplies				
CES Category	Specific Item	Description	Collection Method	N of Observations
Tobacco	Cigarettes	Price for one carton (200 cigarettes) of Marlboro Filter, hard pack, flip-top cigarettes. If Marlboro is not available, price Camel cigarettes.	On-Site	705

READING, EDUCATION, AND MISCELLANEOUS EXPENSES

The major expenditure categories for Reading, Education, Miscellaneous Expenses, Cash Contributions, and Personal Insurance and Pensions were considered to be constant for the relevant benchmark household and were not sampled in this 2013 Cost of Living study. These categories have been held constant throughout all previous Cost of Living studies. No geographical variations are expected for these across the state of Colorado, so all districts receive the same average costs for each of these categories.

PERSONAL (INCOME) TAXES

Income taxes for the benchmark family are calculated for each district itemizing deductions for mortgage interest and property taxes as well as ownership taxes on the vehicles.

DEVELOPING FINAL COST OF LIVING MEASURES

After the collection of all pricing data and shopping patterns data, two major steps were taken to develop the final cost of living measures. First, the price data for the market basket items was integrated with the shopping patterns model in order to develop prices for each district that reflect where people in the district purchase their items. Second, annual expenditures are calculated by determining the ratio of the district average price to the statewide average price for each good and then multiplying by the typical expenditure on that item according to the Consumer Expenditure Survey. This second step scales up costs so that the limited numbers of (for example) grocery items for which data are collected represent the full expenditures for food for the benchmark household. Each of these steps is described in further detail below.

INTEGRATE PRICE DATA WITH SHOPPING PATTERNS SURVEY

As previously described, people do not make all of their purchases in the school district in which they live. The shopping patterns survey gathered data which examined where people shop for 12 categories of items and services: produce, perishable groceries, non-perishable groceries, alcoholic beverages, household products, clothing and shoes, gas, car maintenance and repair, furniture and appliances, TVs, and where they go for haircuts and restaurant meals. For each of these items, Corona Insights developed matrices that specify where people living in each district shop for each item, based on the proportional location of surveyed shoppers' most recent purchases. For example, people who live in the Denver County school district may buy gasoline in not only Denver but also neighboring school districts such as Adams-Arapahoe, Boulder Valley, Brighton, Cherry Creek, Jefferson County, and others. By multiplying the shopping patterns matrices that link "home district" with "shopping districts", regional variations in costs and shopping preferences are reflected.

CALCULATE ANNUAL EXPENDITURES

Calculating the annual expenditures for each district involved determining the district average price for each item, weighting that price by the proportion of teachers in the district to calculate a state average price,

calculating the ratio of the district average price to the state average price, and then multiplying that ratio by the typical expenditures in a category according to the Consumer Expenditure Survey. These steps are elaborated below.

Mirroring the methodology used since the 2007 cost of living study, the majority of the market basket items were sampled by school district in 2013. This helped to ensure that all final cost of living data was specific to an exact school district. In a few cases, the data was only available at a county or region level, and needed to be applied to districts based on location. Utilities prices, day care prices, and insurance prices are a few of the cases where data was available at the county or region level and had to be applied to districts. In these cases, the county (or other) price was assigned to each district located in that county in order to arrive at a price for each district.

Statewide average prices were then calculated by weighting the average price in each district by the proportion of the state's teachers in that district and then adding together the weighted prices for all districts. District average prices were then compared to state average prices by calculating the ratio of the district average price to the state average price. These ratios were then multiplied by the typical expenditure for the category according to the Consumer Expenditure Survey in order to determine a final annual expenditure on that item for each district.

This process was conducted for each market basket item, and then all of the expenditures on items in a common category were added to determine annual expenditures for that category (i.e., categories include food at home, food away from home, housing, transportation, etc.). Finally, annual expenditures in each category were combined to provide total annual expenditures for each district.

CALCULATE CONFIDENCE INTERVALS

Confidence intervals were also calculated for most expenditure categories to estimate the uncertainty in the prices available to consumers in each district. For each district sampled, the variance of the mean (i.e., standard error), was calculated for the prices obtained from that district. These variances were weighted by the shopping patterns for each district and the teacher populations to calculate a state average variance, and then ratio variances were calculated by comparing the variance for a district to the state average variance. Ratio variances were aggregated over items in a category and a confidence interval was calculated for the category as a whole. Details of the statistical methods involved are provided in [Appendix E](#).

Essentially, large confidence intervals reflect a large variance of the mean, which means there is a large variability in the prices collected and relatively few prices collected. In some cases, variability in the error may be reduced by additional sampling in those districts; however, this is only likely to be true in large districts where the universe of stores available to sample from is large. In, for example, a small, rural district with only one substantial grocery store, where a convenience store has also been sampled, the variance of the mean will be large, but sampling additional convenience stores (if even any are available) is likely to only artificially inflate the mean price for the district, because convenience stores tend to charge higher prices than grocery stores. In cases like this there is a tradeoff between reducing error variability and accurately estimating the cost of living in a district. Whether additional sampling is needed should be evaluated on a case by case basis. It should be noted that other factors in addition to the variability of the mean district price will affect uncertainty in the cost of living indices, but currently no additional factors are incorporated in the confidence interval estimates.

See [Appendix E](#) for a more detailed discussion of statistical measures used in this study.

APPENDIX A: DETAILED RESULTS

Appendix A provides an additional level of detail about the results of the study, breaking out costs of living in each district by major expenditure category.

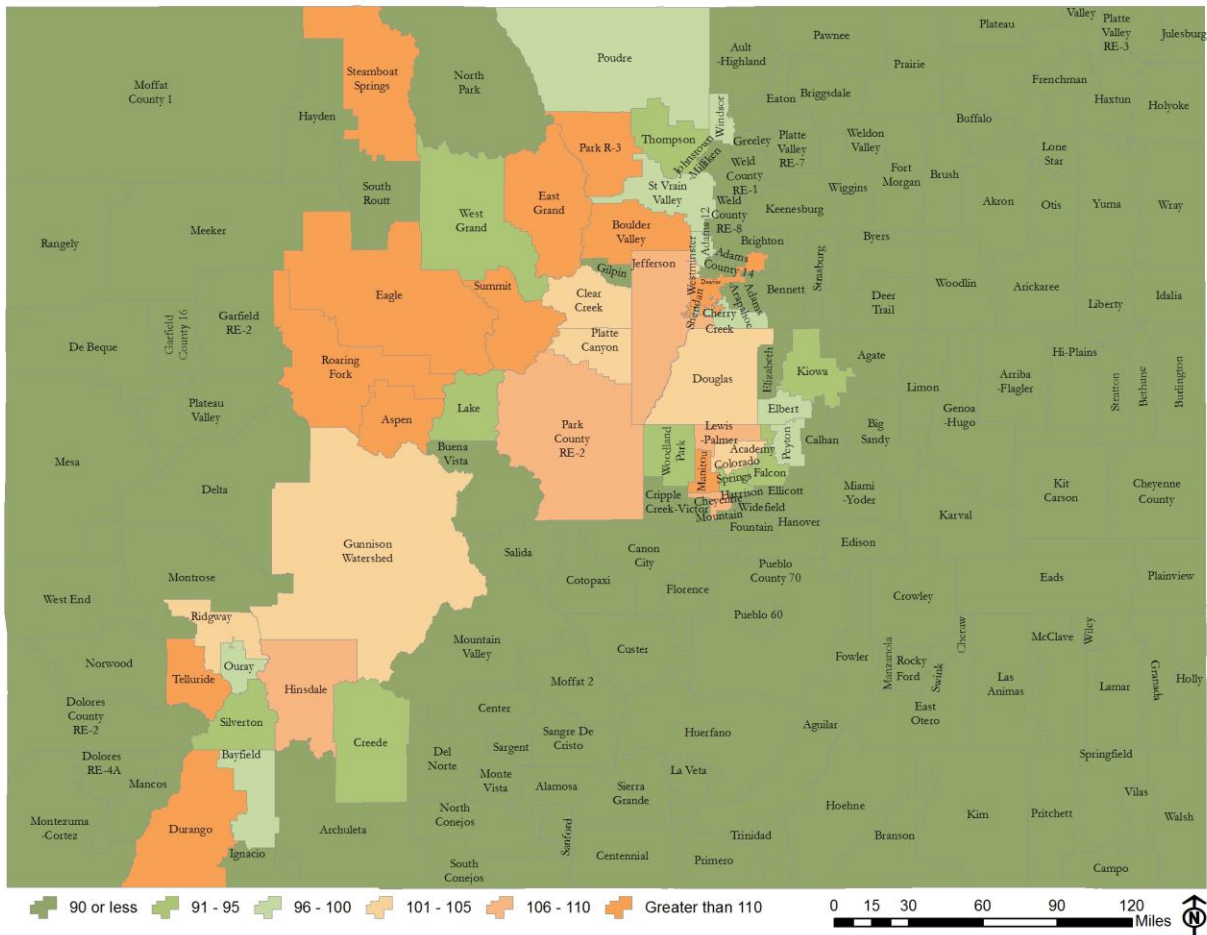
Results are provided both in visual form, through maps provided in this section, and in tabular form in an accompanying spreadsheet. Readers receiving this report electronically will need to review an accompanying spreadsheet file, due to the volume of data.

Maps are provided for the six largest expenditure categories: 1) housing, 2) transportation, 3) food, 4) healthcare, 5) entertainment, and 6) apparel.

