The Health Status of Colorado's Maternal and Child Health Population

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Foreword

The Health Status of Colorado's Maternal and Child Health Population describes the health and well being of reproductive-age women, infants, children, adolescents, and children with special health care needs in Colorado. The report is organized according to "critical periods" in the life course including chapters on preconception, prenatal, infant and postpartum health, as well as child and adolescent health. Issues specific to children and youth with special health care needs, oral health, and access to health care are included in each chapter where appropriate. A variety of data are used to provide an in-depth analysis of the health of the state's maternal and child population.

Data sources include the U.S. Census, birth and death certificates, Pregnancy Risk Assessment Monitoring System, Behavioral Risk Factor Surveillance System, Oral Health Surveillance, Colorado Child Health Survey, Youth Risk Behavior Survey (YRBS), and state-specific data from the National Survey of Children's Health and the National Survey of Children with Special Health Care Needs.

This report was prepared as part of the quantitative assessment of need for the federal Maternal and Child Health (MCH) Block Grant Application for FY 2011. It is also a stand-alone document that provides public health professionals, partners, community members, and the general public with an overview of maternal and child health (MCH) in Colorado. Further information about the MCH population can be accessed from the state's MCH web site at http://www.mchcolorado.org.

Acknowledgements

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Chapter 1 – Overview of the State

An individual's health is influenced by many interrelated factors such as environment, socio-economic status, health behavior, genetics and access to health care. These health determinants are important contextually in order to explain why particular health patterns appear within populations. This chapter explores these factors in more detail in order to establish a state-specific context for considering the health of MCH priority populations.

Section 1: Geography

The state of Colorado, located in the western half of the United States, is bisected from north to south by the Rocky Mountain range, dividing it into eastern and western slopes. The boundary lines create an almost perfect rectangle, measuring 387 miles by 276 miles. Colorado has the eighth largest area of land mass in the U.S., with varying topography. The eastern half of the state boasts grassy plains and rolling prairies that gradually rise westward to the Front Range foothills, at an elevation of over 5,000 ft. Traveling west, Colorado has the highest mean elevation of any state, with more than one thousand mountain peaks over 10,000 feet high.[1]

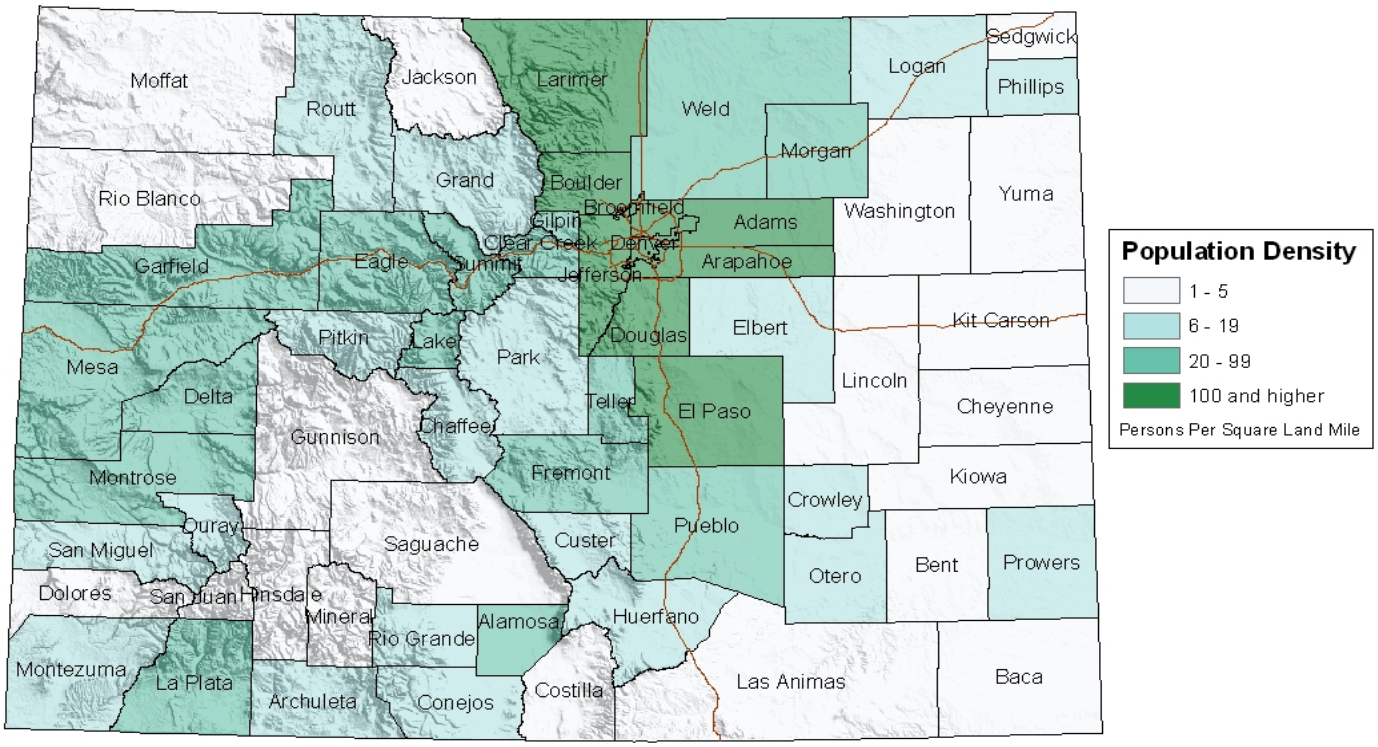

Figure 1. Colorado Estimated Population Density by County, 2010
(Source: Colorado State Demographer's Office)

Eighty-two percent of the state's population lives in 16 metropolitan counties along the Front Range and in one county on the Western Slope.[2] The other 18 percent of residents are scattered throughout Colorado's 47 rural and frontier counties.[3] Confirming the rural vastness of the state, 20 Colorado counties are considered frontier, defined as less than 6 persons per square mile, eleven of which have two or fewer persons per square mile.[4] Front Range population centers include Denver, Boulder, Ft. Collins, Greeley, Colorado Springs, and Pueblo. Grand Junction, located in Mesa County, is the major metropolitan area on the Western Slope. Figure 1 illustrates Colorado counties by population density estimated for 2010.[5]

Section 2: Population

Colorado recently achieved the 5 million resident milestone with a 2010 projected population of 5,218,146. Colorado has one of the fastest growth rates nationally, increasing by 10 percent between 2005 and 2010, and projected to increase another 10 percent by 2015 [3]. The number of Colorado residents increased by an estimated 17.2 percent, between 2000 and 2009, compared to the U.S. at 9.0 percent.[2, 6] All five regions within the state also experienced growth (from 2000-2007), including the Front Range, the Western Slope, the Eastern Plains, the Central Mountains, and the San Luis Valley. Population on the Eastern Plains increased the least at 3 percent, with the Western Slope increasing the most at 18 percent.[3] Population growth is determined by the net result of three factors: the number of 1) resident births, 2) deaths, and 3) migration into the state.

Births

Between 2000 and 2008, the number of Colorado births increased by 7 percent, well below the pace of the state's ten-year 16 percent growth rate in births observed in the decade of the 1990s.[7] In 2000 there were 65,429 births to Colorado residents; the number of births rose to 70,804 in 2007. However, a decline in the number occurred in 2008 when there were 70,028 births. The decline continued in 2009 with a total of 68,602 births in that year.

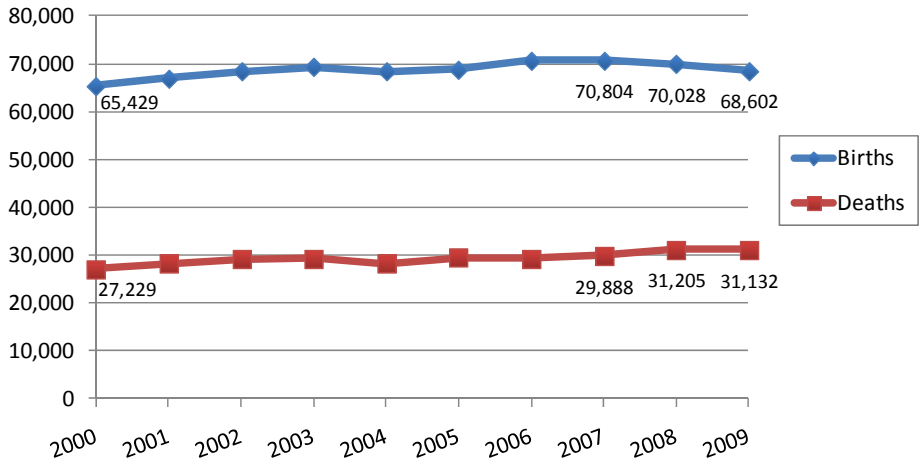

Figure 2. Number of Births and Deaths, Colorado 2000-2009
Source: Colorado Department of Public Health and Environment, Health Statistics Section

Deaths

In contrast to the number of births, Colorado has consistently experienced less than half as many deaths in a given year. For example, while the number of births in 2008 was 70,028, the number of deaths was 31,205. Figure 2 illustrates the number of births compared to deaths in Colorado over the past decade.[7]

Net Migration

Between 2000 and 2009, the net migration in Colorado (the total number of people moving into the state minus the number leaving), was estimated to be 597,392. Between 2010 and 2012, Colorado's net migration is projected to continue increasing with an additional 143,700 residents arriving.[8] Migration contributes the largest component of population growth in the state.

Section 3: Demographics

Race/Ethnicity

The largest racial and ethnic group in Colorado is categorized in the U.S Census as White/non-Hispanic, and makes up 71.0 percent of the population, compared to the U.S. where White/non-Hispanic comprises 65.6 percent.[i] The White/Hispanic[ii] population above is the next largest racial/ethnic group and the fastest growing in Colorado, accounting for 20.2 percent of residents, compared to the U.S. at 15.4 percent. Black/African-Americans make up 4.3 percent of the Colorado population and 12.8 percent of the U.S. population; Asian Americans/Pacific Islanders make up 2.9 percent of Colorado's population, and 4.9 percent of the U.S. population; and American Indians comprise 1.2 percent of the state's population compared with 1.0 percent nationally. In addition, 2.2 percent of Colorado residents have self-reported as either "other race" or "more than one race."[9] Figure 3 illustrates the proportion of racial and ethnic groups in Colorado.

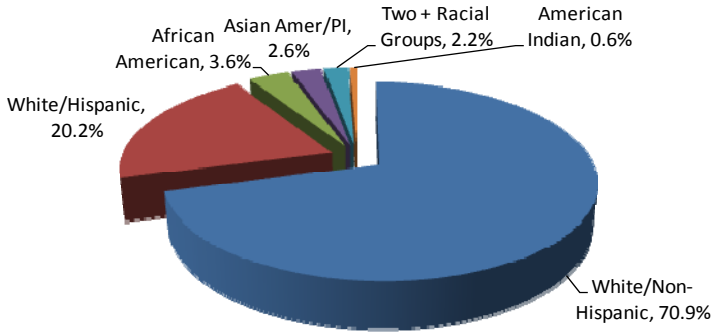

Figure 3. Colorado Population by Race/Ethnicity, 2008

Source: U.S. Census Bureau

[i] White/non-Hispanic refers to categorization by race (White) and by ethnicity (non-Hispanic). In the Census, race and ethnicity are two separate questions.

[ii] White/Hispanic refers to people who are both White race and Hispanic ethnicity. Persons of Hispanic ethnicity are typically grouped under White race in Census tables unless they describe themselves specifically as nonwhite, for example, Black/Hispanic.

The White/Hispanic population is the fasting growing racial/ethnic group in Colorado. During 2000, those identifying as White/Hispanic comprised 17.1 percent of Colorado's population, and increased to 20.2 percent in 2008.[9] The vast majority of the White/Hispanic population is of Mexican descent, while the remainder is primarily from Central and South America. Over 71 percent of Colorado's White/Hispanic population were born in the United States, and almost 16 percent of those born outside the U.S. are naturalized citizens.[10] Table 1 shows the growth in the White/Hispanic population between 2000 and 2006-2008, for Colorado counties with at least a population of 20,000 in the later period. Douglas County had the largest rate of increase at 11 percent, while Adams County experienced the largest growth in numbers, with over 45,000 new White/Hispanic residents during the time period.

Table 1. Growth in the Colorado White/ Hispanic Population from 2000 to 2006-2008

County	2000 White/ Hispanic Population	2006-2008 Estimated White/ Hispanic Population*	Increase in White/ Hispanic Population	
			Percent	Number
Douglas	8,886	19,237	116	10,351
Garfield	7,300	12,692	74	5,392
Arapahoe	57,612	93,308	62	35,696
Elbert	766	1,202	57	436
Teller	718	1,075	50	357
Adams	102,585	148,121	44	45,536
Mesa	11,651	16,342	40	4,691
Jefferson	52,449	72,601	38	20,152
Montrose	4,967	6,779	36	1,812
Larimer	20,811	28,279	36	7,468
Weld	48,935	66,314	36	17,379
El Paso	58,401	78,608	35	20,207
Delta	3,171	3,997	26	826
Boulder	30,456	37,894	24	7,438
Fremont	4,776	5,858	23	1,082
La Plata	4,571	5,345	17	774
Denver	175,704	199,511	14	23,807
Pueblo	53,710	60,262	12	6,552
Subtotal	**634,469**	**857,425**	**35**	**222,965**
All other counties	101,132	106,406	5	5,274
State	**735,601**	**963,831**	**31**	**228,230**

Source: U.S. Census Bureau 2000 Summary File and 2006-2008 American Community Survey.

*One-year estimates are not available for all counties; estimates based on three-year averages are provided.

Language

Approximately 17 percent of Colorado residents age 5 and older speak a language other than English in the home, with over 70 percent speaking Spanish.[11] Four percent of households in Colorado are estimated to be linguistically isolated, meaning that all members ages 14 years and older have at least some difficulty speaking English.[12]

Age

Both Colorado and the U.S. report older populations due to the size of the baby boom generation, now in their late 40s to early 60s. Colorado's 2008 median age was 36.1 years, an increase from 34.4 years in 2000, and similar to the 2008 U.S median age of 36.8.[13-14] In terms of the MCH priority populations, the 2010 projected numbers of residents, by age group, are as follows:

- Early Childhood (ages 0-8): 661,030
- Adolescents (ages 9-12): 274,974
  (ages 13-19): 493,819
- Women of Reproductive Age (ages 15-44): 1,061,773

Table 2 illustrates the projected age distribution of Colorado's population for 2010, in five-year increments below age 45 and by gender.

Table 2. Colorado Population Projections by Age and Sex, 2010

Age Group	Total	Males	Females
0-4	371,888	190,426	181,462
5-9	370,551	189,699	180,852
10-14	335,888	171,930	163,958
15-19	364,312	187,126	177,186
20-24	395,727	206,516	189,211
25-29	354,991	183,903	171,087
30-34	337,274	174,108	163,166
35-39	381,588	199,204	182,384
40-44	370,245	191,506	178,739
45+	1,935,682	935,277	1,000,403
Total	**5,218,146**	**2,629,695**	**2,588,448**

Source: Colorado Department of Local Affairs, Division of Local Government, State Demography Office

Section 3: Economy

The ability to earn an adequate income may be the single largest predictor of health. Income is intrinsically linked to health status with a positive correlation between low income and higher rates of poor health, chronic medical conditions, adverse maternal and child health outcomes and behavioral risk factors. Income functions as a determinant of health care access and neighborhood safety, while influencing lifestyle risk and protective factors and mental health. Studies have shown that living in a low-income household over time produces the type of chronic stress that has a cumulative effect on health. Those with the lowest lifetime incomes tend to demonstrate the poorest health outcomes.[15]

Because income is such an important determinant of health, the health status of a population fluctuates with the economy, and Colorado, like the U.S. is in the midst of a recession. This economic downturn has been realized through job loss, wage declines, loss of wealth, and credit tightening. According to the Colorado Legislative Council, "the road ahead will be rocky,

with different rates of recovery predicted for the state's geographically diverse industries." In addition, state governmental revenues have been falling, and the Council predicts a fiscal year 2011-2012 budget shortfall of $838 million dollars.[16] This situation puts a strain on Colorado residents and their ability to make ends meet, have access to governmental safety-net services, and/or maintain health insurance coverage that is frequently tied to employment.

Unemployment

The ability to cover basic living expenses and access health care is tied to employment. Colorado's average unemployment rate for 2009 was 7.3 percent, an increase from 3.9 percent in 2007.[17] During the first half of 2009, the state experienced a net loss of over 74,000 jobs, bringing the total number of jobs down to the same level as 2001.[16] However, western states in general have fared better than other areas of the country. Colorado's 2009 unemployment ranking was the 18th lowest in the nation, and five of the seven states that border Colorado had even lower unemployment rates.[18]

Income

In 2008, Colorado ranked 14th in the nation in terms of household income, with a median income of $56,993, compared to the U.S. at $52,029. Colorado consistently demonstrates higher-than-average household income; however, like most states, Colorado has experienced a decade of stagnant income with no statistically significant difference from the year 2000. Household income varies widely within the state, with the highest average reported in Douglas County ($98,871) and the lowest reported in Pueblo County ($42,628).[19]

Income also varies by race/ethnicity. In 2008, the state's Asian American/Pacific islander population had the highest median household income at $60,948, followed by the White/non-Hispanic population at $59,822 (not a statistically significant difference). In contrast, the median household income for the White/Hispanic population was 37 percent lower than for the White/non-Hispanic group, with the Black/ African American population reporting incomes 40 percent lower than for the White/non-Hispanic group (Table 3).[19]

Table 3. Colorado Household Income by Race/Ethnicity, 2008

Race/Ethnicity	2008 Colorado Median Household Income	% Difference from White *(if statistically significant)*
Asian American/ Pacific Islander	$60,948	
White/non-Hispanic	$59,822	
White/Hispanic	$37,683	-37.0%
Black/African American	$35,834	-40.1%

Source: Colorado Fiscal Policy Institute, Fact Sheet: Colorado Poverty October 2009.

The majority of children living in low-income families have parents who are married (60 percent) and at least one parent has full-time year-round employment (65 percent), indicating that many of these families are having trouble meeting expenses because they are working in low-wage jobs.[20]

Poverty, defined as not earning enough income to meet basic needs based on family size, has been on the increase. Between 2001 and 2008, the total poverty rate, family poverty rate, and child poverty rate all had statistically significant increases as illustrated in Table 4.

Table 4. Percentage of Overall Poverty, Family Poverty and Child Poverty, Colorado 2001 and 2008

Year	Overall Poverty	Family Poverty	Children in Families at 100% Poverty
2001	9.6%	6.8%	12.2%
2008	11.4%	7.8%	15.1%

Source: Colorado Fiscal Policy Institute, Fact Sheet: Colorado Poverty October 2009.

During 2008, 32 percent of Colorado's children lived in families with incomes at or below 200 percent of the federal poverty level (FPL).[21] FPL was defined in 2008 as an annual income of $21,000 for a family of four; 200 percent FPL indicates a level of $42,200. Some studies have suggested that families need at least an income that matches 200% FPL just to meet basic expenses.[22] Yet even this income level may not be adequate. A study of Colorado households revealed that the majority of families living at 200% FPL or below had expenses beyond their income; twenty-five percent of those with incomes between 100% and 200% of the federal poverty guidelines had negative balances after paying baseline expenses, such as housing, utilities, transportation, food, childcare, alimony and child support.[23]

What constitutes a self-sufficient level of income has not been determined. The federal poverty guidelines (FPL) use a formula developed in the 1960s that is the eligibility benchmark for many state and federal programs. Fifty years ago, approximately one-third of a family's income was spent on food. Consequently, the FPL multiplies the average food costs by three and adjusts for the number of family members and inflation. However, in today's world, the percentage of income spent on food has decreased while the costs of other expenses such as childcare, health care, and housing have risen.

Section 4: Education

Education is the gateway to economic opportunity, directly influencing an individual's occupation and income. Education plus occupation and income make up the indicators of social position described by social economic status (SES). SES is one of the greatest determinants of health. As education, job status and income increase, disease and death decrease: people have better health care access, live in safer neighborhoods, and engage in health-promoting behaviors such as physical activity, good nutrition and smoke-free lifestyles.[24-25]

Income and education are highly correlated. For example, 81 percent of all low-income children come from families where parents had less than a high school education. The poverty rate for Coloradans ages 25 and older without a high school diploma is 23 percent compared to

just over 3 percent for those with a college degree or higher.[26] Table 5 illustrates the difference in annual income by education level. Post-secondary education produces higher lifetime earnings and more stable employment.