Consumer Expenditure Survey Categories and Specific Weights Utilized in Cost of Living Index (Weight as a percentage of income)

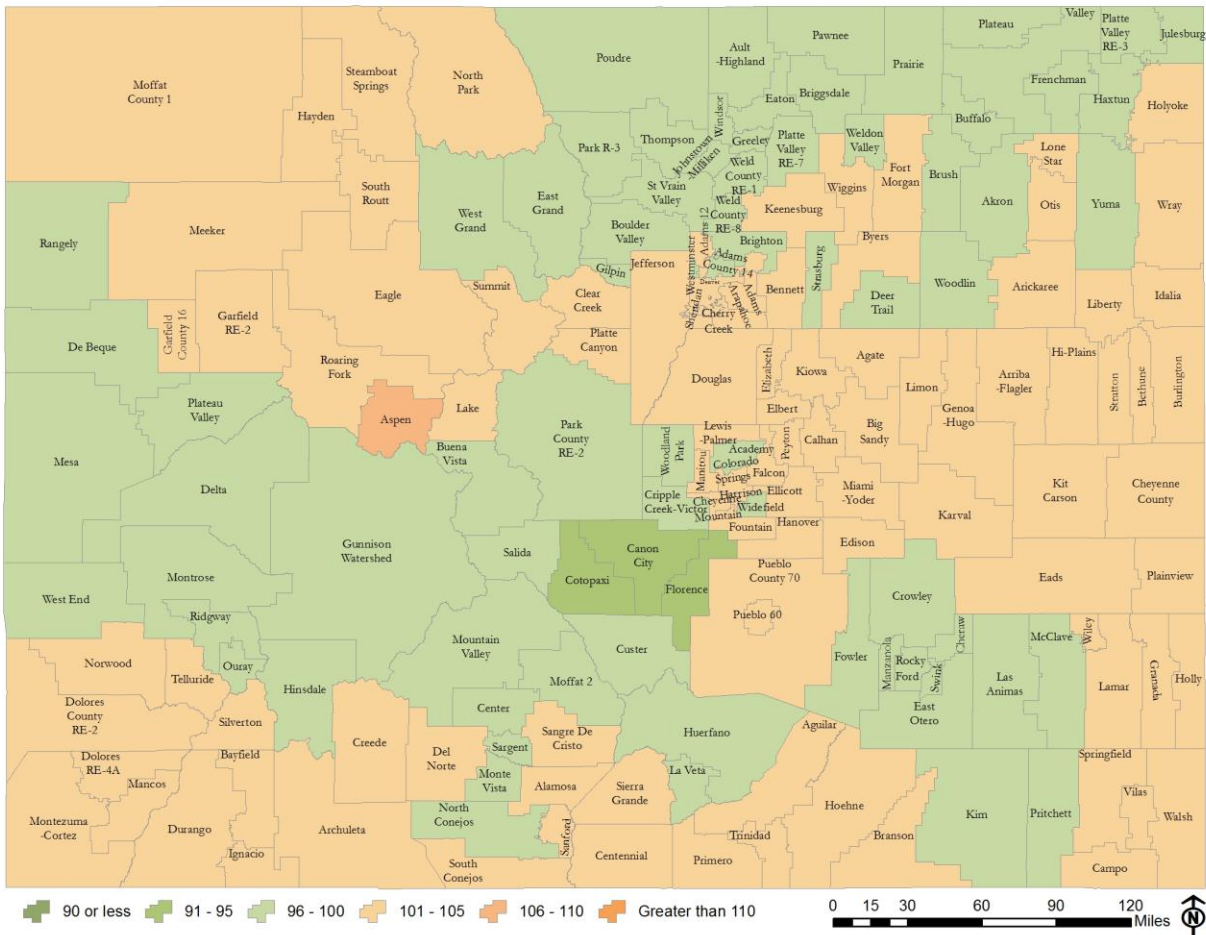
Expenditure Category	% of Income
Food	13.59%
Alcoholic beverages	0.65%
Housing	33.77%
Apparel and services	3.30%
Transportation	19.25%
Healthcare	7.34%
Entertainment	4.45%
Personal care products and services	1.11%
Tobacco	1.22%
Personal taxes	1.49%
Other	13.83%
Total	100.00%

EXHIBIT A-1: MAP OF HOUSING INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



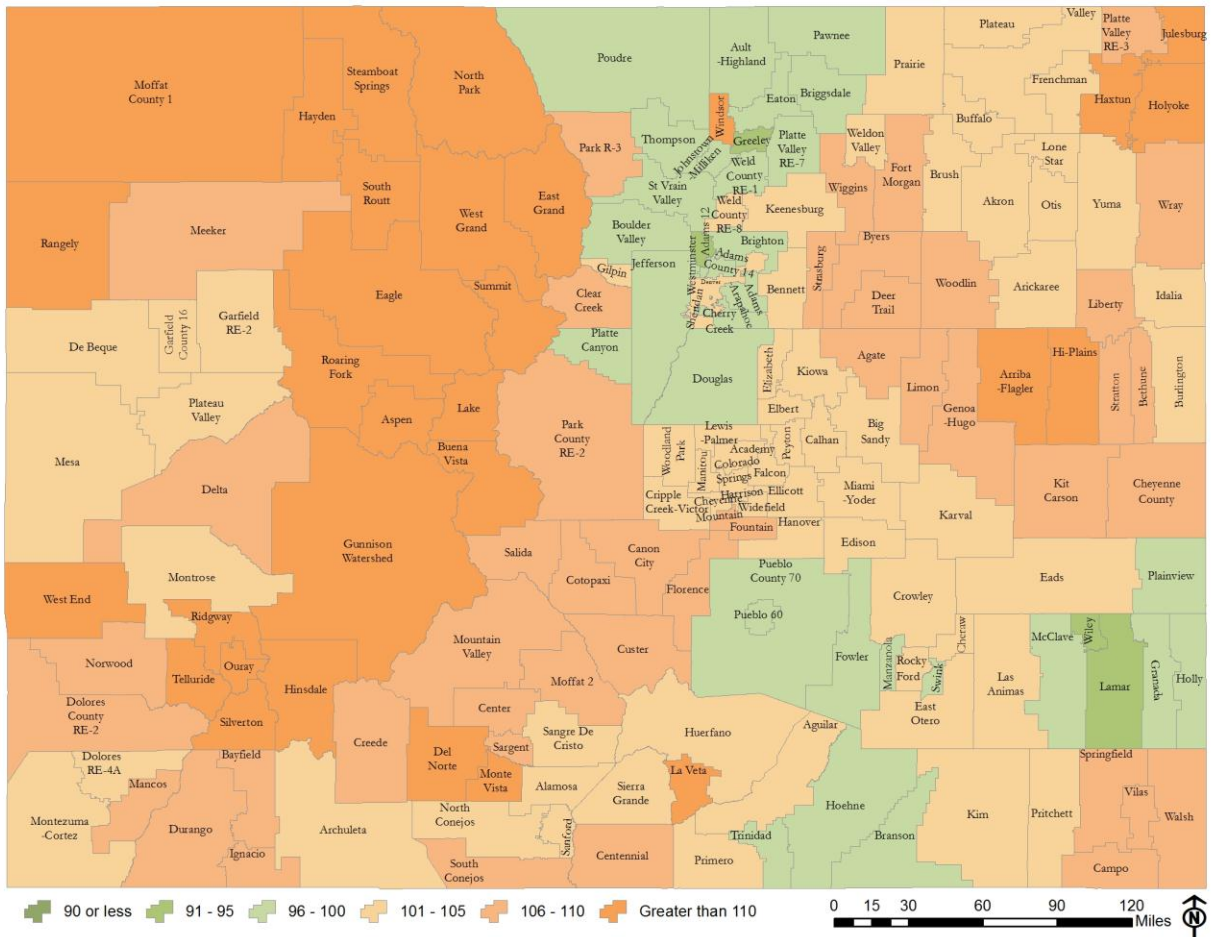
Note. The index value is the ratio of the cost of the housing market basket in each district to the statewide average cost of the housing market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT A-2: MAP OF TRANSPORTATION INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



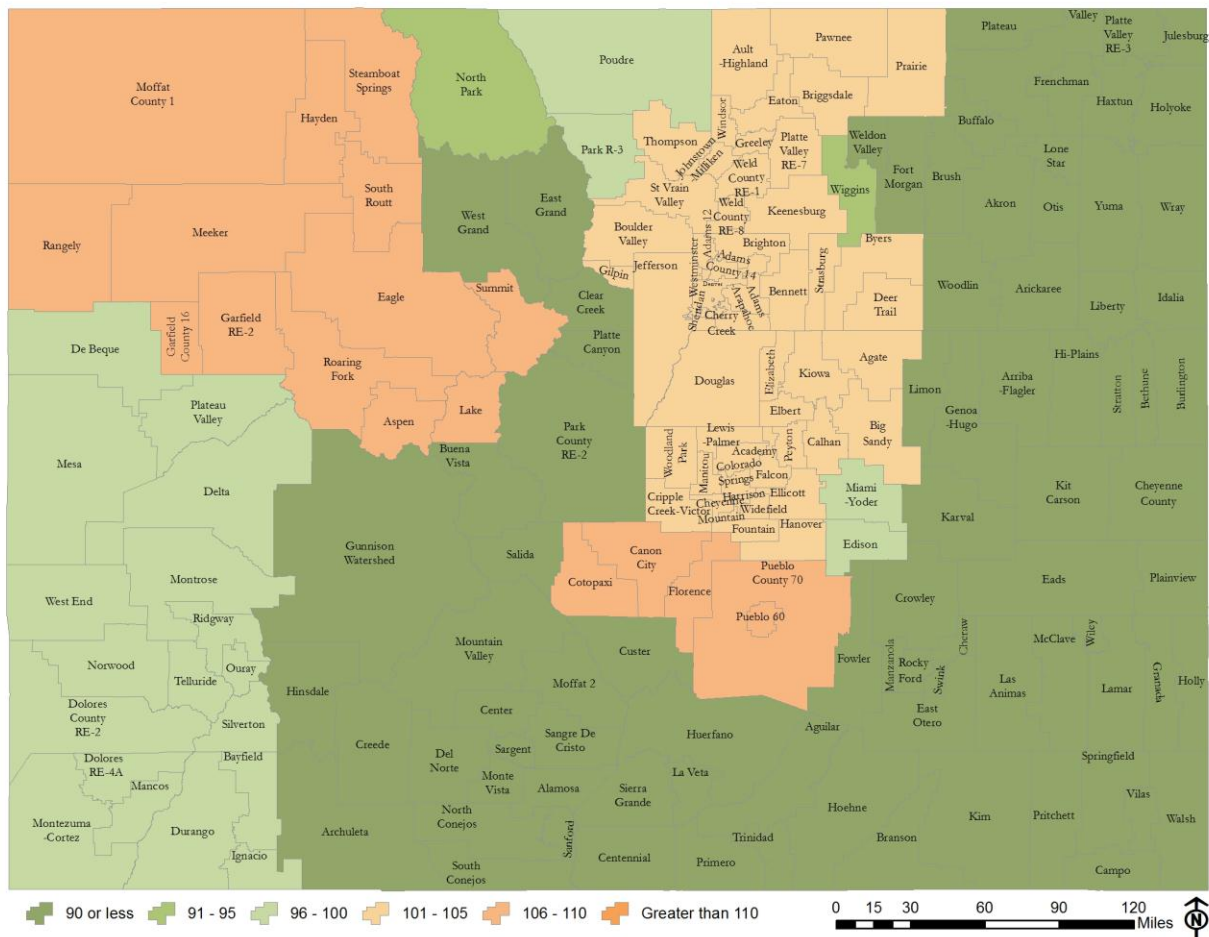
Note. The index value is the ratio of the cost of the transportation market basket in each district to the statewide average cost of the transportation market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT A-3: MAP OF FOOD INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



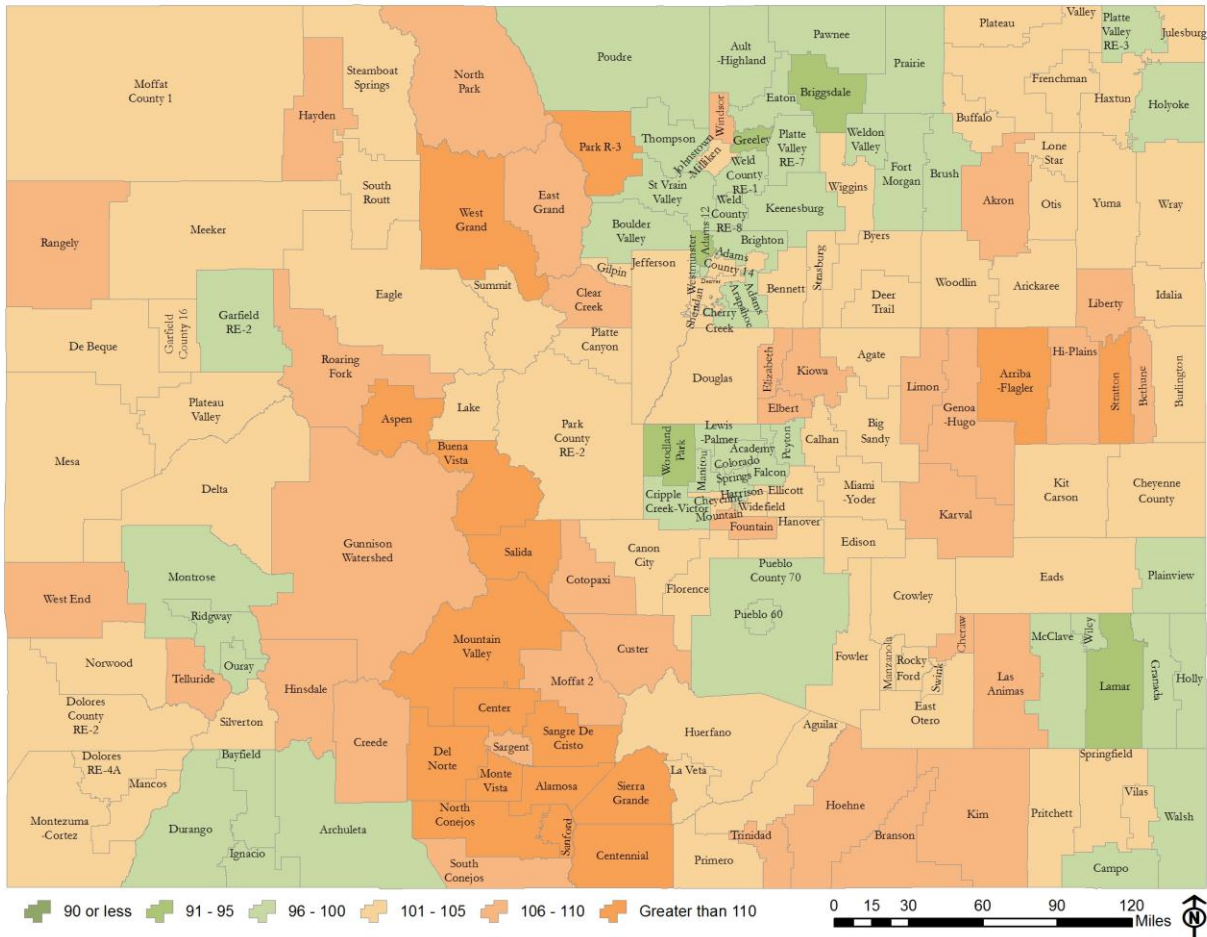
Note. The index value is the ratio of the cost of the food market basket in each district to the statewide average cost of the food market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT A-4: MAP OF HEALTHCARE INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



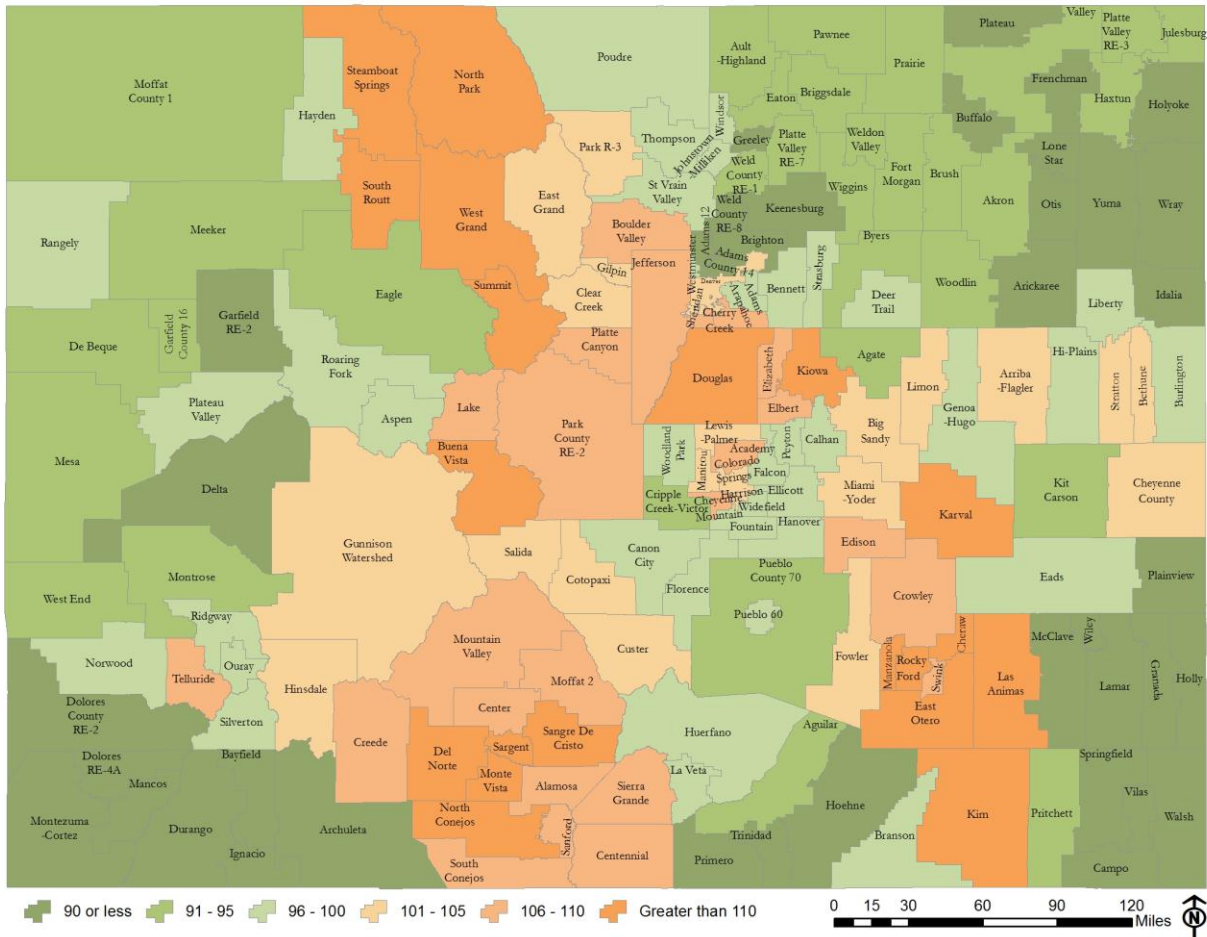
Note. The index value is the ratio of the cost of the healthcare market basket in each district to the statewide average cost of the healthcare market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT A-5: MAP OF ENTERTAINMENT INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



Note. The index value is the ratio of the cost of the entertainment market basket in each district to the statewide average cost of the entertainment market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

EXHIBIT A-6: MAP OF APPAREL INDEX FOR COLORADO SCHOOL DISTRICTS, 2013



Note. The index value is the ratio of the cost of the apparel market basket in each district to the statewide average cost of the apparel market basket. An index value that is greater than 100 means that district is more expensive than average, while a value less than 100 means that district is less expensive than average. In this map, shades of green depict less expensive districts, while shades of orange depict more expensive districts.