Table 5. Median Annual Earnings of Year-Round, Full-Time Workers, Ages 25 and Older, by Highest Level of Educational Attainment and Gender, U.S., 2008

Gender	Some High School Education	High School Diploma or GED	Bachelor's Degree	Master's Degree
Males	$29,680	$39,010	$65,800	$80,960
Females	$20,410	$28,380	$47 030	$57,510

Source: U.S. Department of Education, National Center for Educational Statistics
Digest of Educational Statistics, 2009. Table 384.

College Degrees

In general, Colorado has a highly educated population. Over one-third (34.6 percent) of all Coloradans ages 25 and older have obtained a college degree, and Colorado is ranked 4th nationally in terms of post-secondary degrees. However, this level of educational attainment varies by race and ethnicity with clear disparities. The following figures (2005-2007) provide the percentage of residents, within various racial and ethnic groups that have obtained a college degree:[27]

- Asian American/Pacific Islander population: 46%
- White/non- Hispanic population: 40%
- Black/African American population: 22%
- White/Hispanic population: 11%

Colorado's economy depends on a workforce that is highly educated. For more than six decades, 85 percent of jobs within the state have been in industries that could be categorized as "service" as opposed to "manufacturing" where labor is needed for production of a tangible product. Jobs within service industries have required college or advanced degrees in the areas of science, technical, professional, managerial, administrative, educational, health care, and social assistance.

High School Diplomas

While the prevalence of college graduates in Colorado is high, the percentage of high school students who graduate is relatively low. The national Healthy People 2010 Objective 7-1 is to increase high school completion to 90 percent, with Colorado students falling short of this target.

Table 6 provides Colorado's high school graduation rates for the years 2006, 2007 and 2008. It also illustrates racial and ethnic disparities in a similar pattern to college graduation rates. From 2006 through 2008, graduation rates increased slightly for Black/African American students, but declined for students with disabilities, limited English proficiency, and those who were

homeless or economically disadvantaged. Homeless children and children who are not proficient in English are at greater risk of not graduating from high school.[28]

Table 6. Colorado High School Graduation Rates, 2006-2008 by Race/Ethnicity, Gender, and Special Groups by Instructional Program

Student Groups	2006	2007	2008
Race/Ethnicity			
Asian American/Pacific Islander	82.5	83.5	82.8
White/non-Hispanic	80.8	82.0	81.6
Black/African American	62.7	65.4	64.1
American Indian	56.9	58.9	57.5
White/Hispanic	56.7	57.1	55.6
Sex			
Female	78.0	78.6	77.4
Male	70.3	71.5	70.7
Special Groups			
Gifted & Talented	94.1	93.1	92.2
Students with Disabilities	68.5	63.7	63.0
Economically Disadvantaged	69.7	63.2	59.3
Migrant	70.5	61.1	58.0
Limited English Proficient	65.9	55.4	52.0
Title 1 (at disadvantaged schools)	60.8	51.7	45.3
Homeless	57.4	51.3	52.3
State Total (all students)	**74.1**	**75.0**	**73.9**

Source: Colorado Department of Education, Colorado Graduation Rates by Race/Ethnicity, Gender, and Instructional Program at http://www.cde.state.co.us/cdereval/download/spreadsheet/2008Grads/GradRates-98to08.pdf

Section 5: Access to Quality Health Care

A determinant of health status is access to quality health care. Access to preventive, primary and specialty care are heavily influenced by insurance coverage and the availability of health providers in a given geographic area. Both factors also influence quality in terms of having a usual source of care and access to specialists.

Health Insurance

During 2007-2008, Colorado's percentage of uninsured residents was 15.8, compared to the U.S. at 15.3 percent.[29-30] Forty-one percent of Colorado's White/Hispanic population reported being uninsured, similar to national results for the White/Hispanic population.[29-30] According to a 2008-2009 Colorado household survey, the majority of uninsured Coloradans, ages 19-64 years old, were employed but working for a company that did not offer a health insurance benefit. [31] The Healthy People 2010 Objective 1-1 is to increase the proportion of U.S. residents with health insurance to 100 percent.

A main source of health insurance for Colorado residents is employer-based plans, but the percentage of private companies offering this benefit is steadily decreasing. In 2000-2001, close to two-thirds of private-sector businesses offered health insurance, compared to just over

half (52.1 percent) in 2008.[32] In 2008, businesses with fewer than 50 employees were less likely to offer health insurance (38.1 percent) than companies with 50 or more employees (98.4 percent); and small firms comprised nearly one-third (31 percent) of the private-sector work force in Colorado.[32] Insurance premiums have become a barrier for companies, nearly doubling in cost since the beginning of the decade. In 2000, family coverage averaged $6,797 but increased to $11,952 in 2008 (Figure 4).

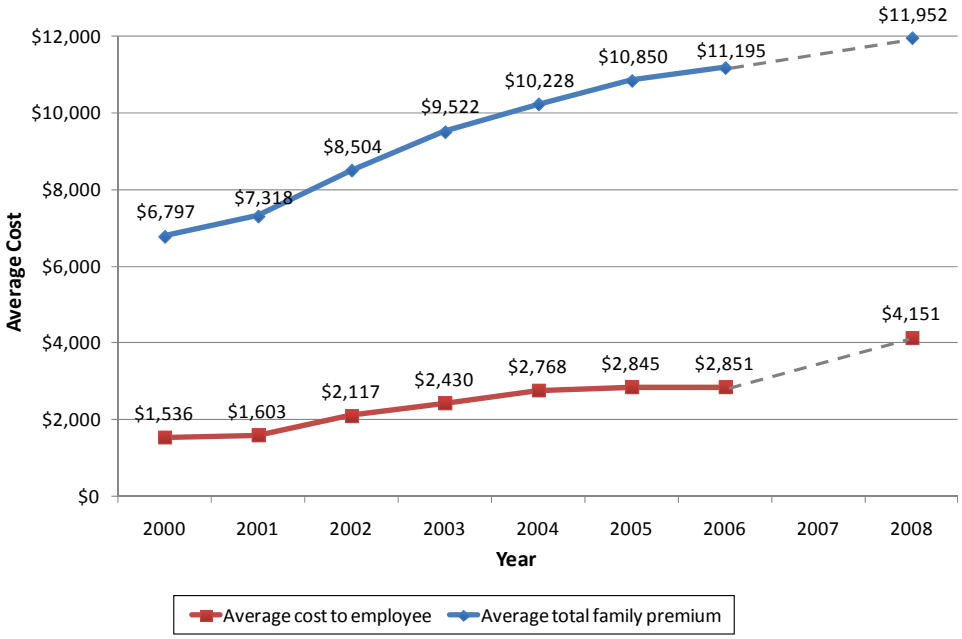

Figure 4. Average Total Family Premium per Enrolled Employee at Private-Sector Establishments That Offer Health Insurance and Average Employee Contribution to the Premium, Colorado, 2000-2008
Source: Agency for Healthcare Research and Quality (Data not available for 2007)

From 2000 through 2006, employers covered approximately 75 percent of the cost of the premium, but by 2008 were only covering an average of 64 percent, resulting in a cost-shift to the employee.[32] A panel study of Colorado households found that only about half of households with incomes between 300 and 500 percent of the FPL had enough income left, after meeting basic financial responsibilities, to cover the current average cost of a family premium.[23] Another Colorado household study found that the vast majority of uninsured Coloradans who had been offered health insurance through their employer and turned it down, did so because the insurance was too expensive.[31]

Colorado's has high rates of uninsured residents relative to other areas. Among states and the District of Columbia, Colorado is ranked 36th for the percentage of persons younger than age 65 who have health insurance coverage, and 43rd for those under age 19. In fact, Colorado lags behind most states in insurance coverage for all racial/ethnic groups and lands near the bottom in terms of coverage of low income groups (Table 7).[33]

Table 7. Percentage of Coloradans with Health Insurance and Ranking in Comparison to Other States and DC, 2006

Groups	Percent Insured	Rank*
Age Groups		
Under 65	81.3	36
Under 65 and below 200% FPL†	61.8	38
Under 19	86.5	43
Under 19 and below 200% FPL	74.8	49
Race/Ethnicity‡		
White, non-Hispanic	87.2	29
White, non-Hispanic and below 200% FPL	70.5	38
Hispanic‡	62.3	39
Hispanic and below 200% FPL	49.1	46
Black, non-Hispanic	78.6	33
Black, non-Hispanic and below 200% FPL	70.8	37

Source: Small Area Health Insurance Estimates, U.S. Census Bureau, http://www.census.gov/did/www/sahie accessed on 9/9/09. *Rank is the ranking of Colorado for percentage of residents with health insurance among the 50 states and the District of Columbia. A ranking of 36 (see Age Group Under 65) indicates that 35 states have a higher proportion of insured residents compared to Colorado. †Household income below 200% of the federal poverty level (FPL) guidelines. ‡Race/ethnicity groups from the original source; Hispanic ethnicity includes all races.

Government-sponsored insurance programs are available to seniors, people with disabilities and some low-income individuals without health insurance. All U.S. residents ages 65 and over are eligible for Medicare. Pregnant women and children living in households at or below the 200 percent federal poverty level are eligible for health insurance coverage either through the Child Health Plan Plus (CHP+) or Medicaid. Monthly enrollments in these two programs have increased from June 2008 to June 2009.[34] Of all Colorado children ages 18 years old or younger, an estimated 9% were enrolled in CHP+ and 28 percent were enrolled in Medicaid during state fiscal year 2008-2009.[35]

Availability of Health Care Providers

Another factor that influences access to health care is the availability of health care providers. The Primary Care Office at the Colorado Department of Public Health and Environment estimates that over 1 million Colorado residents live in communities with a sub-optimal number of primary care providers. In fact, 53 out of Colorado's 64 counties have some level of federal "Health Provider Shortage Area" designation.

Colorado communities with the greatest need for additional providers include the towns of Commerce City and Strasburg; the rural counties of Clear Creek, Conejos, Costilla, Dolores, Jackson, Moffat, Park, Saguache and Yuma; and the eastern part of El Paso County. This need for additional providers is based on local indicators including: the ratio of primary providers to the population, the distance required to acquire care, the concentration of low-income residents, and the birth outcomes of pregnant women in the service area.[36] The National Healthy People 2010 Objective 1-5 is to increase the proportion of persons with a usual primary care provider to 85 percent.

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Chapter 2 – Preconception Health

The health of both a pregnant woman and her infant is highly dependent on her health status prior to pregnancy. To this end, the Centers for Disease Control and Prevention has published recommendations to improve health and health care for women during the pre- and interconception periods. Preconception strategies are defined as "a set of interventions to identify and modify biomedical, behavioral, and social risks to a woman's health or pregnancy outcome through prevention and management."[1] These interventions include identifying and modifying medical, behavioral, and social risk factors prior to pregnancy.[1]

Optimizing health for reproductive-age women includes preconception health promotion since many pregnancies are not intended, that is, they are either unplanned or mistimed. By promoting health in all women of reproductive age, better outcomes can ultimately be achieved for both women and infants, regardless of whether there were plans to conceive.

Section 1: Fertility and Intended Pregnancy

Fertility

By 2010, it is estimated that there will be over one million women of reproductive age (defined as 15-44 years) living in Colorado.[2] According to national statistics, approximately 85 percent of all U.S. women will have given birth by age 44 years.[1] Consistent with other developed countries, the average age at first live birth has been increasing in both the U. S. and Colorado.[3] In 1990, the average age at first birth in Colorado was 24.9 years, increasing to 25.8 by 2008. Asian American/Pacific Islander (AAPI) women had the oldest average age at first birth in 2008 (28.8 years), and Hispanic (all races) and American Indian women had the youngest (22.5 and 22.8 respectively). Table 8 displays the increases in average maternal age, by race and ethnicity, between 1990 and 2008.

Table 8. Average Maternal Age at First Birth by Race/Ethnicity, Colorado, 1990-2008

Year	All	White (Non-Hispanic)	Hispanic*	Black (Non-Hispanic)	AAPI (Non-Hispanic)	American Indian (Non-Hispanic)
1990	24.9	25.8	21.4	21.8	25.9	21.3
1995	25.1	26.2	21.5	22.7	26.6	21.4
2000	25.3	26.7	21.8	22.4	27.3	22.2
2005	25.8	27.3	22.3	23.6	28.5	22.4
2006	25.7	27.2	22.3	23.4	28.4	23.5
2007	25.8	27.3	22.6	23.8	28.9	23.3
2008	25.8	27.3	22.5	23.4	28.8	22.8

Source: Colorado Department of Public Health and Environment, Health Statistics Section, Birth Certificate Data
*Hispanic group includes women of all races whose ethnicity is of Hispanic origin.

Colorado's general fertility rate, defined as the number of live births per 1,000 women of reproductive age,[iii] has remained fairly steady since the year 2000, when it was 67.0 per 1,000. In 2007, Colorado's fertility rate was 68.9 births per 1,000 women and decreased slightly to 67.4 in 2008.[4] While trends in Colorado's general fertility rate have not changed significantly in recent years, a dramatic shift has occurred in age-specific rates. The fertility rate of young women, ages 15-24, has steadily declined, while the fertility rate for women ages 25-44, has increased, exceeding that of younger women since 2005. This reversal of the position of the rates, with older women now having a higher rate than younger women, is unprecedented in the time period since the Colorado Vital Statistics program began tracking age-specific rates in 1970 (Figure 5).

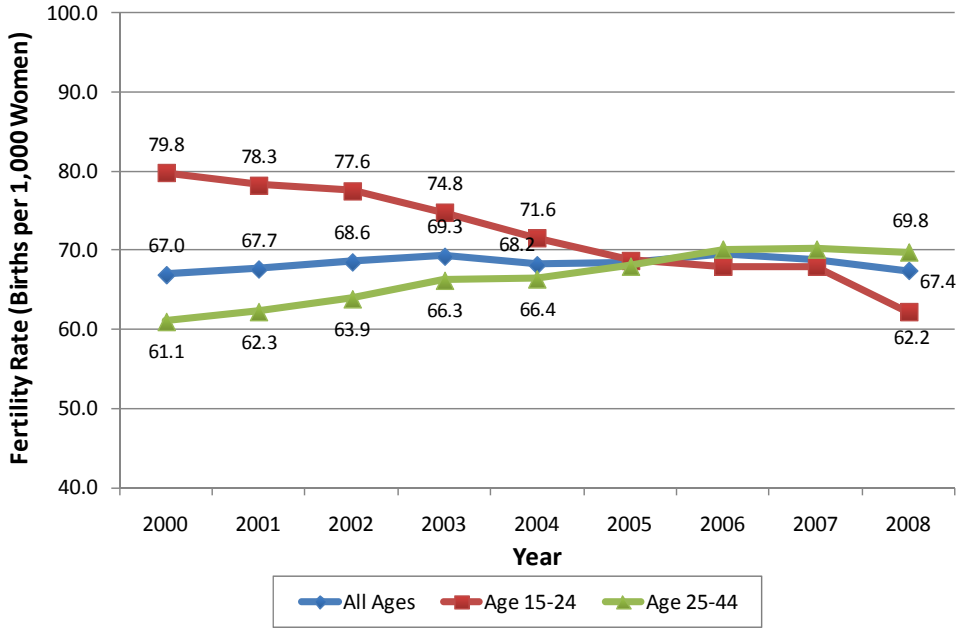

Figure 5. Fertility Rates by Age Groups 15-24 and 25-44, and All Ages, Birth Certificate Data, Colorado, 2000-2008

Source: Colorado Department of Public Health and Environment, Health Statistics Section, Birth Certificate Data

When fertility rates are compared by income level, they are highest among low-income women. A recent Colorado study found that the fertility rate of women ages 19-50, with incomes at or below 200 percent of the federal poverty level (FPL), was 112 births per 1,000 women, compared to 42 births per 1,000 women at incomes higher than 200 percent FPL.[5] Planned pregnancy and contraceptive usage correlate with income; the higher the income, the higher the likelihood of having an intended pregnancy.

[iii] The National Center for Health Statistics estimates that 64 percent of all pregnancies result in a live birth, and the other 36 percent result in either a spontaneous or induced abortion. See National Vital Statistics Report 2008: 56(15): 3 at www.cdc.gov.

In Colorado, White/Hispanic[iv] women consistently demonstrate the highest fertility rate (92.9 births per 1,000, in 2009) among all racial and ethnic groups, including White/non-Hispanic women (56.4 per 1,000 in 2009). American Indian[v] women consistently have the lowest fertility rates (38.4 per 1,000 in 2009). For most racial and ethnic groups, the fertility rate has been fairly consistent since 2000, with the exception of White/Hispanic women, who demonstrated a significant decrease in 2007 and 2008 (Figure 6). However, this may be due in part to a 2007 change in how birth certificate data are collected by race and ethnicity.[vi]

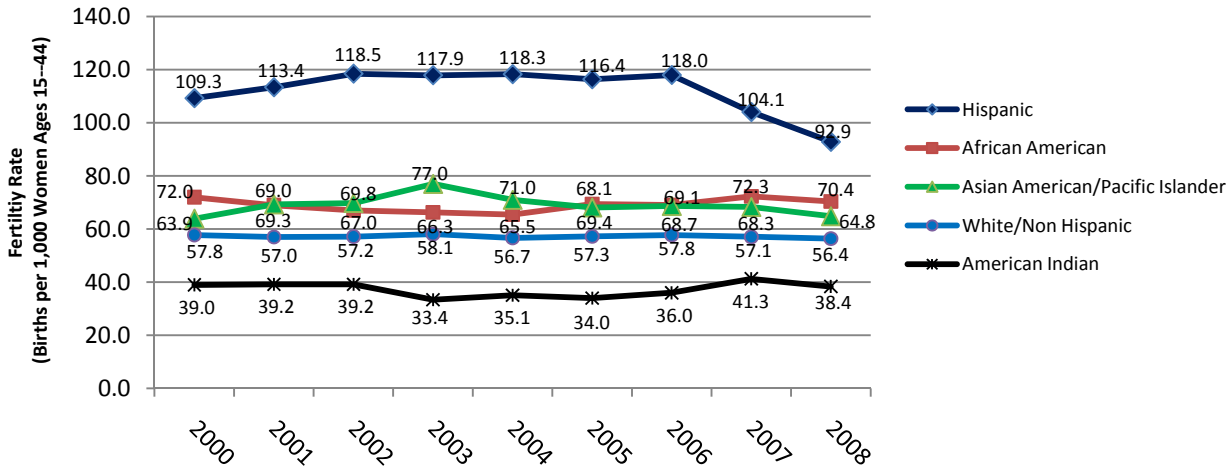

Figure 6: Fertility Rates by Race and Ethnicity, Colorado 2000-2008
Source: Colorado Department of Public Health and Environment, Health Statistics Section, Birth Certificate Data

Intended and Unintended Pregnancy

Unintended pregnancy is defined as one that is either unplanned or mistimed (occurred sooner than desired). Women who are intentional about becoming pregnant are more likely to start prenatal care early, and to adopt healthy behaviors during pregnancy. The national Healthy People 2010 Objective 9-1 is to increase the proportion of intended pregnancies to 70 percent of all births.

In Colorado, women with intended pregnancies are less likely to smoke, and are more likely to take vitamins and supplements with folic acid prior to pregnancy. Based on Colorado's Pregnancy Risk Assessment Monitoring System (PRAMS) data, 63 percent of Colorado live births in 2008 were reportedly intended, which has not varied significantly since 2000.[6,vii]

[iv] Unless otherwise noted in this chapter, "White/Hispanic" refers to the "White/Hispanic" category of the U.S. Census Bureau, which is the population who is White race and also Hispanic ethnicity. It excludes any persons of Hispanic ethnicity categorized as any race other than White; therefore, it does not represent all Hispanic persons. White/non-Hispanic category refers to the population group who is White race and is not of Hispanic ethnicity.

[v] In this reference, American Indian also includes Alaskan Natives as categorized by the U.S. Census Bureau.

[vi] In 2007, Colorado began using the 2003 revisions of the U.S. Standard Birth Certificate, which changed the way race and ethnicity data were collected.

[vii] Rates of intended pregnancy are likely underestimated since PRAMS survey data only includes respondents whose pregnancies resulted in a live birth, and not induced or spontaneous abortion.