APPENDIX B: DETAILED METHODOLOGICAL DISCUSSION – DATA COLLECTION

In Section 4 of the report, a methodological overview is provided regarding the data collection methods for each major expenditure category, and for the development of geographic shopping patterns matrices. [Appendix B](#) provides additional detail on those topics for the interested reader.

In the bulk of this appendix, data collection techniques are expanded upon. Notable sampling techniques, data collection procedures and weighting techniques are expanded upon for each major expenditure category.

Reporting Note: Where sampling, data collection, and weighting techniques were identical between expenditure categories, these techniques will not be repeated in each write-up in order to reduce redundancy. To facilitate this, we have grouped items based on the methodology used to collect data those items.

FIELD DATA COLLECTION

Training Note: A Corona principal who has been involved in past data collections for this project served as the field research manager and was in charge of training and overseeing the staff. Corona recruited temporary contractors to perform the data collection. These contractors were hired in the region they would be working; this helped facilitate local knowledge of communities and stores, and helped manage travel costs for the project. All hires were screened, interviewed, and background checked prior to employment. Data collectors were paid hourly, plus expenses. To encourage efficient and quality work, an incentive structure was set up based on timely work, accurate price collection, and accurate data entry.

When initially hired, Corona provided an overview and training guide for data collectors to review prior to training, as well as to have with them while doing data collection. Corona then conducted a two-hour training with all data collectors in each region, including in-store training. Training time was focused on the importance of collecting data in the exact same manner across the state, including a thorough review of the market basket and substitutions, following the sampling plan of stores, how to record prices, and how to enter data. The research manager and other Corona staff were available for questions by telephone during the entire data collection period. The research managers also made periodic check-in calls with the data collectors to answer questions and monitor progress. Data were recorded on paper, then entered online. Corona retained the paper data sheets and did random data quality checks on each data collector. In the Denver metro area, some data collectors were given iPads to enter data directly online.

Most of the field data collection was completed in a two-week period. In the first week, the field research manager drove around the state conducting trainings at each location. Data collectors had one week to complete their districts, and then the field research manager made a second loop around the state to follow-up with data collectors at each location, collect materials, and so on. While in the field, the field research manager conducted random data checks to ensure the right stores were visited and correct prices were collected. Some Front Range metro districts require more than one week of data collection because of the number of stores to be visited, but data collectors in those regions came to Corona's Denver office for trainings and debriefings.

FOOD AT HOME

All Food At Home item prices were collected in-person throughout each of the 178 school districts in Colorado. Business listings for grocery stores in Colorado were collected from the InfoUSA database. This list was supplemented with a complete list of Walmart Supercenters and Super Target locations to ensure that food prices were collected at these stores. Corona labeled each of the businesses with the school district it is located in using arc-GIS software. Then a sampling plan was developed based on the number of businesses in each school district, which resulted in a goal of sampling the larger of five (businesses) or five percent of businesses in each district. Corona attempted to sample all businesses from districts with fewer than five stores in a given category. In metro area districts with large numbers of businesses in each category, the businesses to be sampled were chosen based on store revenues provided by InfoUSA. The total revenue for a district was divided by the number of stores to be sampled from that district (n), then stores were rank-ordered by their revenue values and one store was chosen from each n-tile of the distribution.

Field research was then conducted by data collectors who visited each district and attempted to collect prices from the number of stores identified by the sampling plan. Gathering prices at gas stations or convenience stores was to be avoided unless no other businesses could be identified in a district. All data that was collected by the data collection team was uploaded to a final database with market basket prices for all goods and for all districts. The database was checked for outliers by identifying prices that were outside three standard deviations from the mean for their region (using regions from the shopping patterns survey to group similar districts together). Grocery tax for each location was then added to each price, and an average price was calculated for each district.

FOOD AWAY FROM HOME

All Food Away From Home item prices were collected in-person throughout the school districts. Business listings for eating places in Colorado were collected from the InfoUSA database, and then Corona mapped each business to a school district using arc-GIS software. The sampling plan for items in the Food Away From Home Category was developed similarly to the **Food At Home Category** (see [above](#)). The main difference between the sampling for the Food Away From Home Category was data collectors were asked to obtain at least three different prices for each of the three different Food Away From Home items (that would be three different prices in each district for cheeseburgers meals, pizza meals and steak meals). In Colorado metro areas with a plethora of eating places, data collectors were instructed to obtain an increased number of prices for each Food Away From Home item so that the overall sample for those districts would be more representative of the overall eating places district population. Corona attempted to sample all businesses from districts with fewer than three stores in a given category (cheeseburger, pizza or steak dining establishments).

Field data collection and training was conducted and entered with the same research method described in the **Food At Home Methodology section** (see [above](#)). It should be noted that since 2009 prices have been gathered at fast food restaurants, specifically for the cheeseburger meal. This methodological shift was made in an effort to enhance the comparability of cheeseburger meals across all districts. All outliers for Food Away From Home were analyzed and checked with the same method described in the **Food At Home Section** (see [above](#)). Dining tax for each location was then added to each price, and an average price was calculated for each district.

ALCOHOLIC BEVERAGES

All Alcoholic Beverage item prices (a six pack of beer) were collected in-person throughout the school districts. Alcoholic Beverage prices and Food At Home items were collected at the same time and utilized the

same methodology described in the **Food At Home Methodology section** (see [above](#)). Beer prices were collected at all grocery stores where beer was sold. In districts where beer prices were not obtainable at grocery stores (or if there were too few grocery stores available in a district), data collectors were instructed to obtain beer prices at local convenience or liquor stores. It should be noted that business listings for liquor stores in Colorado were collected from the InfoUSA database and added to the final data collector list of stores to be sampled (data was collected primarily at liquor stores in districts that had fewer than five total grocery stores to be sampled). Liquor stores were also geo-coded and labeled to the appropriate district using arc-GIS.

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

HOUSING - HOUSEKEEPING SUPPLIES – LAUNDRY SOAP

All Housekeeping Supplies item prices were collected in-person across the school districts. Laundry soap was used as the item to be collected for the Housekeeping Supplies Category. Laundry Soap prices were collected at the same time and using the same sampling methodology described for the **Food At Home Methodology section** (see [above](#)).

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

HOUSING - HOUSEHOLD FURNISHINGS AND EQUIPMENT – REFRIGERATOR

In 2011, a refrigerator was selected to represent the Household Furnishings and Equipment category, and was retained in 2013. In 2013, refrigerator prices were collected in-person across the school districts. Business listings for appliance stores in Colorado were collected from the InfoUSA database, and then Corona labeled each by school district using arc-GIS software. Additional listings for appliance stores were obtained from web sources to ensure that small-town appliance dealers (e.g., Sears Hometown Stores) were represented. The sampling plan for refrigerators was developed similarly to the **Food At Home Methodology section** (see [above](#)) in that the goal was to sample the larger of five (appliance businesses) or five percent of appliance businesses in each district.

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

APPAREL

Apparel prices were collected in-person throughout the school districts. The apparel items to be collected for the Apparel Category included Men's dress shirts, Men's T-shirts, Women's pantyhose, Women's cardigan sweaters, and Men's canvas lace-up shoes. Business listings for apparel business in Colorado were collected from the InfoUSA database. The InfoUSA list was also supplemented with lists of Walmart Supercenters and Super Targets so that apparel prices would also be obtained at these supercenters. Corona then geo-coded and labeled each apparel store into the appropriate school district using arc-GIS software.

Similar to the sampling plan detailed in the **Food At Home Methodology section** (see [above](#)), the sampling plan for apparel was based on the number of businesses in each school district, which resulted in a goal of sampling the larger of five (apparel stores) or five percent of apparel stores in each district for each apparel item. Corona attempted to sample all apparel stores from districts with fewer than five stores in a

given category. Overall, in each district it was the minimum goal to obtain five different prices for each item, but this was not possible in many districts which did not have five total apparel stores.

It should be noted that specific brands and types of clothing items were targeted for pricing for each item, but often those specific brands would not be available within a given store. When this was the case, data collectors were instructed to find brands and item types which most closely replicated the initial target brands.

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price for each apparel item was calculated for each district.

ENTERTAINMENT – TELEVISION SET

The market basket good for Television, Radios and Sound Equipment was a television that would be commonly available across stores and across districts. Television prices were collected in-person throughout all of the districts.

Business listings for electronics and home appliance stores in Colorado were collected from the InfoUSA database, and online yellow pages information was used to supplement those lists when additional electronics stores were needed to sample in a specific district. Each electronic store was then geo-coded and labeled into the appropriate school district using arc-GIS software.

Similar to the sampling plan detailed in the **Food At Home Methodology section** (see [above](#)), Corona attempted to sample the larger of five (electronics stores) or five percent of all electronics stores in each district. Ultimately, many of the smaller (mostly rural) districts often did not have electronics stores, and in those districts data collectors would do their best to obtain at least one price per district. In several districts, there were no TV prices to be obtained (due to a general shortage of available stores selling TVs in that district).

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

ENTERTAINMENT – BATTERIES

All battery prices were obtained in-person at the same time grocery prices were collected. Therefore, the sampling, data collection and analysis plan for batteries is exactly the same as described in the **Food At Home Methodology section** (see [above](#)).

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

ENTERTAINMENT – PET FOOD

All pet food prices were sampled in-person at the same time grocery prices were collected. Therefore, the sampling, data collection and analysis plan for pet food is exactly the same as described in the **Food At Home Methodology section** (see [above](#)). Cat food was the specific item priced for pet food.

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

PERSONAL CARE PRODUCTS - SHAVING CREAM, TOOTHPASTE, TAMPONS

All personal care product prices such as shaving cream, toothpaste and tampons were sampled in-person at the same time grocery prices were collected. Therefore, the sampling, data collection and analysis plan for shaving cream, toothpaste, and tampons is exactly the same as described in the **Food At Home Methodology section** (see [above](#)).

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price for each personal care product, and an average price was calculated for each district for each of the three products in this category.

TOBACCO

Cigarette prices were sampled in-person at the same time grocery prices were collected. Therefore, the sampling, data collection and analysis plan for cigarette prices is exactly the same as described in the **Food At Home Methodology section** (see [above](#)). An attempt was made to obtain cigarette prices at all grocery stores that were visited by data collectors. Similar to the sampling approach used for beer prices, data collectors were instructed to obtain cigarette prices at local convenience or liquor stores in districts where cigarette prices were not obtainable at grocery stores (or if there were too few grocery stores available in a district).

It should be noted that business listings for liquor stores in Colorado were collected from the InfoUSA database and added to the final data collector list of stores to be sampled for cigarettes (cigarette data was collected primarily at liquor stores in districts that had fewer than five total grocery stores to be sampled). Liquor stores were also geo-coded and labeled to the appropriate district using arc-GIS. The InfoUSA list was also supplemented with lists of Walmart Supercenters and Super Targets so that cigarette prices would also be obtained at these supercenters.

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district.

DATA COLLECTION BY PHONE

TRANSPORTATION – OIL AND FILTER CHANGE

Oil change prices were collected by telephone for every district. Business listings for automobile maintenance and repair shops in Colorado were collected from the InfoUSA database, and online yellow pages information was used to supplement those lists when additional automobile maintenance shops were needed to sample in a specific district. Each gas station was then geo-coded and labeled into the appropriate school district using arc-GIS software. The oil change prices obtained were for a 2009 Ford F-150 (see the Transportation table in [Section 4](#)).

Similar to the sampling plan detailed in the **Food At Home Methodology section** (see [above](#)), Corona attempted to sample the larger of five (auto maintenance shops) or five percent of all auto maintenance shops in each district. Ultimately, in many of the smaller (mostly rural) districts where fewer automotive maintenance and repair shops existed, an attempt to obtain oil change prices was made at any (and all) maintenance shops available in the district.

After all data was collected, entered and outliers were analyzed and removed, sales tax was added to each price, and an average price was calculated for each district. It should be noted that sales tax was only applied to the parts of an oil change, and this was standardized across all oil change prices to reflect approximately 40 percent of the total oil change price. Therefore, 40 percent of all final oil change prices were taxed with the local sales tax, and the remaining 60 percent was left untaxed.

TRANSPORTATION – FRONT-END ALIGNMENT

Front-end alignment prices were collected at the same time and with the exact same methodology as oil change prices (see Oil Change Methodology, [above](#)). After all data was collected, entered and outliers were analyzed and removed, an average price was calculated for each district. It should be noted that no tax was applied to front-end alignment prices, because it is considered a service that is not taxed.

TRANSPORTATION – GASOLINE

Gasoline prices were gathered on a single day via telephone calls to gas stations across the state. All gas prices had to be obtained on the same day due to the relative instability of gas prices on a national and regional level. Unleaded grade 85 octane gasoline was priced for the category. Business listings for gas stations in Colorado were collected from the InfoUSA database. Each gas station was then geo-coded and labeled into the appropriate school district using arc-GIS software.

Similar to the sampling plan detailed in the **Food At Home Methodology section** (see [above](#)), the sampling plan for gas stations was based on the number of businesses in each school district, which resulted in a goal of sampling the larger of five (gas stations) or five percent of all gas stations in each district. Corona attempted to sample all gas stations from districts with fewer than five stores in a given category, and an attempt was made to obtain gas prices for each district (though some districts had no gas stations located in their boundaries or the few gas stations that were in their boundaries would not divulge that information over the phone).

After all data was collected, entered and outliers were analyzed and removed, an average price was calculated for each district.

ENTERTAINMENT – MOVIE TICKET

Movie Ticket prices were collected by telephone for every district. Business listings for movie theaters in Colorado were collected from the InfoUSA database, and online yellow pages information was used to supplement those lists when additional movie theaters were needed to sample in a specific district. Each movie theater was then geo-coded and labeled into the appropriate school district using arc-GIS software.

Data collectors were instructed to obtain the price of an adult admission ticket for each movie theater sampled, and only movie theaters showing current release movies were sampled (no dollar movie theater prices or dinner theater prices were used in the final district averages).

After all data was collected, entered and outliers were analyzed and removed, an average price for movie tickets was calculated for each district. It should be noted that no tax was applied to movie theater prices because it is not considered a taxable good.

PERSONAL CARE PRODUCTS AND SERVICES – MEN’S & WOMEN’S HAIRCUTS

Both men’s and women’s haircut prices were collected by telephone for every district. Business listings for beauty salons and barber shops in Colorado were collected from the InfoUSA database, and online yellow pages information was used to supplement those lists when additional beauty salons/barber shops were needed to sample in a specific district. Each beauty shop/barber shop was then geo-coded and labeled into the appropriate school district using arc-GIS software.

Data collectors were instructed to ask for the price of full cut, wash and dry haircut. Each beauty salon/barber shop were asked for the price of both women’s and men’s haircuts, but some stores only offered either women’s or men’s cuts.

Corona attempted to sample the larger of five (beauty shops) or five percent of all beauty shops in each district for both men’s and women’s haircuts. As seen in other market basket categories, many of the smaller (mostly rural) districts often did not have as many beauty shops, and in those districts data collectors would do their best to obtain at least one price per district.

After all data was collected, entered and outliers were analyzed and removed, an average price was calculated for each district. No sales tax was applied to the final haircut prices, because haircuts are considered a service and not a taxable good.

TRANSPORTATION – VEHICLE PAYMENTS

Vehicle financing rates and fees, which are one component of calculating vehicle payment costs, are collected by telephone calls to banks and credit unions in every district. See additional detail in the “[Vehicle Payments](#)” subsection under “Data Collection from Miscellaneous Database Sources.”

DATA COLLECTION FROM MISCELLANEOUS DATABASE SOURCES

HOUSING – SHELTER – MORTGAGE PAYMENT/PROPERTY TAXES

Home values were provided to Corona Insights by the Colorado Legislative Council via a study by an outside consultant, and they were based on a specified home size. This is the same approach used in previous years. Corona Insights calculated an annual mortgage payment (principal and interest) based on a 30-year fixed rate mortgage for 80 percent of the home value with the current mortgage interest rate for Colorado on the day the home values were delivered to Corona Insights.

Owners of residential homes are subject to property tax on their dwelling. The entire value of the home is not taxed; only the assessed value of the home can be taxed. The assessed value of a home is the actual home value multiplied by an assessment percentage. This assessment percentage is the same for the entire state of Colorado and is 9.13% for 2013. The assessed value of the home is then multiplied by the decimal equivalent of the total mill levy. The total mill levy is the sum of the mill levies from the county, city, school district, and any other special levies an area may have. To get the decimal equivalent of a mill levy, the levy is multiplied by .001.

Mill levies are obtained from the 2012 annual report for the Department of Local Affairs. This report was the most recent report available from the Division of Property Taxation. The report includes mill levies for every county, city, school district, and any other applicable levy in the state of Colorado. The mill levies

were summed by school district. The stated home price for each school district was multiplied by the assessment percentage to get the assessed value. The assessed value was multiplied by the total of all applicable mill levies for the district (county, school district, average municipal value in the county, and any special levy). This value is the property tax. This process was repeated for all school districts.

HOUSING – SHELTER – HOMEOWNER’S INSURANCE

Insurance companies with a large market share for homeowners insurance in Colorado were determined by analyzing the most recent Colorado Insurance Industry Statistical Report, obtained from the Colorado Department of Regulatory Agencies (DORA), Division of Insurance. These companies were contacted to determine homeowner’s insurance rates by zip code. In obtaining homeowner’s insurance rates, hazard insurance was sought for a \$100,000 frame dwelling built in 1970 with \$80,000 contents coverage, \$100,000 liability/medical payments, and a \$1,000 deductible. These are the same specifications use in previous studies.