The highest rates of unintended pregnancies are found in two groups: low-income women and young women. In 2008, only 42 percent of births to women on Medicaid were intended, compared to 72 percent of births to women not receiving Medicaid.[6, viii] For younger women (ages 15-19) during the same year, only an estimated 36 percent of births were intended. Similarly, only 41 percent of births to women ages 20-24 years old were intended. Intended pregnancies increased significantly after age 24, where 70 percent of births to women ages 25-34, and 67 percent of births to those ages 35 and older were reportedly intended.[6] Reducing unintended pregnancies among young and low-income women would help Colorado reach the Healthy People 2010 objective for intended pregnancy.

Healthy People 2010 Objective 9-3 focuses on increasing contraceptive use to 100 percent among females at risk of unintended pregnancy (and their partners). According to 2004-2007 Colorado PRAMS data, over 40 percent of women who had an unintended pregnancy reported "not doing anything" to keep from getting pregnant. Of these women, 81 percent reported that they did begin to use some form of contraception two to nine months after giving birth.[6] In the same PRAMS survey of women with unintended pregnancies, participants were asked about the type of birth control method used with their partner. Answers were then classified into three categories: effective, ineffective, or no method used. Effective birth control was defined as tubal ligation, vasectomy, birth control pills, birth control shot once a month or every three months, contraceptive patch, IUD, diaphragm/cervical cap/sponge, or cervical ring. Figure 7 illustrates the results of the survey by maternal age. Less than one quarter of all women with unintended pregnancies reported using effective methods of birth control prior to pregnancy. In the age group 35 and older, only 14 percent reportedly used an effective method.

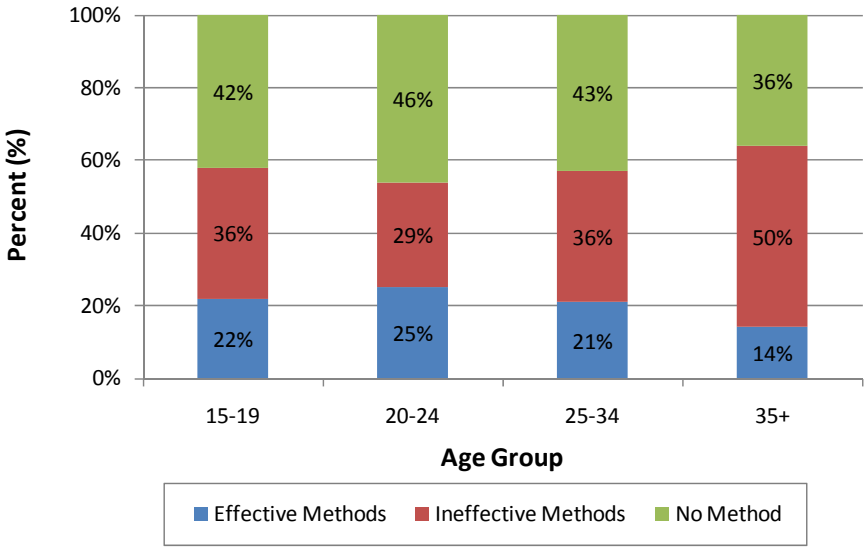

Figure 7. PRAMS Respondents with Unintended Pregnancies by Age Group and Type of Birth Control Method at Conception, Colorado Residents, 2004-2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

[viii] Medicaid coverage can serve as an indicator of low-income, since only pregnant women whose incomes are at or below 133 percent of the federal poverty level are eligible.

Among women with unintended pregnancies who did not do anything to keep from getting pregnant, 32 percent said that they did not think they could become pregnant at that time. Forty one percent of women ages 25 years and older said that they did not mind if they got pregnant, while 32 percent of young women under age 25 noted the same response. Approximately one-third of women ages 15-19 indicated that their partner had not wanted them to use any means of birth control. This response illustrates the need to include partners of younger women in preconception planning. Healthy People 2010 Objective 9-6 focuses on increasing male involvement in pregnancy prevention and family planning efforts. This is consistent with the CDC recommendation that each woman, man, and couple be encouraged to develop a reproductive health plan as a means to improve preconception health.

Section 2: Health Status of Women of Reproductive Age

In terms of overall health status, Colorado women are generally healthy. According to the Colorado Behavioral Risk Factor Surveillance System (BRFSS) for 2006-2008, over 91 percent of women ages 18-44 reported that their health was excellent, very good, or good. The proportion reporting good-to-excellent health increased as household income increased. Among women with household incomes under $25,000 per year, only 77 percent reported good or better health, compared to 90 percent of those with incomes of $25,000 to $49,999, and 97 percent with incomes of $50,000 or more.[7]

Mental Health

According to the BRFSS for 2005-2008, 24 percent of women ages 18-44 reported that they had five or more days in the last month when their mental health was not good (defined by such factors as stress, depression and problems with emotions). This percentage did not vary by race or ethnicity.[7] In 2007, 3 percent of women of reproductive age were estimated to have serious psychological distress, as indicated by specific BRFSS questions added that year.[ix] This rate is comparable to the national rate of serious psychological distress for women ages 18-44.[8]

Diabetes

Approximately one percent of Colorado women of reproductive age have been told by a doctor that they have diabetes. Women with Type 1 and Type 2 diabetes are at increased risk of delivering a child with birth defects.[9] This risk is substantially reduced through proper management of diabetes before pregnancy. Diabetes is more prevalent among Black/African-American women (4 percent) and White/Hispanic women (2 percent), than White/non-Hispanic women (1 percent).[7]

HIV Status and Sexually Transmitted Infections

Preventing the transmission of certain viral infections from mother to infant is a vital, because of the severe and/or life-long consequences to the infant, even though the incidence or prevalence is low. Therefore, though the incidence of Human Immunodeficiency Virus (HIV) in women is low, it is important to test for HIV prior to pregnancy. If HIV infection is identified

[ix] In 2007, the K6 scale was added to the BRFSS as a way to measure serious psychological distress.

prior to conception, antiretroviral treatment can be administered, and women and their partners can be given additional information to help prevent maternal- infant transmission. In Colorado, approximately 52 percent of women of reproductive age have been tested for HIV. Black/African American women have the highest rate of testing (70 percent), compared to White/non-Hispanic women (52 percent), and White/Hispanic women (48 percent).[7]
Early screening, treatment, and prevention of other sexually transmitted infections (STIs) is also important in preventing adverse birth outcomes. Chlamydia and gonorrhea are associated with ectopic pregnancy, infertility, and chronic pelvic pain.[1] A 2009 report by the state's STI/HIV Surveillance Program found that cases of both chlamydia and gonorrhea among Colorado residents increased significantly between 2003 and 2007. Chlamydia and gonorrhea cases among females are most prevalent in younger women: 72 percent of all female cases of chlamydia and 65 percent of all female cases of gonorrhea occurred in women ages 15-24 years old.[10]

Preventing Hepatitis B (HBV infection) in women of reproductive age eliminates risks from the sequelae of HBV infection, e.g., hepatic failure, liver cancer, cirrhosis, and death. It also prevents transmission of HBV infection to infants. According to the BRFSS for 2006-2007, approximately 52 percent of women of reproductive age have ever received the hepatitis B vaccine. During the same time period, the prevalence of vaccination did not vary significantly by race/ethnicity: 54 percent of White/non-Hispanic women, 52 percent African American women, and 47 percent of Hispanic women were immunized.[7]

Section 3: Health Behaviors

To increase the likelihood of a healthy pregnancy outcome, it is important that women increase/maintain healthy behaviors prior to conception, given the incidence of unintended pregnancy and the fact that pregnancy is not always diagnosed early in gestation. Only about 40 percent of women realize they are pregnant as early as 4 weeks gestation, a critical time frame for fetal organ development .[11] To prevent early fetal exposure to potentially harmful factors, healthy behaviors need to be in place prior to conception.

Folic Acid Use

The daily use of folic acid has been shown to reduce the occurrence of neural tube defects. These birth defects occur within 3 to 4 weeks after conception, before most women know they are pregnant. Because neural tube defects occur so soon after conception, the U.S. Public Health Service recommends that all women of reproductive age take 400 micrograms of folic acid daily.[12] Healthy People 2010 Objective 16-16 proposes that 80 percent of non-pregnant women, ages 18-44, consume the recommended amount of folic acid daily.

More women in Colorado are aware that taking folic acid prevents birth defects. In 2006, only 41 percent of women indicated an understanding of the purpose of folic acid, which increased significantly to 58 percent in 2008.[7, 13] Women's understanding of the role of folic acid in preventing birth defects and their use of folic acid supplements are monitored by the Colorado

BRFSS. According to the BRFSS, there has been little change over the last decade in the percentage of women who report taking folic acid daily (44 percent in 2000 compared to 43 percent in 2008).[7, 13]

Women with intended pregnancies are more likely to consume folic acid supplements prior to pregnancy. According to Colorado PRAMS for 2004-2007, 50 percent of women whose pregnancies were intended took multivitamins or prenatal vitamins the month before they got pregnant, compared to 23 percent of those with unintended pregnancies.[6] The proportion of women taking a multivitamin or folic acid supplements daily varies by their educational status. Women with less than a high school education are the least likely to report taking daily folic acid supplements (24 percent), compared to women with a high school education (37 percent), and women with education beyond high school (47 percent), based on results from the BRFSS for 2008.[7]

Minority women are also less likely than White/non-Hispanic women to take multivitamins with folic acid. According to PRAMS data of women who had recently given birth, 14 percent of white/Hispanic women and 21 percent of Black/African American women reportedly took multivitamins before pregnancy, compared with 40 percent of White/non-Hispanic women.[14] This finding is consistent with the 2008 BRFSS telephone survey of all women of reproductive age (18-44 years old), where 25 percent of Hispanic women (all races) reported taking daily multivitamins or folic acid supplements, compared to 50 percent of White/non-Hispanic women.[7] Colorado has yet to meet Healthy People 2010 Objective 16.16 of 80 percent of non-pregnant women, ages 15-44, taking folic acid daily.

Alcohol Use

Excessive use of alcohol is associated with an increased risk of health problems. The current CDC recommendation is that women consume, on average, no more than one alcoholic drink per day, and no more than three drinks on any one occasion. Drinking four or more drinks on one occasion is considered binge drinking. Excessive drinking may disrupt menstrual cycling and increase the risk of infertility, miscarriage, stillbirth, and premature delivery. Women who binge drink are more likely to have unprotected sex and multiple sex partners, both risks associated with unintended pregnancy and sexually transmitted infections.[15]

The BRFSS has been used to monitor alcohol use among Colorado adults by asking respondents about usual and binge drinking within the past 30 days. According to data for 2005-2008, approximately 15 percent of women ages 18-44 years old reported drinking excessively in the last month.[16] For this same period, White/non-Hispanic women ages 18-44 years old reported the highest levels of excessive drinking (18 percent), compared to Black/African-American women (13 percent) and Hispanic women of all races (9 percent).[7] According to a 2009 PRAMS study, women of higher incomes were more likely to report drinking any alcohol three months prior to pregnancy (65 percent of non Medicaid recipients compared to 46 percent of Medicaid recipients).[17]

The level of alcohol use before pregnancy is a strong predicator of use during pregnancy, and there is no safe level of alcohol use while pregnant.[11] Frequent alcohol use is associated with Fetal Alcohol Spectrum Disorders (FASD), a range of health conditions that can occur in an individual whose mother drank alcohol during pregnancy. These effects may include physical, mental, behavioral, and/or learning disabilities with possible lifelong implications.[18] According to the 2008 Colorado PRAMS survey, 58 percent of respondents reported drinking alcohol during the three months prior to conception. This percentage did not vary significantly from the previous five years. Among those women who reportedly used alcohol, 8 percent drank seven or more drinks per week during the three months prior to pregnancy.[19]

Healthy People 2010 recommends that all pregnant women, as well as women who may become pregnant, completely abstain from alcohol. Healthy People 2010 Objective 16-17a proposes to increase abstinence from alcohol among pregnant women to 94 percent.

Tobacco Use

Tobacco use during pregnancy is associated with a number of adverse pregnancy outcomes including low birthweight, small for gestational age, and/or preterm birth, spontaneous abortion, stillbirth, fetal death, and sudden infant death syndrome. Cigarette smoking prior to conception can cause reduced fertility and delayed conception among women.[20] Smoking cessation interventions must begin prior to conception.

Colorado women, ages 15-44 years old, were asked during the BRFSS survey if they have smoked at least 100 cigarettes in their entire life, and, if so, do they now smoke cigarettes every day, some days, or not at all. According to the 2005-2008 BRFSS, an estimated 19 percent of Colorado women ages 18-44 years old reported they were current cigarette smokers.[7] Hispanic women of all races (13 percent) were less likely to smoke, compared to White/non-Hispanic women (21 percent), and Black/African-American women (28 percent).[x] In 2006, Colorado women ages 18-44 had the eighth lowest smoking prevalence (19 percent) of all 50 states and the District of Columbia. The lowest prevalence was among Utah women (10 percent); the highest was among women in West Virginia (34 percent).[21]

Respondents to the PRAMS survey were asked if they had smoked at least 100 cigarettes during the previous 2 years and, if so, whether they had used any tobacco in the 3 months before their most recent pregnancy. Since 2000, the estimated prevalence of smoking prior to pregnancy has fluctuated from a high of 21 percent in 2001 and 2004, to a low of 17 percent in 2008.[22] None of these fluctuations are statistically significant. Cigarette smoking in the three months prior to pregnancy was most prevalent among women on Medicaid (33 percent); women ages 20-24 years old (31 percent), women ages 15-19 years old (28 percent); and among White/non-Hispanic women (23 percent). Smoking prior to pregnancy was also higher among women with unintended pregnancies (30 percent), compared to women with intended pregnancies (14 percent).[19]

[x] The difference in estimated prevalence of cigarette smoking between White/non-Hispanic women (21 %) and African-American women (28%) is not statistically significant.

In an analysis of PRAMS data from 15 states and New York City, the average prevalence of smoking three months prior to pregnancy was 22 percent; Colorado was below this average. Of all sites that reported data from 2000 through 2006, the prevalence of smoking prior to pregnancy decreased significantly only for two states: Utah and New Mexico. The authors concluded that "… efforts to reduce smoking prevalence among female smokers before pregnancy have not been working."[20]

Obesity

Obesity is associated with a number of health conditions such as coronary heart disease, type 2 diabetes, stroke, and some cancers (including colon, endometrial, and breast cancer). Gynecological problems such as abnormal periods and infertility are also associated with obesity in women, as are adverse pregnancy outcomes including: birth defects, infants who are large for gestational age, fetal and neonatal death, labor and delivery complications and, maternal complications (such as hypertension, gestational diabetes, and preeclampsia) (20).[1] Maintaining a healthy weight prior to pregnancy is vital to both the health of women and their infants.

Healthy People 2010 Objective 19-2 proposes to reduce the proportion of adults who are obese to 15 percent. The body mass index (BMI) can be used to measure obesity. A BMI greater than 29 indicates obesity. Respondents to Colorado's BRFSS survey are asked both their height and weight to derive a body mass index (BMI). In Colorado, 19 percent of women of reproductive age in Colorado were considered obese, based on results from the BRFSS for 2006 and 2007.[16] White/Hispanic women had the highest prevalence (25 percent), followed by Black/African American women (23 percent), and White/non-Hispanic women (17 percent).[7] In 2008, close to 18 percent of women who gave birth to a live infant were obese prior to pregnancy.[6] In a study of 25 states and New York City using data from PRAMS surveys in 2004, only one state had a slightly lower obesity rate prior to pregnancy (Utah, 15.7 percent) than Colorado (17.4 percent).[15]

Section 4: Access to Health Care

Many preconception health issues can be addressed through regular and ongoing preventive health care. However, women first need access to such care. Several measures of access are discussed below.

Health Insurance Coverage

Healthy People 2010 Objective 1-1 proposes to increase insurance coverage to 100 percent among all persons under age 65. Approximately 80 percent of women ages 18-44 reported having some form of health insurance in 2008.[7] Between 2003 and 2008, this proportion did not vary significantly. Women ages 35 and older were more likely to have health insurance (85 percent) than those ages 18-24 (74 percent). Approximately 94 percent of women with health

insurance report their health is excellent, very good, or good, compared to only 80 percent of women without health insurance.[7]

Not surprisingly, the cost of medical care was a barrier for those without health insurance. The BRFSS asked women of reproductive age if there was a time in the last 12 months when they needed to see a doctor, but could not because of the cost. During 2006-2008, 19 percent of women answered yes, and 44 percent of the women without health insurance did not see a needed doctor because of cost.[16] Proportionately, more younger women lacked insurance or struggled with the cost of care. An estimated 40 percent of younger women (18-24) reported either having no health insurance or that they were insured but unable to afford the associated costs of care , compared to 26 percent of older women (35-44).[7]

Routine Checkups

Another measure of access to health care is the actual use of health services. An annual checkup provides women the opportunity to discuss preconception issues with their health care provider. According to the 2005-2008 BRFSS, 60 percent of women of reproductive age had visited a doctor or health care provider for a routine checkup within the past year. Women with no health insurance were the least likely to have received a routine checkup (only 37 percent), while women with household incomes of $50,000 or more were the most likely to have completed a routine physical during that time period (68 percent). Sixty-two percent of women in urban areas had a routine checkup in the past year, compared to 54 percent of women in rural areas. This difference was not statistically significant.[7, xi]

In the same survey, 53 percent of women of reproductive age identified one or more of the following risk factors that could be addressed during preconception health care visits:

- 5 or more poor mental health days in the last 30 days
- current smoker
- excessive alcohol use
- obesity
- diabetes

Only 51 percent of women with at least one of these risk factors had seen a doctor or health care worker in the past year for a routine checkup.[7] Having one or more of the above risk factors varied for subgroups of White/non-Hispanics defined by income, but not for Hispanic women. Figure 8 shows that 75 percent of the White/non-Hispanic women with an annual household income less than $25,000 have at least one risk factor, compared to only 47 percent of White/non-Hispanic women with an annual household income of $50,000 or greater. In contrast, regardless of income level, half of the White/Hispanic women have at least one risk factor.[7, xii]

[xi] The sample size of rural women was small, so the ability to detect a true difference between urban and rural women is limited.

[xii] Too few women of other race/ethnicity categories were interviewed during this time period to provide reliable estimates for other racial/ethnic groups.

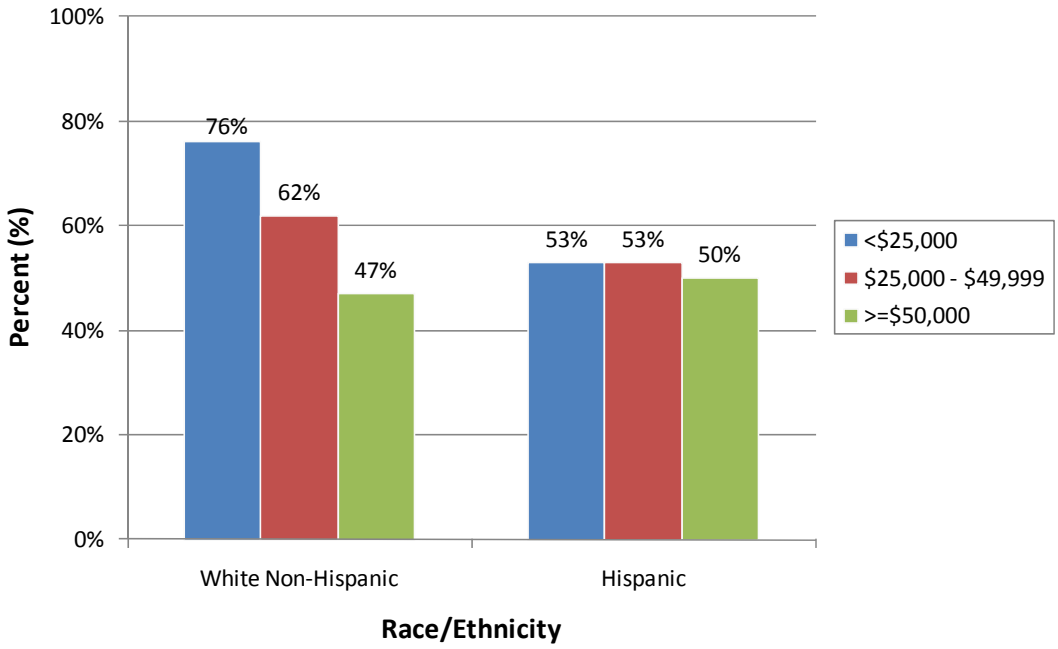

Figure 8. Percentage of Women Ages 18-44 with One or More Preconception Health Risk Factors By Race/Ethnicity and Income, Colorado, 2005-2008

Source: Colorado Department of Public Health and Environment, Behavioral Risk Factor Surveillance System

Oral Health Services

Healthy People 2010 Objective 21-10 proposes to increase to 58 percent the proportion of children and adults who use the oral health system each year. Oral health care for women of reproductive age is especially important. Periodontal disease has been linked with an increased risk for low infant birth weight and preterm birth.[1] Screening for and treatment of oral health problems prior to conception may reduce these risks. In 2008, approximately 68 percent of Colorado women of reproductive age reported visiting a dentist or dental clinic within the past year; 70 percent of women in urban areas and 63 percent of women in rural areas have done so. These three groups exceeded the Healthy People 2010 target of 58 percent.[7]

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Chapter 3 – Prenatal Health

According to the Life Course Model, critical periods exist during the life course, when a positive or negative factor has a stronger effect on an individual's health trajectory than it would during other developmental periods.[1] The prenatal time frame is one such critical period. The status of a woman's health both before she becomes pregnant and during her pregnancy can exert a long-term impact on the infant and child. Prenatal health focuses on the period during pregnancy when women are encouraged to manage their health conditions, modify health behaviors and access prenatal care.

Section 1: Prenatal Care

First Trimester Care

Healthy People 2010 Objective 16-6a recommends that 90 percent of pregnant women enroll in first trimester prenatal care. Colorado is not meeting this goal, experiencing a decline in this measure for over a decade. In 2008, only 76.9 percent of pregnant women received first trimester care, compared to 80.7 percent in 2000 (Figure 9). Colorado's highest percentage of first trimester prenatal care was achieved in 1997 when 82.9 percent of all women reported early enrollment.[2] The national average reached 83.7 percent in 2006 (the latest available national data).[3]

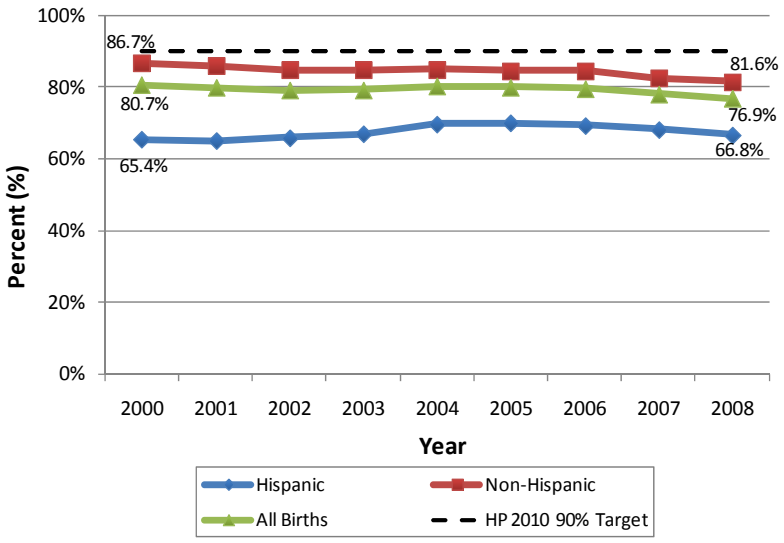


Figure 9. Percent of Births with First Trimester Care
Colorado Residents by Ethnicity, 2000-2008
Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Figure 9 also compares first trimester care for Hispanic women (all races), and non-Hispanic women (all races), who gave birth between 2000 and 2008.[xiii] Non-Hispanic women

[xiii] Unless otherwise noted, data in this chapter describing "Hispanic" births are births to women of all races whose ethnicity is Hispanic. Births to "non-Hispanic" women are births to women of all races whose ethnicity is not Hispanic.

demonstrated a fairly steady drop in early care over the nine-year period, starting with 86.7 percent in 2000, and ending with only 81.6 percent in 2008. The pattern for Hispanic women was slightly different, with nearly five percentage points of improvement in first trimester care noted between 2000 and 2005, from 65.4 percent to 70.0 percent, with a subsequent decline to 66.8 percent in 2008.

According to the Colorado Pregnancy Risk Assessment Monitoring System (PRAMS) data from 2005-2008, 54 percent of all women had private insurance for prenatal care, 36 percent had public insurance, 8 percent paid expenses themselves, and 2 percent reported other sources. These figures differed significantly for Hispanic and non-Hispanic women, as shown in Figure 10. Two-thirds of non-Hispanic women were covered by private insurance, but the majority of Hispanic women (55 percent) were covered by public insurance.

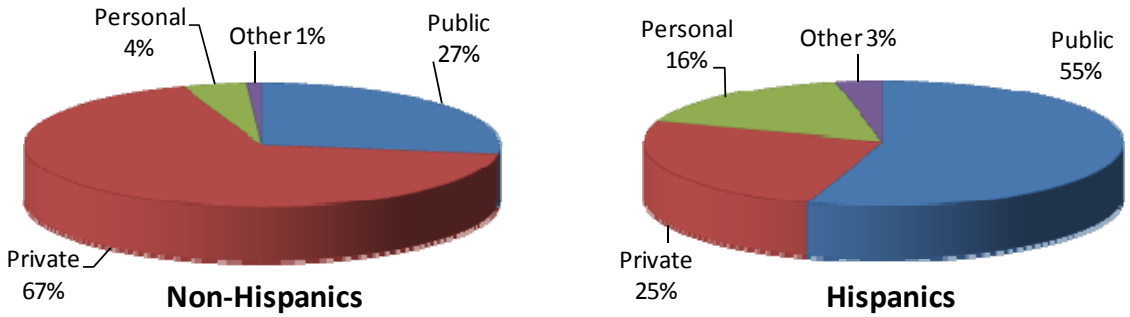


Figure 10. Percent of Pregnant Women by Ethnicity and Type of Prenatal Care Insurance, Colorado Residents, 2005-2008

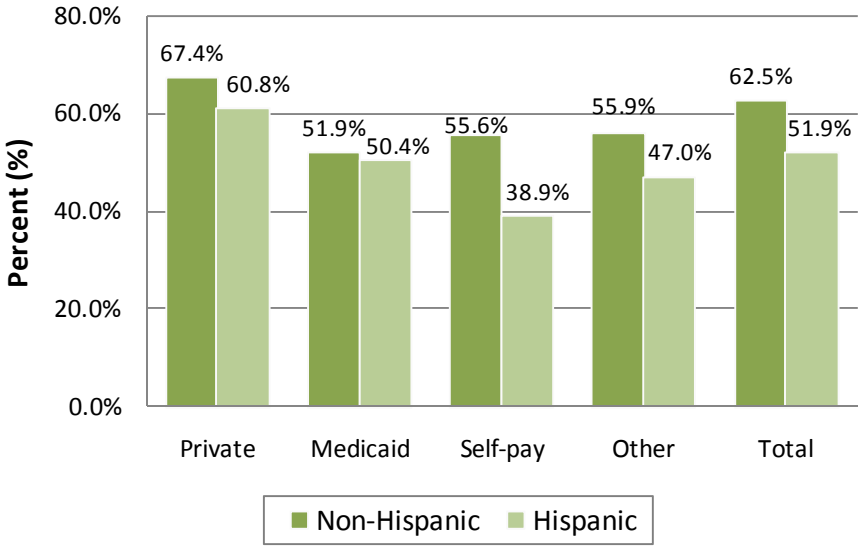
Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Adequate Prenatal Care throughout Pregnancy

While first trimester enrollment is a general indicator of access to care, "adequate prenatal care" is a better measure of appropriate care because it incorporates both early care and a consistent number of prenatal visits into the definition. In general, the percentage of women who receive adequate prenatal care throughout their pregnancy is lower than the percentage with first trimester care, since women may obtain a visit early in gestation, but may not obtain all recommended visits during pregnancy.[4] Healthy People 2010 Objective 16-6b proposes that 90 percent of pregnant women receive adequate prenatal care (the same as first trimester care).[5]

Among all women in 2007-2008 who had private insurance coverage for delivery (about half of all deliveries), just 2 out of 3 women (66.4 percent) received adequate prenatal care. The percentages for other types of insurance are even lower: when Medicaid covered deliveries (about one-third of all deliveries), just half (51.1 percent) received adequate prenatal care, and where "self-pay" was reported as the source of coverage, 47.6 percent demonstrated adequate prenatal care. When Hispanic ethnicity was considered (Figure 11), the percentages dropped: 60.8 percent of Hispanic women with private insurance obtained adequate care, compared to

67.4 percent of non-Hispanic women, and 38.9 percent of Hispanic women who reported "self-pay" obtained adequate care, compared to 55.6 percent of non-Hispanic women. These differences are significant. Among women with Medicaid coverage, however, about half of both non-Hispanic and Hispanic women obtained adequate prenatal care, a non-significant difference.



(Note: Self-pay describes 5 percent of all women; Other describes 7 percent.)

Figure 11. Percent of Women Receiving Adequate Prenatal Care by Type of Insurance at Delivery, and Ethnicity, Colorado Residents, 2007-2008
Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Hispanic women who are not U.S. citizens and who are also undocumented do not qualify for public programs that pay for prenatal care; therefore, they tend to have low rates of adequate prenatal care, thus influencing this measure. For this population, Emergency Medicaid is the only public benefit available to cover the costs of labor and delivery. An estimated 1 in every 10 Colorado births occurs to a woman who receives only Emergency Medicaid coverage.

The percentage of women receiving adequate prenatal care varies by county and region. This figure is influenced most by the availability of health care and the level of education and income within the county. Figure 12 illustrates the percentage of mothers who received adequate care during 2007-2008 by county. There were only six counties where 75 percent or more of mothers received adequate prenatal care: Clear Creek, Douglas, Gilpin, Kit Carson, Logan, and Pitkin. In 20 counties, less than half of pregnant residents received adequate prenatal care (most of these had a small population, with the exception of El Paso and Mesa). In addition, the map shows differences regionally. Lower proportions of women receive adequate care in the east central, south central and western parts of the state.

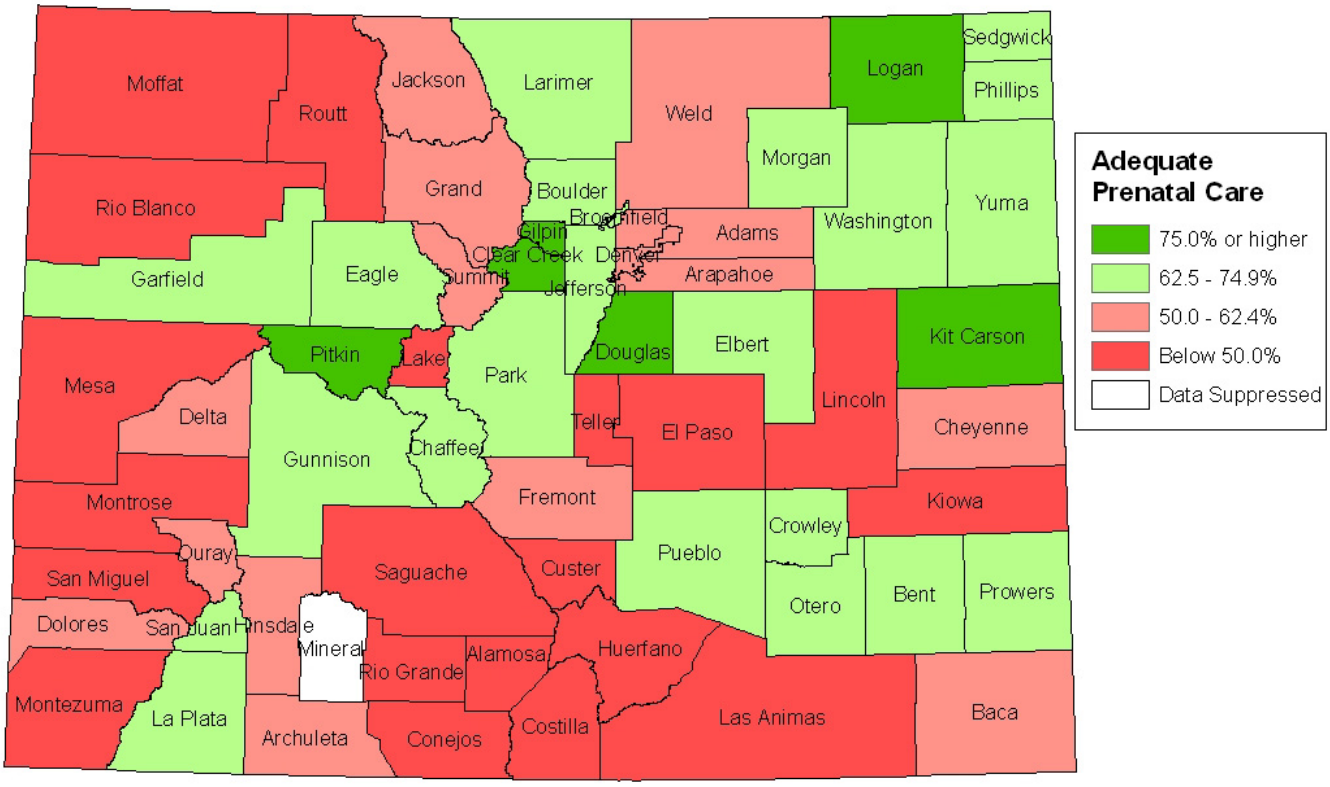


Figure 12. Percent of Pregnant Women in Colorado Receiving Adequate Prenatal Care, by County of Residence, 2007-2008
Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Oral Health Care

Addressing oral health during pregnancy is an important component of prenatal care. Although not well understood, periodontal disease (a disease of the gums and tissues around the teeth and bone) and poor oral health appears to be associated with adverse birth outcomes such as preterm birth, low birth weight, and preeclampsia, according to several studies since 1996.[6-10]

A 2001 study published in the Journal of the American Dental Association concluded that the risk of delivering early was greater for women with severe or generalized periodontal disease:[6]

- Delivery before 37 weeks was 4 times greater;
- Delivery before 35 weeks 5 times greater;
- Delivery before 32 weeks was 7 times greater.

The National Health and Nutrition Examination Survey determined that during 1999-2004, 6.4 percent of women between the ages of 20 and 64 years old reported periodontal disease, with more than half these women exhibiting moderate or severe periodontitis. Data are not available for women of reproductive age (ages 15-44 years old) but for men and women ages 20-34 years old, the rate was 3.8 percent. Higher rates of periodontal disease are associated

with male gender, low income, low education, smoking and older ages. Among women ages 35-44 years old, the rate of destructive periodontal disease was 11.9 percent, and among all persons below 200 percent of the federal poverty level (FPL), it was 28 percent.[11]

PRAMS data for 2005-2008 provide some information on the status of oral health care for pregnant women. Only 37 percent of women reportedly had their teeth cleaned during pregnancy: 49 percent had private health insurance, compared to 20 percent with public insurance. Further, only 42 percent of pregnant women reportedly had a health care worker advise them about proper oral health care during pregnancy. Forty-eight percent of women with private health insurance received this type of information, compared to 35 percent with public insurance (Figure 13).[xiv] The low percentages suggest that oral health care is not a standard component of ongoing prenatal care.

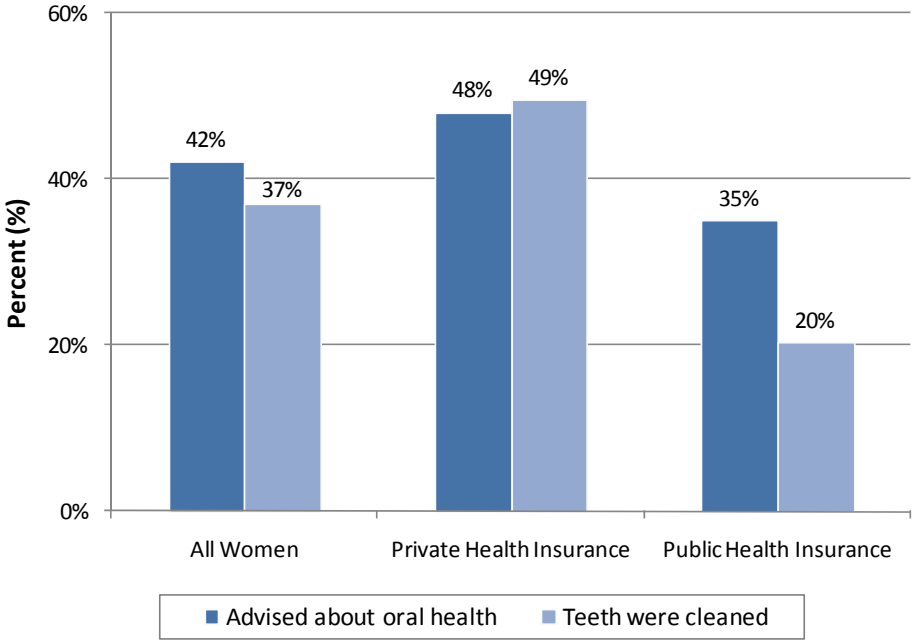


Figure 13. Percent of Pregnant Women Advised About Oral Health and Getting Teeth Cleaned During Pregnancy, by Type of Health Insurance, Colorado Residents, 2005-2008
Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

During 2005-2008, 21 percent of pregnant women reported problems with their teeth, requiring dental care. The percentage among low-income women (at or below 200 percent FPL) was nearly double that of higher income women (above 200% FPL) —28 percent compared to 16 percent. Among women reporting that they had an oral health problem and needed to see a dentist, a slight majority (57 percent) sought and received care. However, this proportion varied greatly by income, as shown in Figure 14. Among women at or below 200% FPL, just half saw a dentist, compared to nearly three-quarters (73 percent) of women above 200% FPL.

[xiv] PRAMS does not include data on dental insurance; therefore, health insurance was used as a simple proxy.

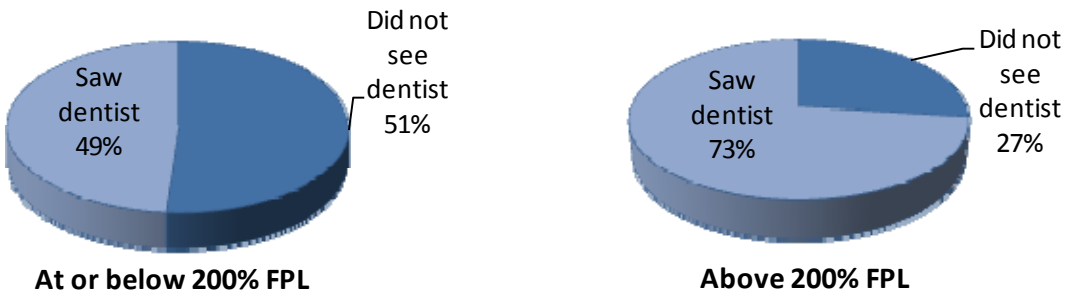


Figure 14. Percent of Pregnant Women by Poverty Level Needing to See a Dentist By Whether They Obtained Care, Colorado Residents, 2005-2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Section 2: Maternal Morbidity

Diabetes

It is important that women with type 1 or 2 diabetes (non-gestational), be diagnosed as early as possible, because they are at increased risk for delivering an infant with birth defects.[12] Although the prevalence of pre-pregnancy diabetes and gestational diabetes is low among pregnant women in Colorado, complications from diabetes are common. Colorado PRAMS data from 2005-2008 show that just over 1 percent of all pregnant women reported being diagnosed with diabetes prior to pregnancy. The prevalence of pre-pregnancy diabetes was two times higher among Hispanic women (2 percent) compared to non-Hispanic women (1 percent), a statistically significant difference (Figure 15).