The rates were provided to Corona Insights by zip code. The rates were averaged to the school district level, then weighted by the home value for each district to obtain the final spending on insurance in each district.

HOUSING – UTILITIES – ELECTRIC

We estimated an average monthly electric bill for each school district using data gathered in 2013 by the Colorado Association of Municipal Utilities (CAMU). CAMU collects billing rates, based on 700-megawatt usage, from every Colorado electric utility in January and July. These rates include tax equivalents, either the exact PILOT (payment in lieu of taxes) or transfer to the municipal general fund, but do not include county or municipal sales tax. We averaged the January and July rates to determine an average monthly billing rate for each utility.

To assign an average monthly bill to each school district, we retrieved the Franchise-Log Workbook from the Colorado Public Utility Commission website that listed the utility provider for about 300 municipalities. We used a global information system (GIS) to overlay each of these municipalities onto one or more school districts and to determine the proportion of the municipal population within each school district. Then we assigned the previously calculated average monthly electric bill rate to each school district weighed by the population proportion in that district. We also used GIS to match residents of municipalities that were not listed in the Franchise-Log Workbook and unincorporated residents to their school district, and we used a map from CAMU to match unincorporated areas to utility rates.

One possible limitation of this methodology is that the monthly electric bill is averaged across each utility’s entire service area, but usage and rates are likely to vary across geographies. Further, some providers’ rates may fluctuate more than others throughout the year. Nonetheless, we believe this methodology produced robust results given the available data.

HOUSING – UTILITIES – GAS

In order to calculate the average monthly natural gas bill for residents around the state, Corona used a methodology very similar to that described for electric providers. We estimated an average monthly natural gas bill for each school district using data gathered from annual reports filed with the Colorado Public Utility Commission in 2012. These reports contain annual residential revenues and the number of residential customers for each of the providers’ service areas. We used these data to calculate an average bill for each

service area. To assign an average monthly natural gas bill to each school district, we employed the same methodology that we used to assign electric rates (described above).

Residents within some school districts depend on propane (a type of liquid petroleum) for their heating needs rather than natural gas. Indeed, no natural gas is available for residential use in some school districts. While it is possible to gather information on propane prices around the state, propane providers do not have an accurate measurement of the actual propane usage in their area. Trying to estimate the true cost of propane service based on some estimated usage value, therefore, would likely be very inaccurate. Instead, Corona used data from the Energy Information Administration to calculate the relative cost of using propane for energy instead of natural gas, based on the actual energy output for each fuel in BTU's and the 2012 average cost for propane in Colorado.

After determining this “conversion factor,” the cost of propane service for each school district without natural gas service was computed by averaging the natural gas bills of the surrounding districts and inflating that average based on the analysis discussed above.

HOUSING – UTILITIES – TELEPHONE

To estimate the average monthly telephone bill for Colorado residents, Corona obtained the most current telephone rates from the Public Utilities Commission. This dataset detailed the monthly base rates charged by each incumbent local exchange carrier (ILEC). ILECs charge the same rate throughout their service area, with the exception of CenturyTel. In this case, each of CenturyTel's rate areas was considered to be a separate provider for the purposes of computing an average bill.

Similar to the process used for electric providers, these rates were assigned to each of the school districts based on the providers' coverage areas. In areas where multiple providers serve a single school district, a weighted average based on population size covered was used to calculate the rate to be assigned to each district.

In addition to the base rates being charged by each company, a variety of other fees contribute to the total monthly bill in an area. First, a number of fees are assessed on telephone bills across the entire state. Specifically, the high cost surcharge, hearing impaired relay fund, low income surcharge, and subscriber line charges are the same across the entire state. Similarly, state taxes were applied for all districts. Other charges, such as the 911 surcharge, vary from one area of the state to another. These charges were, therefore, applied on a district-by-district basis to calculate the overall average bill.

HOUSING – UTILITIES – WATER/WASTEWATER

In order to determine the average monthly payments for water and wastewater bills in each school district, Corona Insights collected rate information for 258 cities and towns throughout the state. The data collection was initiated by using a spreadsheet that held contact data and information from similar research performed in 2011. Corona employees attempted to collect data from each of the 258 agencies; most of the information was collected via phone calls, although rates for some towns were found online. Phone calls proved to be the fastest source of information in most cases. In the event that no contact information could be found, or if a town used only wells or septic tanks, proxy values were used based on rates charged in another town in the same school district, or based on rates charged in another school district in the same county. In some cases where neither of these methods was applicable, proxy values were used based on the rates charged the nearest town.

After data collection was complete, equations for determining monthly totals were written into the spreadsheet for each of the 258 towns. The equations figured rate totals based on a home that uses 6,000 gallons of water per month, and produces 6,000 gallons of wastewater for processing per month. These totals were then applied to the appropriate school districts. In some cases, rates had only been researched for one town within a district; in these cases, that rate was simply applied to the entire district. Other school districts were host to multiple towns, and data had been collected from several towns within the district. In those cases, each rate was weighted according to population so that a more accurate value for each district could be determined.

HOUSING – HOUSEHOLD OPERATIONS – DAY CARE

Average day care costs (by Colorado County) were obtained from the 2013 Market Rate Survey of Child Care Providers, which is conducted by Qualistar Colorado. Qualistar Colorado is the result of a merger that occurred in 2004 between two early education non-profit organizations based in Colorado – Educare Colorado and the Colorado Office of Resource and Referral Agencies (CORRA). Qualistar is under contract to the Colorado Department of Human Services, Division of Child Care as the State Resource and Referral Agency. As part of this contract they conduct this bi-yearly market research study of state-wide day care costs.

Included in the Market Rate Survey of Child Care Providers are costs for licensed child care centers (CCC), family child care providers (FCC), and school-age child care (SACC) facilities in all 64 counties. Full-time weekly rates of caring for children between 0 to 12 months, 1 to 2 years, and 2 to 5 years were provided in Qualistar’s 2013 report.

In determining the average weekly costs for childcare services, the average of child care centers (CCC’s) and family care centers (FCC’s) was calculated for each of the three age groups: 0 to 12 months, 1 to 2 years, and 2 to 5 years. The averages were then weighted based on the age makeup of children of in “Center” or “Family” day care. These proportions were obtained from the FFY 2011 CCDF Data Tables, U.S. Department of Health and Human Services, Administration for Children & Families, data for State of Colorado.

Weekly rates were then converted to a monthly cost by multiplying the weekly cost of care by 52 weeks per year and then dividing it by 12. Final district average day care costs were then reallocated from the county level to the final district level using a weighted average method to aggregate based on the population of the counties in each district.

TRANSPORTATION – VEHICLE PAYMENTS

Vehicle pricing was gathered for a 2011 Honda Civic LX Sedan. The purchase price of the 2011 Honda Civic was \$14,614 (per Kelley Blue Book information assuming the vehicle had 24,000 miles at the time of purchase). This was the base price used to determine annual car payments for a four-year loan. This price was assumed to be constant throughout the state, which insures that the identical vehicle is being purchased in each district. With a used car purchase, not only is availability of a specific model limited across districts, but the specific condition and features on each available vehicle can vary widely making it impossible to compare available pricing for a specific vehicle. Instead, the vehicle value is held constant at the KBB value, and the variance between districts comes from the sales and registration taxes and fees, as well as the financing rates and fees available. Ownership taxes, registration & licensing fees, other fees (title) are provided in the “Colorado Motor Vehicle Law Resource Book” from the Colorado Legislative Council. The vehicle weight is also required for calculating taxes; this was obtained from the vehicle manufacturer’s website.

Financing rates for vehicle loans were obtained from telephone surveys of banking institutions and credit unions throughout the state. The list of banking institutions to survey was obtained from InfoUSA. Businesses were mapped to the district level to obtain the rate for each district. Average monthly car payments were then calculated, given the total amount financed (including the purchase price, all bank loan charges, and any applicable tax, title, and registration fees) and the interest rate charged by the bank or credit union.

TRANSPORTATION – VEHICLE INSURANCE

Insurance companies with a large market share for vehicle insurance in Colorado were determined by analyzing the most recent Colorado Insurance Industry Statistical Report, obtained from the Colorado Department of Regulatory Agencies (DORA), Division of Insurance. These companies were contacted to determine vehicle insurance rates by zip code.

For vehicle insurance, two vehicles were used to calculate rates. The first vehicle was a 2009 Honda Civic LX sedan with a four cylinder 1.8 liter engine, five speed manual transmission, 24,000 miles, air conditioning, power steering, power windows, power locks, cruise control, and dual airbags. The coverage was comprehensive with liability policy limits of \$25,000/\$50,000/\$15,000 with a \$250 deductible and 15,000 miles per year. The second vehicle was a 2009 Ford F-150 XL 6.5 ft. Bed Pickup with a 4.6 liter V6 engine, automatic transmission with two wheel drive, 60,000 miles, air conditioning, power steering, and airbags. The coverage was liability only with liability policy limits of \$25,000/\$50,000/\$15,000 with 15,000 miles per year. These two cars are similar to the ones used in previous studies and represent highly popular makes and models. The model year was updated from the previous study so that the vehicles are always 2 years old and 4 years old, and some features have to be adjusted accordingly.