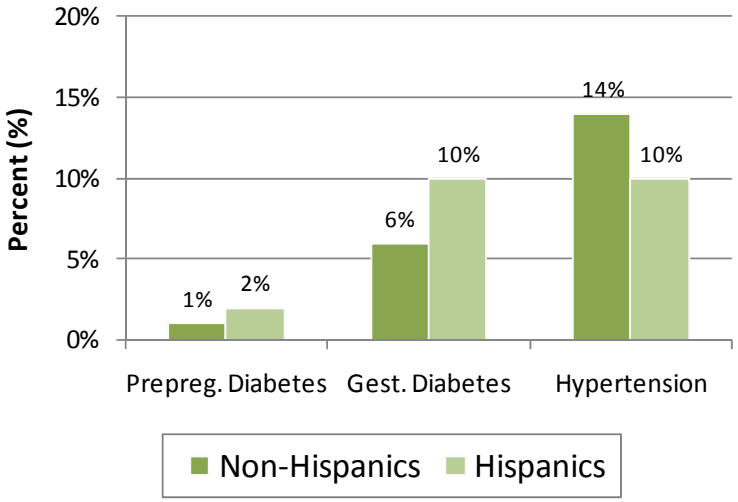


Figure 15. Percent of Pregnant Women Reporting Diabetes or Hypertension by Ethnicity, Colorado Residents, 2005-2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Gestational Diabetes

The risk of having a baby born with birth defects is lower among women who are diagnosed with gestational diabetes, than those with pre-existing diabetes; however, gestational diabetes puts women and their infants at risk for other health issues such as preeclampsia, premature birth, cesarean section delivery, and large for gestational age infants. According to 2005-2008 PRAMS data, 7 percent of pregnant women in Colorado were diagnosed with gestational diabetes. The prevalence of gestational diabetes was significantly higher among Hispanic women (10 percent), than among non-Hispanic women (6 percent) (Figure 15). Lifelong risks associated with gestational diabetes include development of type 2 diabetes in the mother, and glucose intolerance and obesity in the child.[13] Healthy People 2010 Objective 5-8 proposes to reduce the proportion of pregnant women with gestational diabetes.

Hypertension

Pregnancy-related hypertension is associated with poor birth outcomes that include increased risks for prematurity, cesarean delivery, acute renal dysfunction, placental abruption, chronic hypertension, respiratory distress syndrome, and fetal growth restriction in the infant.[14-18] The PRAMS survey asks women if they experienced high blood pressure, hypertension, preeclampsia or toxemia during pregnancy. For the period 2005-2008, 13 percent of women responded affirmatively. Fourteen percent of the non-Hispanic women (all races) had hypertension, a significantly higher proportion than the 10 percent of Hispanic women (all races) with hypertension (Figure 15). Unlike gestational diabetes, which affects Hispanic women more than non-Hispanic women, hypertension is more likely to affect non-Hispanic women, including Black/African American women.

Injury

There are no Healthy People 2010 or 2020 objectives related to injury that are specific to pregnant women. However, serious injuries of concern to pregnant women include car crashes and physical abuse.[19-20] PRAMS data for 2004-2007 indicate that between 1 and 2 percent of pregnant women are involved in car crashes. Research shows that wearing a seatbelt decreases injury for the mother and significantly reduces the possibility of fetal death. Data also indicate that pregnant women believe that seatbelt usage may injure the fetus during a crash, a misconception that must be addressed.[21] PRAMS data indicate that information regarding proper seatbelt usage during pregnancy was communicated to just over half of all pregnant women (56 percent in 2007), and has not increased in recent years.

An estimated 3 percent of women report some form of physical abuse during the year before delivery (PRAMS, 2005-2008). The definition of physical abuse includes being pushed, hit, slapped, kicked, choked or physically hurt by a former or current partner. Abuse occurs significantly more often among women younger than 25 years old (5 percent), compared to women ages 25 years and older (2 percent) (Figure 16). It is equally common among Hispanic and non-Hispanic women in these two age groups; the difference between the two groups younger than 25 years old is not statistically significant.

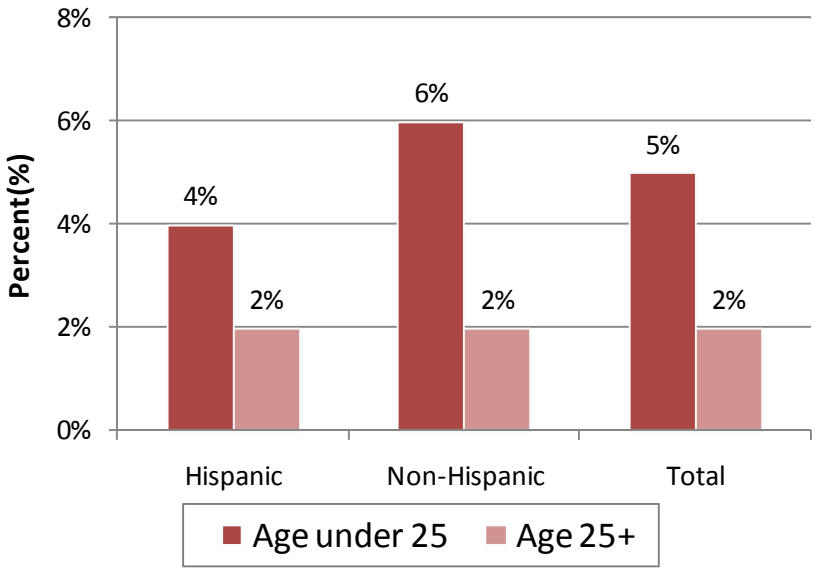


Figure 16. Percent of Pregnant Women Reporting Physical Abuse during Pregnancy by Ethnicity and Age, Colorado Residents, 2005-2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

The PRAMS survey asks women about possible risk factors for physical abuse. Risk factors include threats, fears for personal or family safety, excessive control of daily activities, and unwanted sexual activity. Among women experiencing any of these risk factors, 28 percent reported abuse during pregnancy (2004-2007). Among women without any risk factors, just 1 percent reported abuse. Also during the same time period, slightly less than half of pregnant women (47 percent) reported having a health care worker discuss physical abuse. Women who reported abuse or risk factors for abuse were no more likely to say that the subject was covered by a health care worker than women who did not report abuse or risk factors for abuse.

Section 3: Health-Related Behaviors

Certain behaviors result in major health consequences for both mother and infant, most notably: smoking, alcohol use, lack of stress management, inadequate or excessive weight gain, poor nutrition, and a lack of physical activity. As such, attempts should be made to modify these behaviors during prenatal period. The discussion below provides more information about each of these behaviors.

Smoking

Women who smoke during pregnancy are at risk for premature birth, pregnancy complications, low weight infants, stillbirth, and infant mortality.[22] In a 2000 study, smoking during pregnancy was found to be the second leading cause of low birth weight among singleton births in Colorado.[23] The prevalence of smoking among women who become pregnant has changed little since the year 2000.[24] According to PRAMS data, about 1 out of every 5 women identifies

as being a smoker prior to pregnancy (Figure 17). Healthy People 2010 Objective 16-17c proposes that 99 percent of pregnant women refrain from smoking during pregnancy. In addition, a new Healthy People 2020 objective (MICH HP2020-23) targets a reduction in postpartum relapse among smokers who quit during pregnancy.

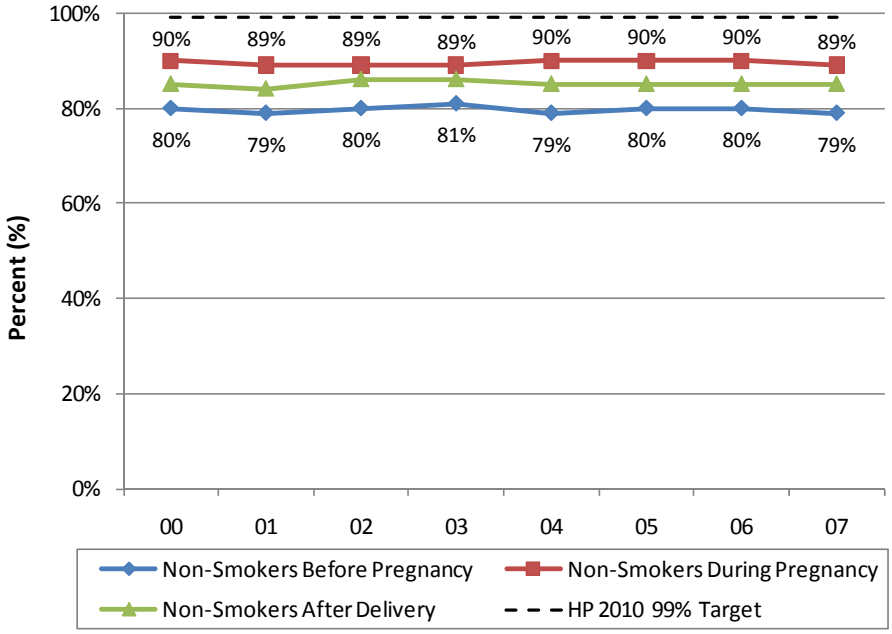


Figure 17. Percent Nonsmokers Before and During Pregnancy and After Delivery, Colorado Residents, 2000-2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

In a recent national review of smoking during pregnancy, 20.2 percent of women in Colorado were smoking before pregnancy in 2005, a percentage that was lower than some states and higher than others. Women in Utah had the lowest smoking rate; only 10 percent were smoking before pregnancy in 2005.[25] Many women (close to half) do quit smoking when they learn that they are pregnant, and the percentage of pregnant women who are nonsmokers increases to nearly 90 percent during pregnancy (Figure 17). Unfortunately, about half of women who quit smoking during pregnancy resume after delivery.

The prevalence of nonsmokers among women who give birth varies greatly by age. Figure 18 illustrates PRAMS data for 2004-2007, which shows the likelihood of being a non-smoker prior to pregnancy, quitting during pregnancy, and staying a non-smoker after pregnancy is higher among women ages 25 and older, and generally increases with age after 25 (Figure 18).

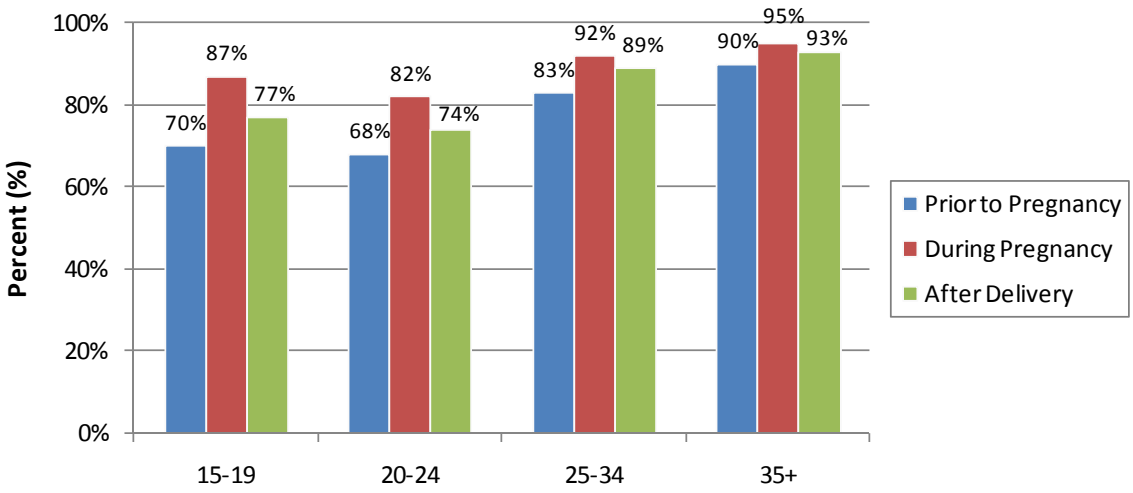


Figure 18. Percent Nonsmokers by Maternal Age and Pregnancy Status, Colorado Residents, 2004-2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Smoking prevalence among women who give birth also varies by race/ethnicity (Figure 19). According to PRAMS data (2004-2007), there were significantly more White/Hispanic nonsmokers before pregnancy compared to White/non-Hispanic women (87 percent compared to 76 percent).[xv] Quitting smoking during pregnancy is more common among White/non-Hispanic women, but resuming smoking is equally likely for women in both ethnic groups.

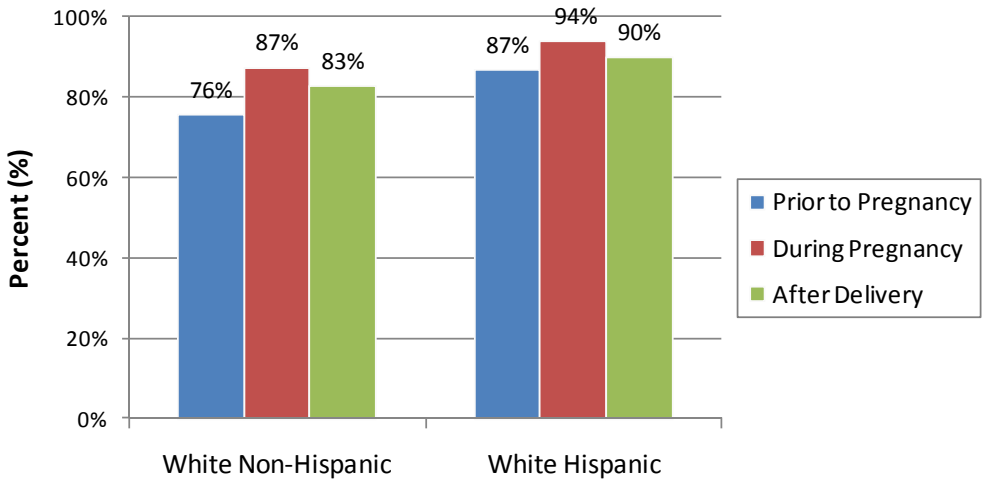


Figure 19. Percent Nonsmokers by Race/Ethnicity and Pregnancy Status, Colorado Residents, 2004-2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

[xv] "White/Hispanic" refers to women who are of White race and also Hispanic ethnicity. It excludes any Hispanic women categorized as other race. "White/non-Hispanic" refers to women who are of White race and are not of Hispanic ethnicity.

Smoking prevalence also varies widely by income (Figure 20). According to PRAMS data (2004-2007), women whose prenatal care was covered by Medicaid were significantly less likely to be nonsmokers compared to women whose prenatal care was covered by other sources (67 percent compared with 86 percent). Thirty-three percent of women on Medicaid were smokers prior to pregnancy, compared to 14 percent of non-Medicaid mothers. However, 42 percent of pregnant Medicaid women who smoked prior to pregnancy quit during pregnancy. After delivery, 74 percent of Medicaid women were nonsmokers compared to 91 percent of non-Medicaid women, an increase from pre-pregnancy rates for both groups.

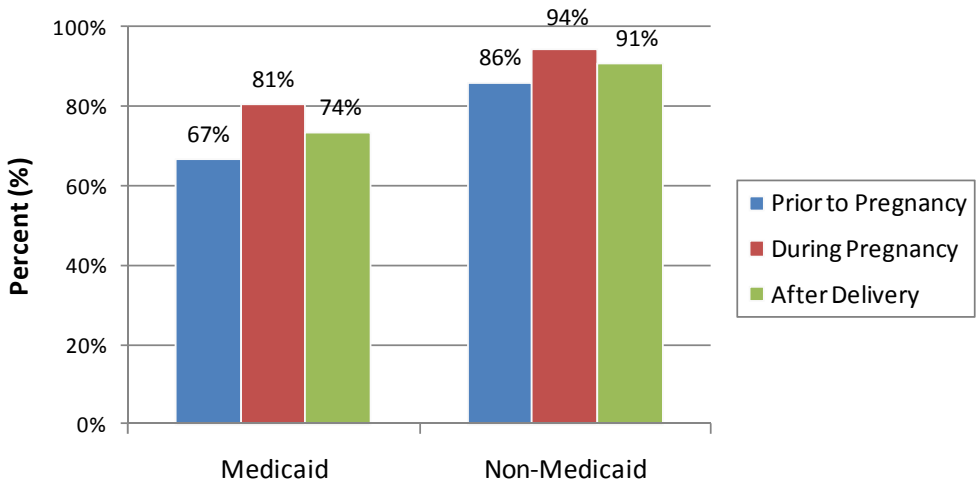


Figure 20. Percent Nonsmokers by Medicaid Status and Pregnancy Status, Colorado Residents, 2004-2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

A number of smokers reported that a health care worker talked to them during pregnancy about techniques to stop smoking including: pills, gum, the nicotine patch, or the state's QuitLine. According to Colorado PRAMS data (2005-2008) 47 percent of women who smoked before pregnancy reported such advice, while 60 percent of women who smoked during the last trimester reported such advice. A total of 54 percent of women who reported smoking after delivery also recalled such advice.

A further analysis of PRAMS data by age and race/ethnicity for 2005-2008 illustrates which smokers are most likely to quit during pregnancy and to remain non-smokers after delivery (Figure 21). For women younger than 25 years old, Hispanic women were more likely to quit and remain smoke free; nearly half (46 percent) of the smokers in this group remained smoke free compared to one-third (32 percent) of non-Hispanic women younger than 25 years old. Among older women, the same pattern prevailed but at lower rates: Hispanic smokers who quit were more likely to avoid relapse (36 percent) than non-Hispanic smokers who quit (28 percent).

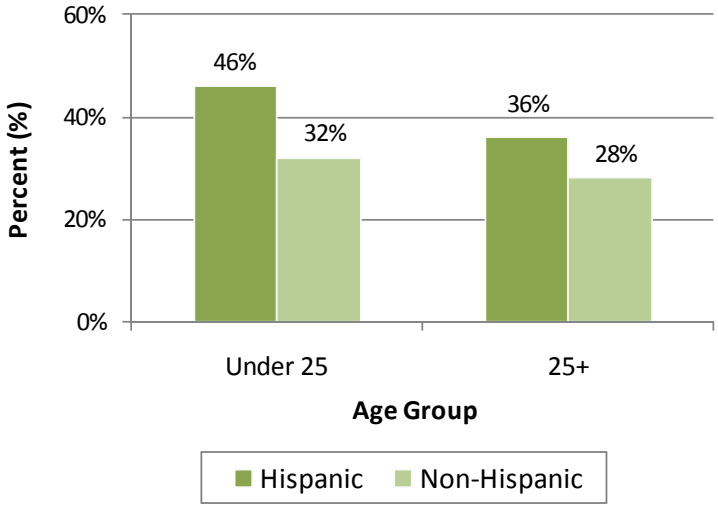


Figure 21. Percent of Pregnant Smokers Who Quit Smoking and Remain Nonsmokers after Delivery, by Age and Ethnicity, Colorado Residents, 2005-2008
Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Alcohol Use in Pregnancy

Alcohol use during early pregnancy can result in spontaneous abortion, behavioral and learning problems in children, fetal alcohol spectrum disorders, and low birth weight. Continued alcohol use throughout pregnancy can worsen these effects and result in preterm delivery. In 2005, the Surgeon General advised all pregnant women, as well as women who may become pregnant, to completely abstain from alcohol.[26] Healthy People 2010 Objective 16-17a proposes that at least 94 percent of pregnant women abstain from alcohol.

Alcohol usage by Colorado's pregnant women is slightly on the increase, and is apparently higher than other states. According to PRAMS data, 88 percent of women reported no alcohol use in the last trimester during 2007, compared to 91 percent in 2000 (although the trend is not statistically significant) (Figure 22). In a 2003 Centers for Disease Control and Prevention study, out of the 19 states that participate in PRAMS, Colorado had the highest alcohol usage rate of any of state. In fact, 16 states met the Healthy People 2010 target of 94 percent abstinence, while only Colorado, Florida and New York (excluding New York City) did not.[27]

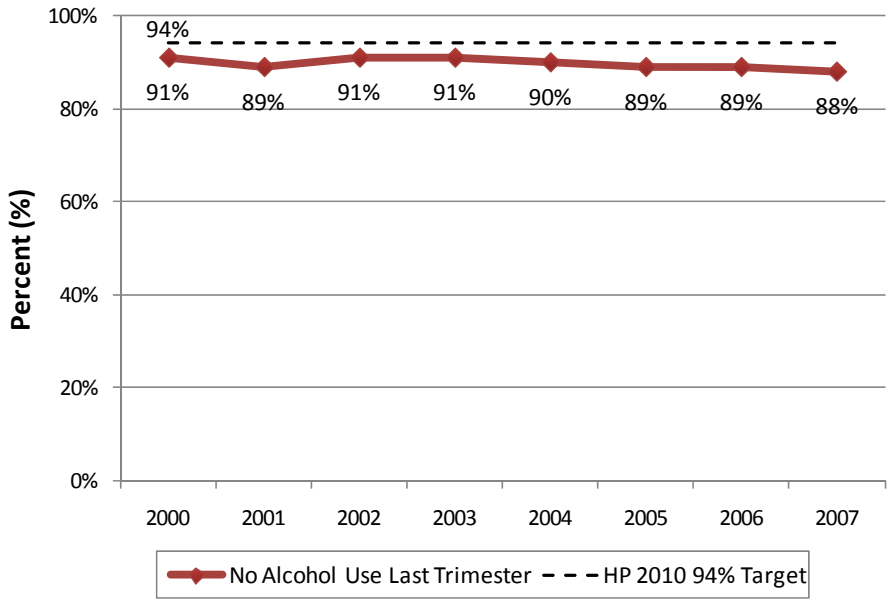


Figure 22. Percent of Pregnant Women Abstaining from Alcohol Use During the Third Trimester, Colorado Residents, 2000 to 2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Colorado PRAMS data for 2004-2007 show some important differences in alcohol usage by age. Ninety-seven percent of young, pregnant women (ages 15-19 years old) abstained from drinking alcohol, which is above Healthy People objective of 94 percent. Women ages 20-24 years old were close to meeting the target, while women ages 25 years and older had abstinence rates far below the target (Figure 23).