For each car and across each zip code, the driver's characteristics were held constant. The driver of the Honda Civic was assumed to be a thirty-six year old married woman with good credit and a good driving record. The driver of the Ford F-150 was assumed to be a thirty-seven year old married man with good credit and a good driving record. The particular characteristics of the driver were not vitally important because the comparison of the rates were done using ratios, and as long as the driver's information was held constant by each insurance company, the utilization of the ratio method can be assumed to be a valid method of comparison. Data was given for six months, so the total of the two vehicle's insurance was summed and multiplied by two to get the yearly rate for both cars.

As previously detailed in the main body of the report, vehicle insurance data was obtained from one vehicle insurance provider that has a large share of the vehicle insurance market in Colorado. The name of that company will not be provided in this report in order to ensure pricing confidentiality to that company. Vehicle insurance rates were provided from the participating vehicle insurance company for each vehicle by zip code. Once the zip codes for each county were determined, the rates for each zip code were averaged for each county and then were weighted by population to the proper school district as final vehicle insurance rates.

HEALTH CARE

Insurance companies with a large market share for health insurance in Colorado were determined by analyzing the most recent Annual Report of the Commissioner of Insurance to The Colorado General Assembly on Health Insurance Costs. In order to determine the average monthly health insurance premium rate in each school district, Corona Insights contacted the four largest health insurance providers to identify the two most popular plans for each provider. Corona then collected rate information for the identified plans

from the providers' websites. Data were collected for PPOs from three of the companies, and an HMO from the remaining provider. Using each insurance provider's website, Corona employees gathered rates as they would apply to a family of three, all non-smokers, and in good health. The family of three was described as:

- ⇒ 1 Male, 37, DOB 6/20/1976;
- ⇒ 1 Female, 36, DOB 2/4/1977; and
- ⇒ 1 Male, 4, DOB 4/5/2009.

Most of the websites determined rates based on location within the state as indicated by county or zip code. In the cases when a zip code was required, the code from the applicable county seat was used.

Rates for the two most popular plans for each of the four participating companies were obtained. Corona project staff consulted with representatives from each of the four companies to select the final plans that were used from each company. The plans are not necessarily comparable between all companies because benefits varied widely among the providers. In addition to recording plan rates, Corona employees also noted the benefits provided by each plan.

Average health insurance costs were averaged for each of the four companies (between the two most popular plans) and then final health care costs were calculated by multiplying these final company averages by the weighted (comparative) average market share of each company to obtain final costs by zip code. The costs collected for each zip code were then applied to school districts within each county.

PERSONAL (INCOME) TAXES

Personal income taxes were calculated for the benchmark family in each district using the IRS Form 1040 for federal income tax, and adding state income tax and occupational/head taxes for relevant local jurisdictions. For federal income taxes, the standard deduction was compared to the itemized deduction calculated using mortgage interest and property taxes, as well as specific ownership taxes from the vehicles, state income taxes, and cash contributions based on the CES, and the higher of the two deductions was used for each district. IRS Publication 936 was used to calculate the allowable limits on home mortgage interest deductions for high home value districts (e.g., Aspen). Specific ownership taxes are calculated from the original Manufacturer's Suggested Retail Price (MSRP) value for each vehicle, and the tax formula from the Colorado Motor Vehicle Law Resource Book. Colorado state income taxes are calculated from the formulas in publication, DR 1098 "Colorado Income Tax Withholding Tables for Employers".

READING, EDUCATION, MISCELLANEOUS EXPENSES, CASH CONTRIBUTIONS, AND PERSONAL INSURANCE AND PENSIONS

Mirroring previous Cost of Living studies, the major expenditure categories for Reading, Education, Miscellaneous Expenses, Cash Contributions, and Personal Insurance and Pensions were not sampled in this 2013 Cost of Living study. Similar to the previous studies, these expenditure categories were expected to be constant for the relevant benchmark family and were thus held constant for all districts. No significant geographic variation or trends were expected to be seen for these goods, and the final costs divvied across the districts came directly from the benchmark families spending level calculated for each category from the *Consumer Expenditure Survey*.

APPENDIX C: CHANGES FROM THE PREVIOUS STUDY & IMPLICATIONS

A few notable methodological changes were implemented between the 2011 and 2013 Cost of Living Studies. In the opinion of the research team, each of these changes had a positive impact on the quality of the data.

BENCHMARK HOUSEHOLD INCOME

- ⇒ **Benchmark income based on most recent teacher salary data.** Due to faster release dates from the Colorado Department of Education, in 2013 we were able to use the average teacher salary from 2012 as the benchmark household income, whereas in previous years we used the average teacher salary from two years prior to the study year. This means the benchmark income is more closely tied to economic changes for the state. The benchmark income determines the spending profile for the household. In recent years the benchmark income has changed very little, resulting in very minimal changes in the household spending profile. In general, lower income levels spend proportionally more on housing, transportation, and food, and less on apparel, healthcare, and entertainment, so as income rises, the cost of living index will be weighted somewhat less strongly toward housing, transportation and food, however those remain the largest categories for a range of incomes around the average teacher salary.

CHANGES TO THE MARKET BASKET

Each year we review market basket items based on our experiences pricing items in the previous study, and current year availability of items. As a result, minor changes were made to a few of the goods included in the market basket. These changes are detailed below:

- ⇒ **TV specifications updated.** The electronics market has rapid turnover in available technology. Prior to 2007, the entertainment category was represented by a then-standard television model, but in 2007, flat screen TVs were becoming available, and it had become difficult to find a commonly available television model. In 2007, we began pricing a DVD Player that was commonly available. However, by 2011, DVD Players were being taken over by Blu-Ray players and a commonly available model of DVD Player was difficult to identify. So, in 2011 we returned to a television set item, and identified a now-common flat screen LCD TV with a set of features produced by most manufacturers and widely available across stores. In 2013, the TV was again updated to a commonly-available flat screen LED TV. Because this cost of living index is a point-in-time snapshot of differences across school districts, the most critical need is to be able to price identical or near-identical items in each district (as opposed to pricing the same item over time). The electronics item is likely to need regular updating to ensure a currently popular item that will be available widely.
- ⇒ **Women's Polo Shirt changed to Women's Cardigan Sweater.** In 2013 we collected prices for both a women's polo shirt and a women's cardigan sweater during field data collection. Upon reviewing the data obtained for each item, it was determined that the cardigan sweater was more commonly available statewide resulting in better data for the item category. In total, 204 prices for women's cardigan sweaters were obtained, compared to only 128 prices for women's polo shirts.
- ⇒ **Vehicle updates.** Each year the vehicles are updated to a two-year old sedan and a four-year old truck. This year the truck model was updated to the Ford F-150 from the Ford Ranger because the F-150 is currently the most popular truck model.

ANALYSIS PROCEDURES

- ⇒ **The geographic shopping patterns matrix was not updated in 2013.** The shopping patterns matrix is built from a growing database containing data from the 2007, 2009, and 2011 studies. Because the matrix was not updated in 2013, data may lag current shopping patterns slightly. However, this matrix is designed for a ten-year rotating collection cycle, so the impact of the lag will be minor.

- ⇒ **Improvements to calculations where data is collected by county, zip code, or municipality.** In 2013 we utilized a geographic information system (GIS) approach to extract population totals for counties within districts, zip codes within districts, and municipalities within districts. This method allowed us to more precisely calculate weighted average prices for districts using data available for counties, zip codes, or municipalities.

APPENDIX D: RAW PRICING DATA FOR SELECTED PURCHASE CATEGORIES

This appendix provides the raw pricing data that underpins the analysis. Readers receiving this report electronically will need to review an accompanying spreadsheet file, due to the volume of data.

APPENDIX E: STATISTICAL MEASURES USED IN THIS REPORT

This appendix is reproduced from previous Cost of Living reports to ensure that this information on the development of confidence intervals is available to readers each year. The general concept employed in this methodology is the propagation of uncertainty. Uncertainty propagation examines how the uncertainty in a calculated result depends on the uncertainty in the measured values that are entered into the formula. The generalized equation for error propagation for a function $f(x, y, z \dots)$ where variables x, y and z are uncorrelated is:

$$\sigma_f^2 = \left(\frac{\partial f}{\partial x}\right)^2 \sigma_x^2 + \left(\frac{\partial f}{\partial y}\right)^2 \sigma_y^2 + \left(\frac{\partial f}{\partial z}\right)^2 \sigma_z^2 + \dots \quad [1]$$

where σ_i^2 is the variance of variable i . For this project, we are interested in determining the variances (the 95% confidence interval of f is approximately $1.96\sigma_f$) of the cost of living index $COL = f(\mu_D, S, p, w)$ where μ_D are the mean prices of consumer products in the district, S are the shopping patterns, p are the decimal population fractions in each district, and w are weights that determine the contributions of individual consumer products to the overall cost of living. All four of these variable types are estimated from surveys of one type or another, and hence have error associated with them. However, only the errors in the district consumer prices μ_D are considered in the Bengtsson treatment.

The Bengtsson derivations for the propagation of μ_D errors are approximate in that equation [1] is not applied directly to the COL function. Rather, for simplicity, equation [1] is applied successively to components of the COL function in order to build up the final expression for σ_f^2 . This simplification is probably necessary given the complexity of the COL function. An amplification of the derivation of the variances of interest is provided later. The conceptual part of this appendix will address some key questions.