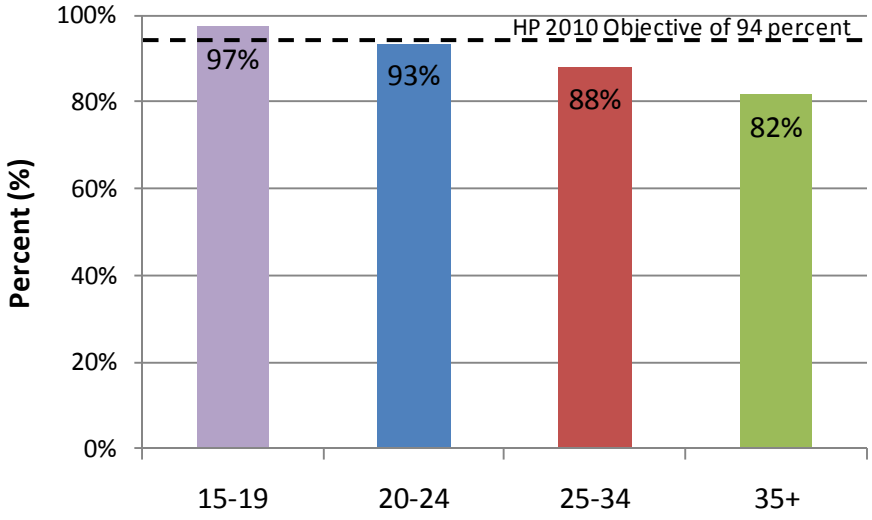


Figure 23. Percent of Pregnant Women Abstaining from Alcohol in the Third Trimester by Age, Colorado Residents, 2000 to 2007

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

PRAMS data also show that White/ Hispanic women were significantly more likely to be abstinent than White/non-Hispanic women, with 94 percent (meeting the target) reporting no use of alcohol in the last trimester, compared to 86 percent.[xvi] In addition, women whose prenatal care was paid for by Medicaid were much less likely to drink during pregnancy compared to women who were not covered by Medicaid. A total of 93 percent of women on Medicaid were abstinent in 2004-2007, while 87 percent of women not on Medicaid reported being abstinent, a difference which is statistically significant. Women on Medicaid also reported more often that a health care worker discussed the issue of drinking in pregnancy: 77 percent compared to 71 percent of women not on Medicaid (although this difference is not statistically significant). Finally, PRAMS data for 2007 show that among all women, 73 percent reported that a health care worker discussed alcohol, a significantly lower percentage than in 1999, when 81 percent reported such a discussion.

Stress

The effects of stress on pregnancy are becoming increasingly clear, with a growing body of research showing that preterm birth and low birth weight can be related to stress both before and during pregnancy.[28-32] Stress increases a corticotrophin-releasing hormone (CRH) into the blood which increases prostaglandins which can in turn trigger uterine contractions and labor. Stress appears to be related to racial discrimination, demanding working environments, living in "high-deprivation" neighborhoods, and other highly individual factors. Stress can also lead to destructive behaviors such as smoking, drinking, and drug use.[28-32]

The PRAMS survey asks a number of questions about stress, and the responses are typically grouped according to the number of stressors a woman reports. Thirteen stressors are named, including the death of someone close, separation, divorce, moving, job loss, financial problems, jail, alcohol or drug abuse, and physical fighting. The number of stressors by age group is provided in Table 9. A higher percentage of younger women have more stressors than older women, with an average of 2.5 stressors for younger women (ages 15-24), compared to 1.4 for older women (ages 25 and older), a statistically significant difference.

Table 9: Percent of Pregnant Women Experiencing Stress, by Age Group, Colorado Residents, 2005-2008

Number of Stressors	Age Group of Pregnant Women	
	15-24	25+
3 or more	40%	22%
1 or 2	39%	44%
None	20%	35%

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

[xvi] In this discussion, "White/Hispanic" refers to women categorized as both White race and Hispanic ethnicity. It excludes any Hispanic women categorized as other race. "White/Non-Hispanic" refers to women who are both White race and non-Hispanic ethnicity. It excludes non-Hispanic women who are not also White.

When grouped by federal poverty levels, the variation in the number of stressors among pregnant women is fairly pronounced (Table 10). In fact, the differences are statistically significantly for those with three or more stressors, and also for those with none.

Table 10. Percent of Pregnant Women Experiencing Stress Grouped by Poverty Level, Colorado Residents, 2005-2008

Number of Stressors	Federal Poverty Level	
	At or below 200%	Above 200%
3 or more	37%	16%
1 or 2	42%	43%
None	22%	41%

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Stress is highly related to a number of other risk factors. Twenty-seven percent of all pregnant women report 3 or more stressors in the 12 months prior to delivery. In contrast, 89 percent of pregnant women who were physically abused report 3 or more stressors. Among women who smoked during pregnancy, 52 percent reported 3 or more stressors. Among women with an unintended pregnancy, 40 percent reported 3 or more stressors (Figure 24).

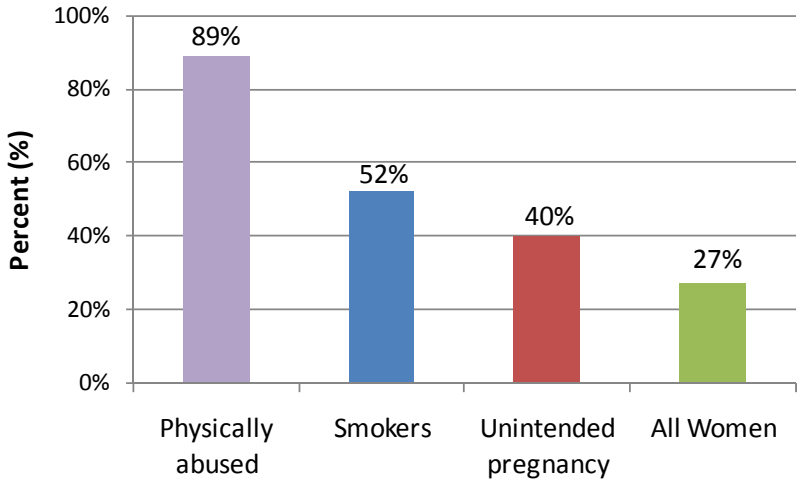


Figure 24. Percent of Pregnant Women Reporting 3 or More Stressors in the 12 Months Prior to Delivery, by Specified Risk Factors, Colorado Residents, 2005-2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Weight Gain during Pregnancy

Guidelines for weight gain during pregnancy are defined by the Institute of Medicine, and categorized as adequate, inadequate, or excessive. Each category is determined by the body mass index (BMI) of the woman prior to pregnancy. Based on the guidelines from 1990 that were available at the time that these data were analyzed, the recommended amount of weight to gain during pregnancy was 28-40 pounds for an underweight woman, 25-35 pounds for a normal weight woman, 15-25 pounds for an overweight woman, and 15 pounds for an obese

woman.[xvii] There is a new weight gain objective in Healthy People 2020 (MICH HP2020-17) to increase the proportion of mothers who achieve their recommended weight gain during pregnancy. During 2004-2008, only about 30 percent of women in Colorado gained an appropriate amount of weight during pregnancy, according to PRAMS data. Twenty four percent gained too little weight and 46 percent gained too much as defined by the Institute of Medicine.

Inadequate Weight Gain

The birth weight of the infant is correlated with the weight gain of the mother. A 2000 Colorado study entitled *Tipping the Scales: Weighing in on Solutions to the Low Birth Weight Problem in Colorado,*[23] determined that women who failed to gain enough weight during pregnancy were 1.6 times more likely to have a low birth weight infant than women who gained adequate weight. PRAMS data show that close to 1 in every 5 pregnant women do not gain enough weight which contributes to about 1 out of every 8 low birth weight infants.

Inadequate weight gain is more common among low-income women. For the period 2004-2008, 27 percent of women on Medicaid experienced inadequate weight gain, compared to 23 percent of women not covered by Medicaid, a difference that is significant. However, this issue affects women of all ages, educational levels, and racial and ethnic groups: Figure 25 shows that at least 1 in 4 to 5 women in any group gains inadequately.

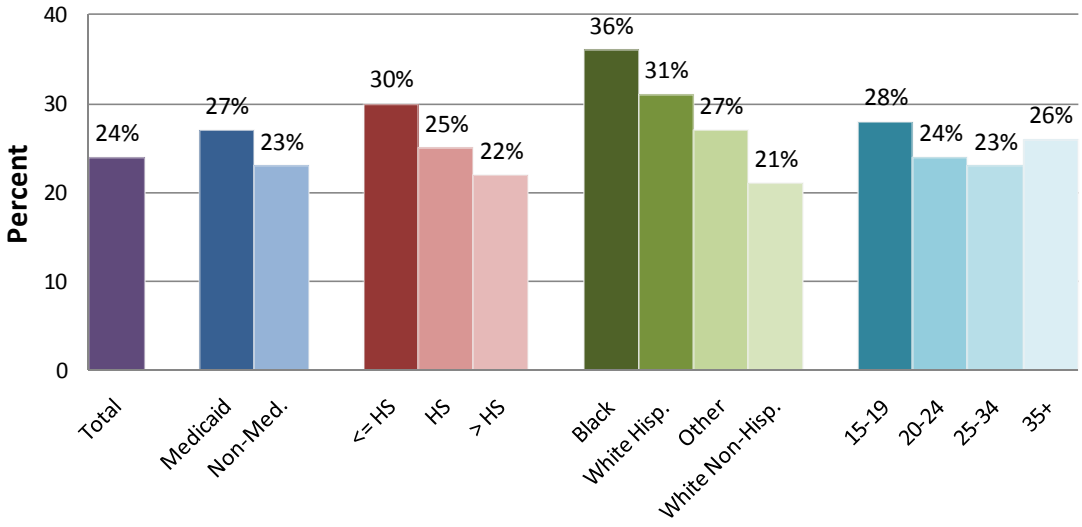


Figure 25. Percent of Pregnant Women Gaining an Inadequate Amount of Weight by Medicaid Status, Education, Race/Ethnicity, and Age Group, Colorado Residents, 2004-2008
Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

Groups of women most at risk of gaining too little weight are as follows: women who have Medicaid during pregnancy; women with less than a high school education; women of color;

[xvii] The Institute of Medicine guidelines in this section of the report are from 1990. New guidelines, which differ slightly, were issued in 2009.[33]

and women younger than 20 years old. In Figure 25, the percentage of the women in these subgroups approached or exceeded 30 percent.

Excessive Weight Gain during Pregnancy

Excessive weight gain during pregnancy is associated with gestational diabetes, pregnancy-associated hypertension (including preeclampsia and eclampsia), increased risks of preterm delivery, cesarean section, difficulty with breastfeeding, and weight retention after delivery.[33]

According to birth certificate data for women delivering singletons during 2007-2008, about half (51 percent) of those who gained too much weight during pregnancy were overweight or obese before pregnancy, based on their BMI recorded on the birth certificate. (The remaining half of pregnant women who gained too much weight during pregnancy were in the normal or underweight BMI range at conception). Excessive weight gain varies little among subgroups of women defined by race/ethnicity, age, or education. However, according to PRAMS data (2007-2008) nearly half (47 percent) of the pregnant women on Medicaid gained too much weight.

Counseling by a medical provider on appropriate weight gain during pregnancy is an important aspect of prenatal care. According to Colorado PRAMS (2005-2008), one-third of pregnant women reported that they were not told how much weight to gain by a health care provider.

Adequate/Recommended Weight Gain

Just 3 in 10 Colorado women (29.9 percent) gain weight according to the IOM guidelines (birth certificate data, 2007-2008). Figure 26 shows the differences by age, and racial and ethnic groups.[xviii] Women ages 25 and older were significantly more likely to gain an adequate amount of weight (31.0 percent) compared to women younger than 25 years old (27.6 percent).

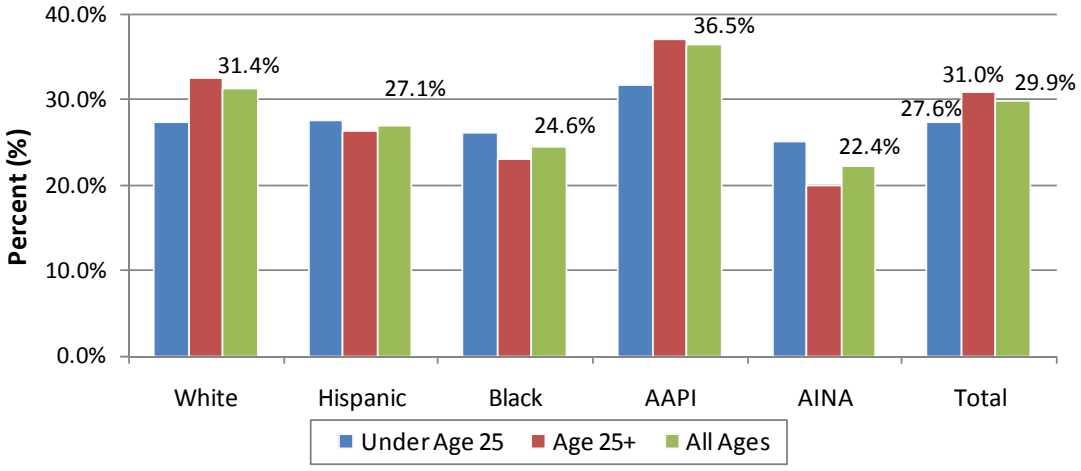


Figure 26. Percent of Pregnant Women Gaining Adequate Weight during Pregnancy By Race/Ethnicity and Age, Colorado Residents, 2007-2008

Source: Colorado Department of Public Health and Environment, Birth Certificate Data

[xviii] In the accompanying figure, "White" includes all White women of either ethnicity (Hispanic and non-Hispanic), "Hispanic" includes all Hispanic women of any race (White, Black, other, etc.), and the other racial groups include all women of either ethnicity.

Asian American/Pacific Islander (AAPI) women were the most likely to gain an adequate amount of weight at 36.5 percent. This is a statistically significant difference compared to women of all other racial and ethnic backgrounds. White/non-Hispanic women were the next largest group, with 31.4 percent gaining weight adequately. The group least likely to gain adequate weight was American Indian/Native Alaskan women (AINA) at 22.4 percent.

Women's Weight Prior to Pregnancy

In Colorado, the percentage of women who were overweight or obese before becoming pregnant has increased over the past 11 years. In 1998, 9 percent of women were overweight and 14 percent were obese, increasing to 14 percent and 18 percent respectively, by 2008 (Figure 27). Over this entire period, there is a statistically significant linear increasing trend in overweight and obese mothers as well as a decrease in underweight mothers.

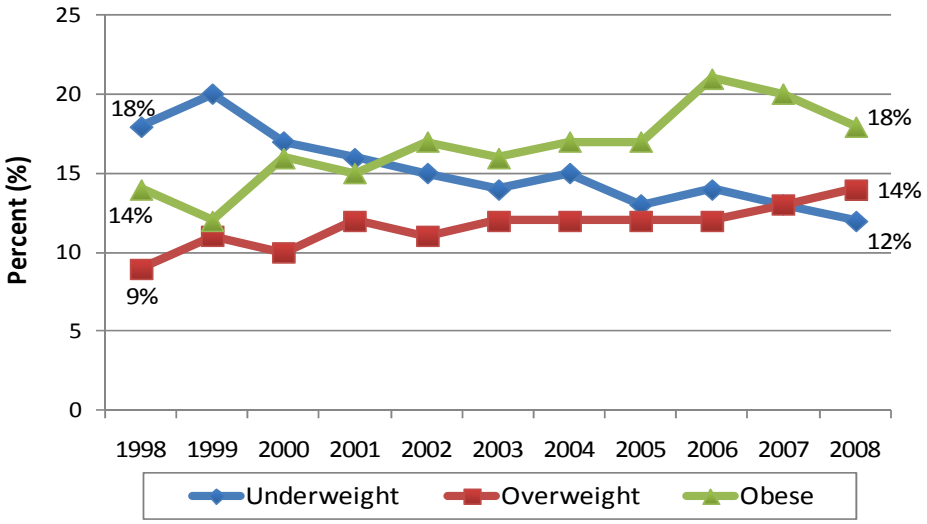


Figure 27. Percent of Pregnant Women by BMI Category at Start of Pregnancy, Colorado Residents, 1998-2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

As pre-pregnancy weight increases, so does the proportion of women who gain too much weight. This pattern is of particular concern, given the trend in the proportion of women who are overweight or obese prior to pregnancy (Figure 27). Figure 28 illustrates the magnitude of weight gained during pregnancy (according to IOM guidelines), based on whether the women's BMI placed her in the category of underweight, normal weight, overweight or obese, prior to pregnancy. The figure illustrates the correlation between weight prior to pregnancy and excessive weight gain for Colorado women during 2007-2008.

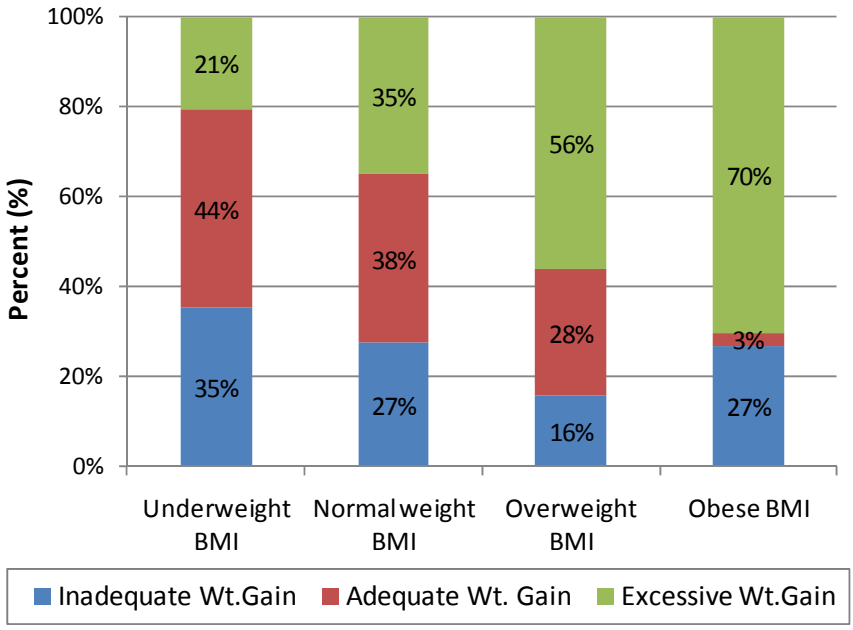


Figure 28. Maternal Weight Gain During Pregnancy by Prepregnancy BMI Colorado Residents, 2007-2008

Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Fruit and Vegetable Intake

Healthy People 2010 and 2020 have the same objectives regarding fruit and vegetable intake for the general population, which also applies to pregnant women. This includes the consumption of two daily servings of fruit and three daily servings of vegetables. According to 2004-2007 Colorado PRAMS data, the recommended target of five fruits and vegetables daily was met by just 12 percent of women (eating patterns were reported during the last three months of pregnancy). There was little difference by age: 15 percent of women younger than 20 years old reported eating the recommended number, 11 percent of women ages 20-34 years did so, and 13 percent of women age 35 years and older consumed five or more. In addition, no significant differences were found between Hispanic and non-Hispanic women. It may be worth noting that in 2007, ten percent of all women who gave birth reported that they ate less food than they felt they should overall, because they did not have enough money to buy food. This may indicate a barrier to purchasing adequate amounts of fruits and vegetables (PRAMS, 2007).