Does a large variance in the item cost data automatically translate to a large confidence interval? Consider that you wanted to get a haircut in Aspen. It is likely that you could find haircuts ranging from around \$20 to well over \$100, leading to a large variance in the price of haircuts in Aspen. Does this necessarily mean that the cost of living index will have a large confidence error? No, because the confidence interval depends on the *variance of the estimate of the mean price* as opposed to the variance of the sample. But districts with large price variances do require more intensive sampling. Consider a simplified example where there are 20 places to get a haircut in Aspen, and at half of them you can get a \$20 haircut and at the other half haircuts cost \$100. Let's also assume that by chance whenever we sample haircut prices that we sample equally between the two haircut prices. Table 1 illustrates what happens to the variance and 95% confidence interval of the estimate of the mean price as a function of number of prices sampled.

EXHIBIT E-1: VARIANCE AND CONFIDENCE INTERVAL OF MEAN PRICE ESTIMATE AS A FUNCTION OF SAMPLE SIZE.

N	Estimate of Mean Price	Variance of Sample	Variance of Estimate of Mean Price	95% Confidence Interval of Estimate of Mean Price
2	\$60	3200	1516	\$76
4	\$60	2133	449	\$42
8	\$60	1829	144	\$24
16	\$60	1797	24	\$10

While this example is somewhat extreme, it does illustrate that large variances in the district prices can be overcome by more intensive sampling. However, a question arises; are the higher priced haircuts even pertinent to the middle-income population targeted by the study, given the availability of lower priced haircuts? Seemingly, much of this problem would go away with a careful outlier detection process, as was implemented in the 2007 study and used in the current 2009 study. If additional sampling of certain districts is indicated by large CI, more detailed outlier removal for that shopping district may be indicated.

Does a large CI always signal a need for additional price sampling? The primary motivation of determining confidence intervals of COL indices is to determine if additional sampling is needed. The question arises, is additional sampling always indicated when the CI is large? Probably not. Consider a rural area where there may be one grocery store in which the majority of people shop, but also several small convenience stores with somewhat higher prices. Provided the initial price sampling included the grocery store, additional sampling of convenience stores will likely artificially inflate the mean price. The uncertainty in the size of the shopping universe also complicates this situation (see first paragraph of the appendix). As n approaches U , the uncertainty in the mean price estimate approaches zero. So, in a small district with large price variances, the strategy for reducing the CI would be to sample every store. However, in some cases the number of stores sampled to date exceeded the size supposed value of U . This uncertainty of U makes it difficult to be certain that every store has been sampled. The need to increase sampling of high CI districts needs to be evaluated on a case by case basis. Most of the challenges described so far could be eliminated with store-specific shopping patterns for the target income groups. However, reliable collection of such data is probably impossible.

What are the limitations of the methodology used to calculate the confidence intervals of the COL indices? One of the major limitations of the methodology of calculating CI is that only uncertainty in mean district prices is taken into account. There is also likely to be uncertainty in the shopping patterns, which also propagates through the calculation and would affect the uncertainty in the COL indices. There may also be smaller errors associated with the weighting and population factors, depending on what these measures are designed to represent. Mathematically, the derivation of an analytical expression to propagate uncertainty in the district prices, shopping patterns, and other sources of uncertainty may be difficult. A Monte Carlo method may be more practical. However, given the expected size of the uncertainty in the shopping patterns, the overall uncertainty in the COL indices may appear to be unacceptably large to the client without prior education.

Alternatively, a separate CI interval could be calculated using uncertainty of the shopping pattern alone, without consideration of the uncertainty in shopping patterns. The purpose of this CI would be to determine if additional surveying of shopping patterns is needed.

What does the confidence interval actually tell us? The confidence interval as calculated by the Bengtsson method indicates the level of uncertainty in the COL indices as affected by uncertainty in the prices available to consumers. It does not reflect the overall uncertainty in the mean COL estimates. It can be used as a screening tool to identify districts that may potentially benefit from additional price sampling. However, once identified, some additional consideration needs to be given to whether additional price sampling would actually be beneficial or whether tools such as outlier detection may be more appropriate. In general, shopping areas that have a large number of consumer choices and large price variances may benefit from additional sampling. If the shopping district has relatively few choices, additional sampling could help provided 1) the new stores sampled actually capture a significant market share and 2) the total universe of stores in the district is known with certainty.

Statistical Appendix

To illustrate the application of equation 1 to the COL function and to aid in decoding the vector notation in the Bengtsson methodology, we will consider a simple case in which there are two school districts and three shopping districts in the state. For each consumer item that contributes to the COL index, we estimate the mean price within the district μ_D by a shopping survey of a subset n of the stores. We also calculate the variance of the sample σ_D from the sample data. The *variance of the estimate of μ_D* is given by $\sigma_\mu^2 = \sigma_D^2/n$, which is also the square of the standard error of the sample. As n approaches the total number of stores that have that item (U), the accuracy of our estimate of μ_D increases. We account for this effect on σ_μ^2 by multiplying by the factor $(U-n)/(U-1)$. So for our example we have: $\mu_D = (\mu_{D1}, \mu_{D2}, \mu_{D3})'$ and $\sigma_\mu = (\sigma_{\mu1}^2, \sigma_{\mu2}^2, \sigma_{\mu3}^2)'$. We also have the shopping pattern matrix (note that the shopping matrix assembled by Corona Insights is actually S' as shown below):

$$S' = \begin{pmatrix} S_{11} & S_{12} & S_{13} \\ S_{21} & S_{22} & S_{23} \end{pmatrix} \quad [2]$$

The actual prices paid by consumer in the district is the shopping-pattern-weighted costs $\mu_{SD} = S' \mu_D$. If we expand this for school district 1 we get:

$$\mu_{SD1} = S_{11}\mu_{D1} + S_{12}\mu_{D2} + S_{13}\mu_{D3} \quad [3]$$

If we now apply equation [1] to find $\sigma_{S\mu1}^2$ (the variance of μ_{SD1}):

$$\sigma_{S\mu1}^2 = \left(\frac{\partial \mu_{SD1}}{\partial \mu_{D1}} \right)^2 \sigma_{\mu1}^2 + \left(\frac{\partial \mu_{SD1}}{\partial \mu_{D2}} \right)^2 \sigma_{\mu2}^2 + \left(\frac{\partial \mu_{SD1}}{\partial \mu_{D3}} \right)^2 \sigma_{\mu3}^2 = S_{11}^2 \sigma_{\mu1}^2 + S_{12}^2 \sigma_{\mu2}^2 + S_{13}^2 \sigma_{\mu3}^2$$

This corresponds to the vector notation:

$$\sigma_{S\mu}^2 = S' \sigma_{\mu}^2 S$$

Where σ_{μ}^2 and $\sigma_{S\mu}^2$ are square matrices with the elements of interest on the diagonals.

The state-average price is given by:

$$\begin{aligned} \mu_{SS} &= p_1(S_{11}\mu_{D1} + S_{12}\mu_{D2} + S_{13}\mu_{D3}) + p_2(S_{21}\mu_{D1} + S_{22}\mu_{D2} + S_{23}\mu_{D3}) \\ &= (p_1S_{11} + p_2S_{21})\mu_{D1} + (p_1S_{12} + p_2S_{22})\mu_{D2} + (p_1S_{13} + p_2S_{23})\mu_{D3} \end{aligned}$$

To find the variance of the state-average price we again apply equation [1]:

$$\begin{aligned} \sigma_{SS}^2 &= \left(\frac{\partial \mu_{SS}}{\partial \mu_{D1}} \right)^2 \sigma_{\mu1}^2 + \left(\frac{\partial \mu_{SS}}{\partial \mu_{D2}} \right)^2 \sigma_{\mu2}^2 + \left(\frac{\partial \mu_{SS}}{\partial \mu_{D3}} \right)^2 \sigma_{\mu3}^2 \\ &= (p_1S_{11} + p_2S_{21})^2 \sigma_{\mu1}^2 + (p_1S_{12} + p_2S_{22})^2 \sigma_{\mu2}^2 + (p_1S_{13} + p_2S_{23})^2 \sigma_{\mu3}^2 \end{aligned}$$

This corresponds to the vector notation:

$$\sigma_{SS}^2 = p' S' \sigma_{\mu}^2 S p \leftarrow \text{imagine this in bold}$$

The *COL* is a weighted function of the ratios $r_D = \mu_{SD}/\mu_{SS}$. Now for district 1 we calculate the variance σ_{r1}^2 of the ratio $r_{D1} = \mu_{SD1}/\mu_{SS}$ by application of equation [1] again, remembering that the variances of μ_{SD1} and μ_{SS} are $\sigma_{S\mu1}^2$ and σ_{SS}^2 , respectively:

$$\begin{aligned} \sigma_{r1}^2 &= \left(\frac{\partial r_D}{\partial \mu_{SD1}} \right)^2 \sigma_{S\mu1}^2 + \left(\frac{\partial r_D}{\partial \mu_{SS}} \right)^2 \sigma_{SS}^2 \\ &= \frac{1}{\mu_{SS}^2} \sigma_{S\mu1}^2 + \frac{\mu_{SD1}^2}{\mu_{SS}^4} \sigma_{SS}^2 = \frac{1}{\mu_{SS}^2} (\sigma_{S\mu1}^2 + r_{D1}^2 \sigma_{SS}^2) \end{aligned}$$

where we assume r_{D1} can be approximated by 1. Finally the cost of living index over i items is given by:

$$COL = \sum w_i r_{Di}$$

and its variance is given by:

$$\sigma_{COL}^2 = \sum w_i^2 \sigma_{ri}^2$$