Physical Activity

The research on physical activity among pregnant women indicates that light-to-moderate physical activity for women, in the absence of certain risk factors, has positive health effects for both the mother and infant. During pregnancy, exercise reduces and prevents back pain, reduces retention of liquid, reduces cardiovascular stress, increases oxygenation capacity, decreases blood pressure, reduces the risk of gestational diabetes, prevents thromboses and varicose veins, and helps control maternal weight gain.[34] One study reports that even vigorous physical activity is associated with a reduced rate of preterm birth.[35]

Figure 29 illustrates exercise frequency in the last trimester of pregnancy, among all Colorado women who delivered their baby during 2005-2008, and among subgroups defined by their pre-pregnancy weight. (Excluded from the results are women who were advised not to exercise by their health care worker.) In general, 30 percent of women exercised less than one day per week, 53 percent exercised 1 to 4 days per week, and 17 percent exercised more than 5 days per week. Healthy People 2010 Objective 22-1 proposes that 30 percent of adults (baseline 15 percent) exercise moderately for 30 minutes a day.[xix] There was an inverse association between pre-pregnancy weight and the typical number of days per week that women exercised during the third trimester: overweight and obese women were the least likely to exercise more often.

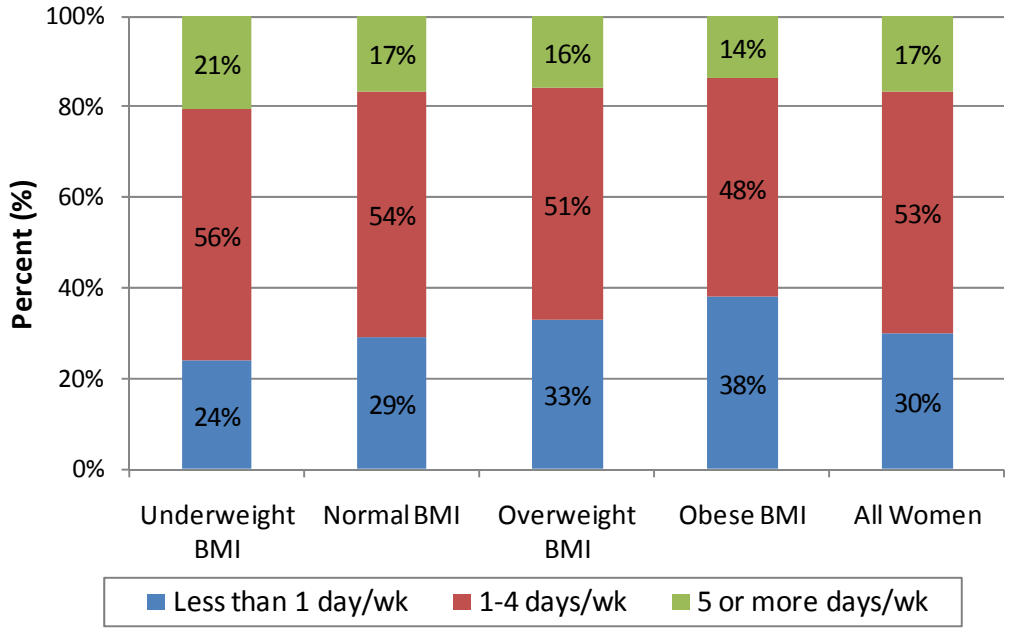


Figure 29. Frequency of Exercise and the Percent of Pregnant Women Exercising in the Last Trimester by their Pre-pregnancy BMI, Colorado Residents, 2005-2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment Monitoring System

[xix] The Healthy People 2020 objectives no longer focus on moderate levels of physical activity, but rather focus on reducing the number of adults who do not exercise at all (PAF HP2020-1), and increasing the numbers who walk (PAF HP2020-10) or bike (PAF HP2020-11). No Healthy People objectives specify desired levels of physical activity for pregnant women.

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Chapter 4 – Infant and Postpartum Health

The health of an infant is dependent upon the health and well-being of the mother before, during and after delivery. According to the Life Course Model, infants who receive the healthiest start in life have the best chance for continued health and wellness into childhood, adolescence, and adulthood. This chapter focuses on those influences, highlighting the leading causes of infant morbidity and mortality.

Section 1: Maternal Postpartum Health

During the postpartum period, there are a number of factors that can influence positively or negatively the health of the mother and her newborn, including the method of delivery, the incidence of postpartum depression, and breastfeeding.

Method of Delivery

The type of delivery (e.g., vaginal or cesarean section) influences maternal and infant health. Surgical delivery, indicated for a variety of maternal or fetal conditions, is not without potential complications. Women undergoing a cesarean section are at risk for infection, hemorrhage, embolism (blood clot formation in the blood vessels or lungs), scar tissue formation, anesthesia complications, and damage to the bladder or bowel.[1] Unlike vaginal delivery in which recovery takes a few weeks, recovery from cesarean section can take twice as long (four to six weeks). For infants, passing through the birth canal during a vaginal delivery is important for optimal lung function. Because infants do not pass through the vaginal canal during a cesarean section, they can be at increased risk for lung complications. In addition, some babies may be initially lethargic due to the administration of anesthesia.[1] Therefore, the Healthy People 2010 Objective 16-9a is to reduce cesarean births among low-risk (full term, singleton, vertex presentation) women giving birth for the first time to 15 percent.

Because delivery is a major event for both mother and infant, the method of delivery has been continuously monitored since the mid -1960s. Interestingly, the proportion of live births delivered by cesarean section has fluctuated considerably in recent decades. In 1965, the proportion of cesarean sections in the United States was 4.5 percent, peaking in 1988 at 25 percent.[2] The proportion then fell to 20.7 percent in 1996, but reached 31.1 percent in 2006, the highest level ever reported in the United States.[3]

The rise in the cesarean rate is largely attributed to an increase in the primary cesarean rate,[3] defined as the proportion of live births delivered by cesarean section to mothers with no previous history of a prior cesarean section. In the United States, the primary cesarean rate for 2006 was 23.5 per 100 live births.[3]

In the late 1990s, studies demonstrated an increase in uterine rupture among women with vaginal births after a prior cesarean delivery. As a result, in 1999, the American College of Obstetricians and Gynecologists published new guidelines around vaginal delivery after

cesarean section.[4] In response to these guidelines, by 2006, 92 percent of all U.S. women with a previous cesarean section had repeat cesarean deliveries.[3] This rate far exceeds Healthy People 2010 Objective 16-9b, which is for no more than 63 percent of women to have a repeat cesarean section.

In Colorado, the proportion of vaginal deliveries, including vaginal births after cesarean sections, has been decreasing over time. In 1996, 84.9 percent of all deliveries were vaginal; however by 2008, the percentage of vaginal deliveries dropped to 74.1 percent. As seen in Figure 30, the rates for primary cesarean section, repeat cesarean section, and vaginal birth after cesarean section in Colorado have also been changing over time. In 2004, the primary cesarean section rate appears to exceed the Healthy People 2010 Objective, but the data shown include births to all mothers, not just to mothers with low-risk pregnancies (full-term, singleton, and vertex presentation). The proportion of live births by repeat cesarean section has also been increasing with a slight dip observed in 2007 and 2008. The rate of vaginal birth after cesarean has been decreasing from a high of 2.9 percent in 1996 to the current rate of 1.7 percent in 2008.[5]

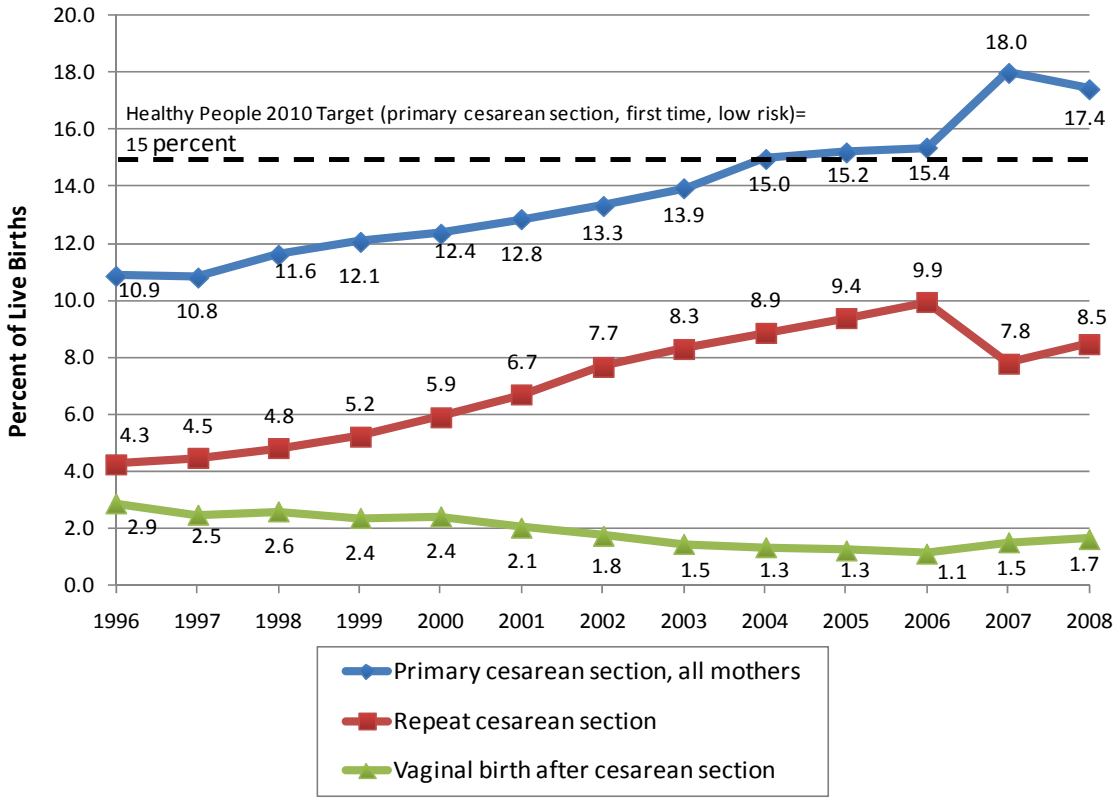

Figure 30. Percent of Live Births by Method of Delivery (Primary Cesarean Section, Repeat Cesarean Section, and Vaginal Birth after Cesarean Section), Colorado, 1996-2008

Source: Colorado Department of Public Health and Environment, Colorado Birth Certificate Data

It is assumed that the proportion of primary cesarean sections has been on the rise in recent years, at least in part, because of concerns over malpractice litigation.[6] The escalating number

of multiple births may also play a role in that surgical delivery is associated with multiple gestation.[7-8] In addition, there is a concern that "consumer demand" may also be driving the rate, as some women are electing a cesarean delivery. Finally, the induction of labor leads to higher cesarean section rates, particularly when the cervix is unprepared.[9]

Although the notion of consumer demand/doctor preference cannot be validated with any population-based surveillance data, increasing trends in late preterm cesarean section delivery (35 to 36 weeks) suggest that some of these result from elective cesarean sections that are not medically indicated. As seen in Figure 31, among Colorado women, the two-year average of cesarean section delivery for 2007–2008 was 25.9 percent of all live births, ten percentage points higher than the two-year average for the ten years prior (1997–1998). Interestingly, the greatest difference between the two time periods is observed among infants with gestational ages at 35 and at 36 weeks (where for both groups of infants the difference between the proportions of infants who were delivered by cesarean section in each time period was approximately 13 percentage points).

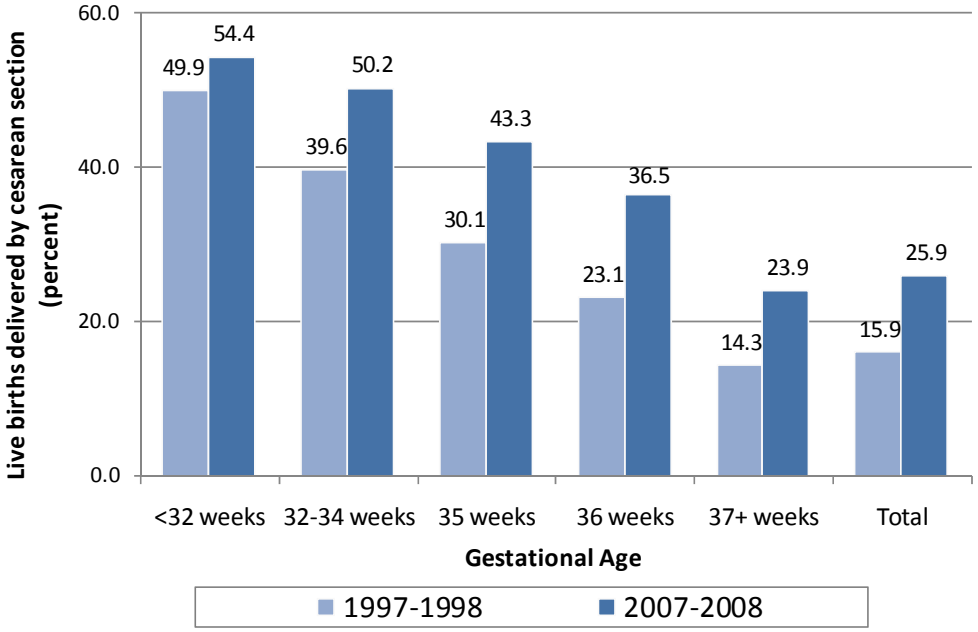

Figure 31. Percent of Live Births Delivered by Cesarean Section by Gestational Age, A Comparison of Two Time Periods, Colorado, 1997-1998 and 2007-2008
Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Postpartum Depression

Postpartum depression is one of the most common complications of childbirth.[10-11] Signs and symptoms of depression include depressed mood, guilt, anxiety, irritability, insomnia, loss of interest and pleasure, tearfulness, sadness, anger, and in some cases thoughts of harming oneself or the infant.[12] Although as many as 50 to 80 percent of mothers experience the baby blues, a period of mild depression that lasts no longer than two weeks following delivery, a small proportion of new mothers experience postpartum depression that can last up to one year after delivery. Recent studies of postpartum depression have demonstrated that the

condition can negatively impact the infant, with effects persisting into childhood.[13] Identifying postpartum depression is important for reducing adverse outcomes for both the mother and infant. Although postpartum depression was included as a developmental objective as part of Healthy People 2010, a proposed objective in Healthy People 2020 (MICH HP2020-24) has been developed to assess the percentage of women attending a postpartum care visit with a health worker.

According to 2008 Colorado Pregnancy Risk Assessment Monitoring System (PRAMS) data, 84 percent of all Colorado pregnant women reported that a health care worker talked with them about postpartum depression. Among women receiving prenatal care paid for by Medicaid, 90 percent reported they received information on postpartum depression from a health care worker, a significant difference ($p < 0.05$) from women not receiving Medicaid.[14] A recent analysis of PRAMS data (2005–2007) indicated that 20 percent of women on Medicaid reported postpartum symptoms following delivery, which is double the proportion reported by women not receiving Medicaid.[12] Among Hispanic women (all races) receiving prenatal care paid for by Medicaid, 18 percent reported postpartum depression symptoms following delivery; this is almost two times as high when compared to Hispanic women (all races) not receiving Medicaid (10 percent). Similarly, among non-Hispanic women (all races) receiving prenatal care paid for by Medicaid, 21 percent reported postpartum depression symptoms after delivery, a twofold increase compared to non-Hispanic women (all races) not on Medicaid (10 percent). Postpartum depression symptoms are more likely to occur among women whose prenatal care was paid for by Medicaid, regardless of Hispanic ethnicity.[14]

Breastfeeding

Both mothers and infants benefit from breastfeeding. Women who breastfeed have lower rates of type 2 diabetes, and breast and ovarian cancers compared to women who do not breastfeed.[15] For infants, breastfeeding reduces morbidity and mortality from conditions such as otitis media, respiratory tract infections, and gastroenteritis. Further, breastfeeding reduces the risk of infant death from sudden infant death syndrome.[16] Breastfeeding is also associated with a reduction in the development of conditions later in life such as type 2 diabetes and obesity.

Initiating and Sustaining Breastfeeding

In Colorado, almost all infants are born in either a hospital or a birthing center. Although time spent in these facilities after delivery is limited, the early postpartum period is considered critical to support breastfeeding success among new mothers.[17] According to the National Immunization Survey, the prevalence of children ever breastfed in the United States rose from 68 percent in 1999 to 74 percent in 2006, and has almost met Healthy People 2010 Objective 16-19, for 75 percent of mothers to initiate breastfeeding.[18] In Colorado, the 2006 prevalence of children ever breastfed is 83 percent, exceeding the Healthy People 2010 target.[18]

Progress has also been made in terms of the duration of breastfeeding. In the United States, the prevalence of women breastfeeding until six months postpartum has increased from 33 percent in 1999 to 43 percent in 2006.[18] In Colorado, the 2006 prevalence of breastfeeding at six

months is 60 percent, higher than the national percentage and exceeding the Healthy People 2010 target (Objective 16-19) of 50 percent.[18] Similar results are observed at one year. The 2006 prevalence of breastfeeding at 12 months in the United States was 23 percent and the Colorado prevalence was 31 percent, which exceeds the national prevalence and Healthy People 2010 Objective 16-1 of 25 percent.[18]

In order to help mothers prepare for breastfeeding, it is recommended that healthcare providers discuss breastfeeding with pregnant women prior to delivery. In 2008, the prevalence of Colorado women who discussed breastfeeding during prenatal care visits was 84 percent, and the prevalence of women reporting breastfeeding for nine or more weeks after delivery was 70 percent.[14] The top reasons that Colorado women reportedly stopped breastfeeding were: 1) not producing enough milk (perceived or actual) (44 percent); 2) did not satisfy baby (41 percent); 3) baby had difficulty nursing (27 percent); and, 4) mother went back to school/work (21 percent).[14]

Successful Practices to Promote Breastfeeding in a Hospital Setting

In Colorado, analysis of data for 2002–2003 demonstrated that significant improvements in breastfeeding duration resulted when mothers participated in five specific activities while still in the hospital. These include five of the ten World Health Organization recommended steps to successful breastfeeding practice, specifically 1) breastfeeding initiation within the first hour of delivery; 2) infant fed only breast milk in the hospital; 3) infant stays in the same room as the mother in the hospital; 4) infant does not use a pacifier; and, 5) mothers are given a telephone number to call for help with breastfeeding prior to discharge.[19]

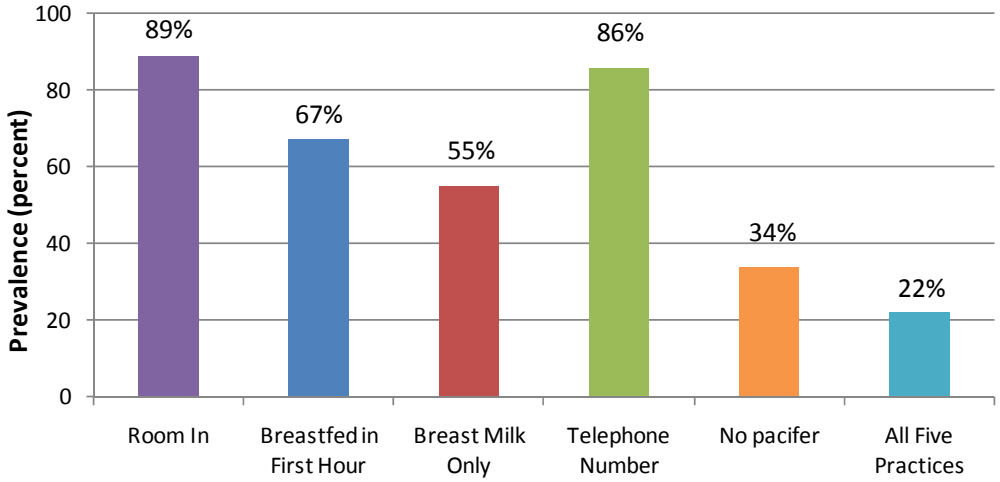

Figure 32. Percent of Mothers Reporting Five Successful Hospital Breastfeeding Practices, Colorado Residents, 2008

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment and Monitoring System

As seen in Figure 32, the 2008 prevalence of Colorado women rooming with the baby at the hospital was 89 percent; the prevalence of women breastfeeding within the first hour of delivery was 67 percent; and the prevalence of women receiving a telephone number for breastfeeding support was 86 percent. In addition, the prevalence of infants receiving only

breast milk was 55 percent, and the prevalence of infants not using a pacifier at the hospital was 34 percent. In 2008, the prevalence of Colorado women experiencing all five best practices was 22 percent. Among the recommended best practices, the lowest percentage related to prohibiting pacifier use (34 percent). Recommendations from the American Association of Pediatrics may be influencing this percentage, as pacifier use after one month of age has been recommended for preventing sudden infant death syndrome.[20]

Together, all five practices influence the duration of breastfeeding. In a recent analysis of breastfeeding practices (2005–2006), a greater proportion of women with healthy infants who experienced all five hospital best practices breastfed babies through 20 weeks, as compared to mothers with healthy infants who did not receive all five. This finding is observed in Figure 33; the shaded region signifies a statistically significant difference (for weeks two through 19).

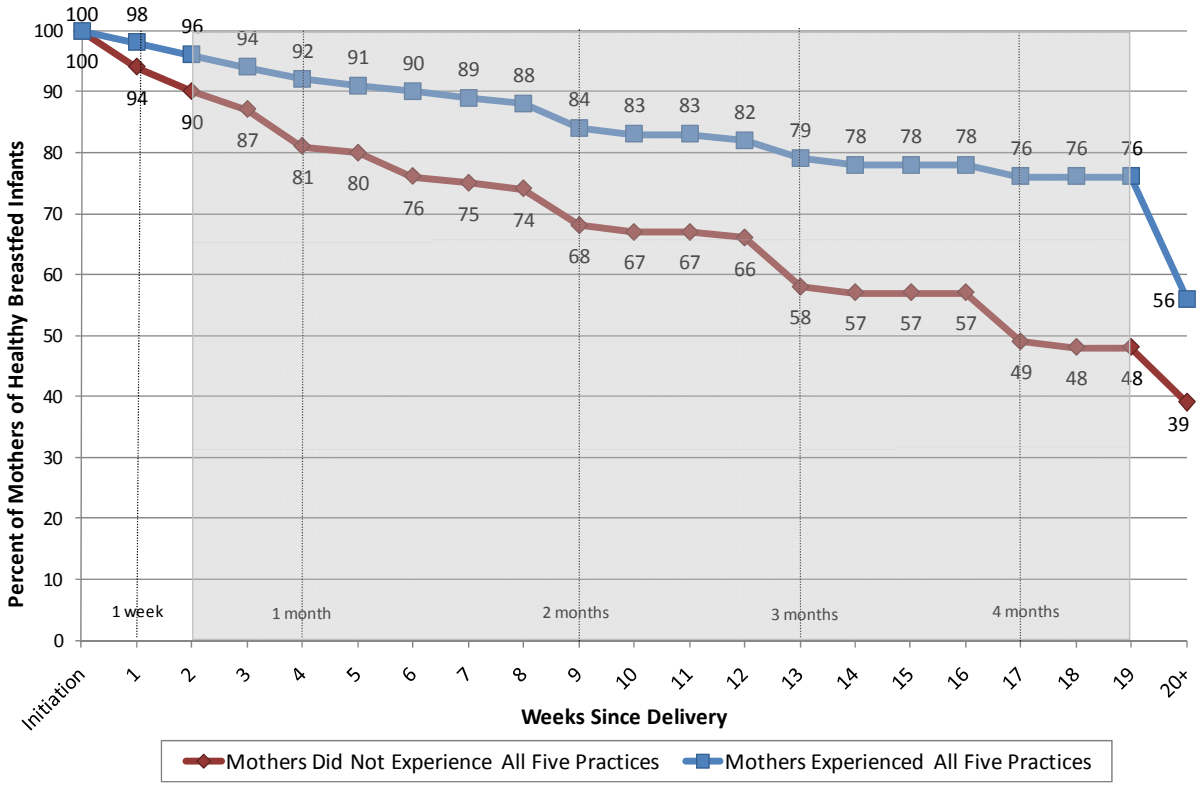

Figure 33. Colorado Breastfeeding Duration Rates among Mothers of Healthy Breastfed Infants, by Five Successful Hospital Breastfeeding Practices, Colorado Residents, 2005-2006

Source: Colorado Department of Public Health and Environment, Pregnancy Risk Assessment and Monitoring System

Nationally, three new Healthy People 2020 objectives have been proposed to improve breastfeeding. Two of the three are specific to improving hospital breastfeeding practices: 1) decrease the prevalence of breast-fed newborns who receive formula supplementation within the first two days of life (MICH HP2020-27); and, 2) increase the percentage of live births that occur in facilities providing recommended care for lactating mothers and their babies (MICH HP 2020-28). The other objective is specific to increasing the percentage of employers who have worksite lactation programs (MICH HP2020-26).

Section 2: Infant Mortality

At the turn of the 20th century, 100 infants per 1,000 live births died before the age of one.[21] Since then, the U.S. infant mortality rate has decreased dramatically to 6.7 deaths per 1,000 live births (2006).[22] The decrease is attributed to a number of factors including access to health care and availability of hospitals and maternity wards, increased awareness of nutrition, improved medical imaging and technology, and the rise in the standard of living and educational levels of women.[21]

Still, the United States has a comparatively high infant mortality rate, ranking 30th in the world during 2005, despite having the highest gross domestic product (a measure of economic output). The U.S. infant mortality rate is higher than many countries with high-income economies such as Sweden, Hong Kong, Japan, Finland, and Norway,[23] plus some countries with second tier economies like Poland and Cuba.[24]

In a 2004 study of infant mortality that compared the United States and Europe, the National Center for Health Statistics identified a lower infant mortality rate for preterm (< 37 weeks of gestation) infants born in the United States; however, the U. S. has a disproportionately higher number of preterm (< 37 weeks) births compared to Europe.[23] The study noted that much of the high infant mortality rate in the United States was due to the high percentage of preterm births. For example, if the United States had the same distribution of births by gestational age as observed in Sweden, the U.S. infant mortality rate would be reduced by one-third. In the United States, most premature and fragile infants are likely to be born to low-income and minority women lacking health care and social support.[23]

In 2008, the infant mortality rate in Colorado was 6.2 deaths per 1,000 live births. During that year, Colorado had 434 infant deaths out of 70,028 live births. The infant mortality rate has been decreasing for over 10 years. Since 1998, the number of Colorado births has increased by 18 percent, while the number of infant deaths has remained constant (on average approximately 415 infant deaths per year). Healthy People 2010 Objective 16-1 proposes to reduce the rate of infant deaths to no more than 4.5 per 1,000 live births (Figure 34).[25] As of 2007, no state in the nation had met the Healthy People 2010 target.

The infant mortality rate varies by race and ethnicity, with wide disparities for Black/African American infants. In 2006-2008, the infant mortality rate for Black/African American (non-Hispanic) was 13 deaths per 1,000 live births, a decrease from 17 deaths per 1,000 live births during the previous 18 years. There may also be a disparity for Hispanic infants (all races) whose death rates have varied from nearly 10.0 deaths per 1,000 live births during 1991-1993 to 7.4 deaths during 2006-2008. Asian American/Pacific Islander infants had the lowest infant mortality rate at 4.6 per 1,000 during 2006-2008. This is the only population to have met the Healthy People 2010 objective during the last decade (Figure 34).

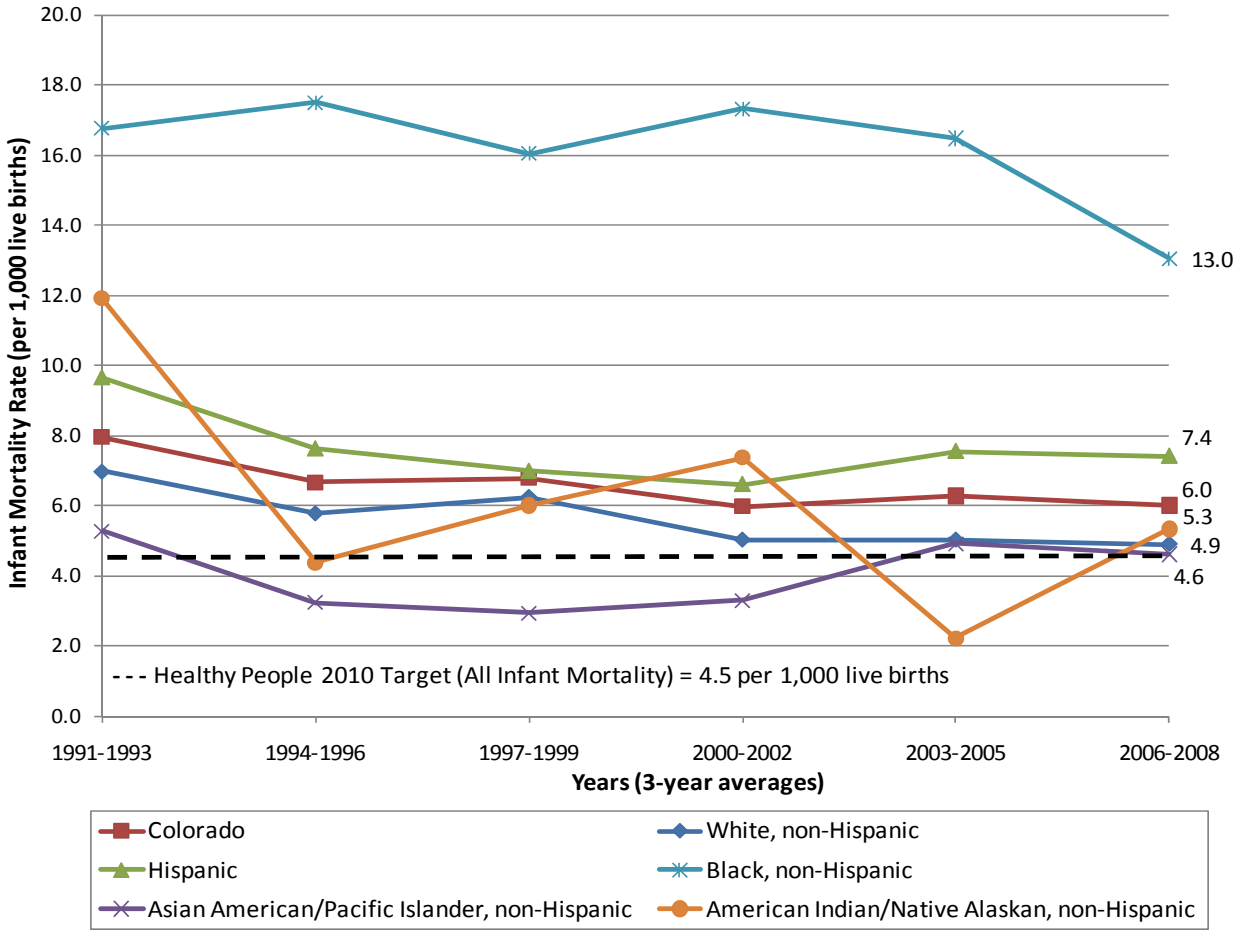

Figure 34. Infant Mortality Rates for Colorado and Select Racial/Ethnic Populations 3-year Averages, Colorado Residents, 1991-1993 to 2006-2008

Source: Colorado Department of Public Health and Environment, Colorado Vital Statistics

In Colorado, over 95 percent of Hispanic births occur to women who were born in either the United States or Mexico.[26] Since 1991, U.S.-born Hispanic women have experienced a higher rate of infant mortality compared to Mexico-born Hispanic women (Figure 35). Over time, the difference in rates appears to be narrowing, as the infant mortality rate of U.S.-born Hispanic women decreases and the rate of Mexico-born Hispanic women rises. Both rates exceed the Healthy People 2010 (HP 16-1) target to reduce all infant deaths to 4.5 per 1,000 live births.

Infant mortality rates also vary by county of residence. Using a five-year annual average from 2003–2007, differences in rates can be observed for Colorado's 64 counties (Figure 36): 20 counties met the Healthy People 2010 target, 6 counties were close to the target, 18 counties were at some distance from the target, and 7 were very far from the target.

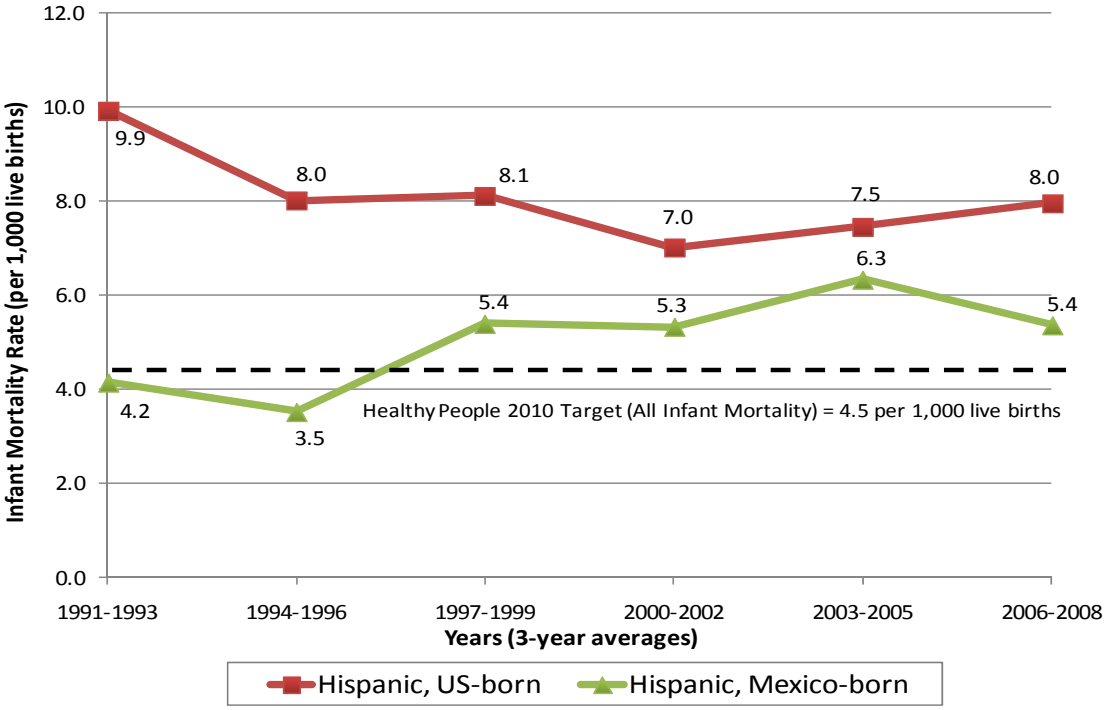

Figure 35. Infant Mortality Rates of US-born and Mexico-born Hispanic Women 3-year Averages, Colorado Residents, 1991-1993 to 2006-2008

Source: Colorado Department of Public Health and Environment, Colorado Vital Statistics

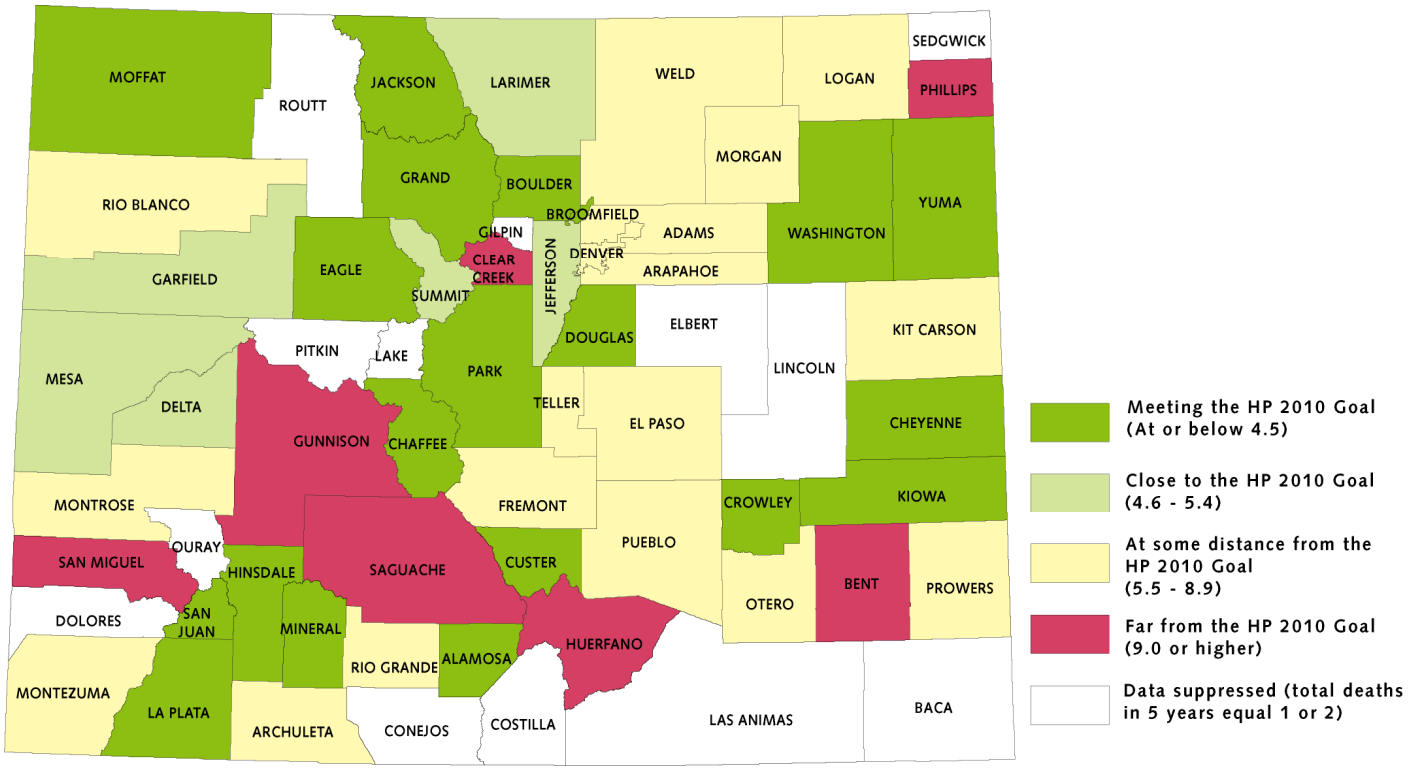

Figure 36. Five-year Average Infant Mortality Rates in Relation to the Healthy People 2010 Objective, by Colorado County, 2003–2007

Source: Colorado Department of Public Health and Environment, Colorado Vital Statistics

Causes of Infant Mortality

In this section, causes of infant mortality will be examined including perinatal period conditions, congenital anomalies/birth defects, sudden infant death syndrome and both intentional and unintentional injuries.

Perinatal Period Conditions and Congenital Anomalies

Leading causes of infant deaths include perinatal period conditions and congenital anomalies. The perinatal period condition classification means that death occurred around the time of birth from disorders related to the age of gestation (preterm birth), fetal growth, birth trauma, infections or other conditions. Congenital anomalies/birth defects include defects of the cardiovascular, central nervous, musculoskeletal, genitourinary, and digestive systems. Between 2006 and 2008, 50.5 percent of deaths among infants less than one year of age were classified as perinatal period conditions, and 22.1 percent were classified as congenital anomalies.[5]

Unintentional Injury

Deaths from unintentional injuries (falls, poisoning, car crashes, drowning, etc.), occur rarely among infants less than one year of age, accounting for 3.2 percent of deaths during 2006-2008. During the same time period, there were 41 infant deaths from unintentional injuries in Colorado: 66 percent were among male infants and 44 percent were among female infants. Out of the total number of deaths, 22 percent were due to a motor vehicle crash, while the other 78 percent were classified as "non-transport other and unspecified." These include injuries from falls, poisonings, drowning/submersion, firearms, smoke and flames or other.

Child Abuse/Neglect and Homicide

Infant deaths from child abuse/neglect are also limited in number. Between 2004 and 2006, approximately 26 infant deaths were attributed to child abuse and/or neglect, approximately 2 percent of infant deaths during that time period. Twenty-three of these deaths were determined to be homicides. The largest proportion of infant homicides occurred among White/non-Hispanic infants (47.8 percent). However, White/Hispanic infants are the most disproportionately affected group as they comprise 25.3 percent of the infant population in Colorado but account for 34.8 percent of infant homicides.[27] When discussing homicide among children and adolescents, teen homicide rates are often perceived to be higher than infant homicide rates. However, as seen in Figure 37, the three-year moving average rates of homicide in Colorado are higher among infants compared to teens, and teen homicide rates are trending downward. Most recently (2006–2008), the homicide rate among the infant population was almost two times as high as the homicide rate among teens 15–19 years of age.

A review of infant and teen homicide cases by the Colorado Child Fatality Prevention System's State Review Team revealed differences in each age group. Between 2004 and 2006, 82 percent of teen homicides resulted from use of a firearm, and 65 percent of infant homicides resulted from physical assault (e.g. punching, beating, throwing, dropping, and shaking). Also, 14 of the 23 infant homicides (60.9 percent) were the result of shaken baby syndrome.[27]

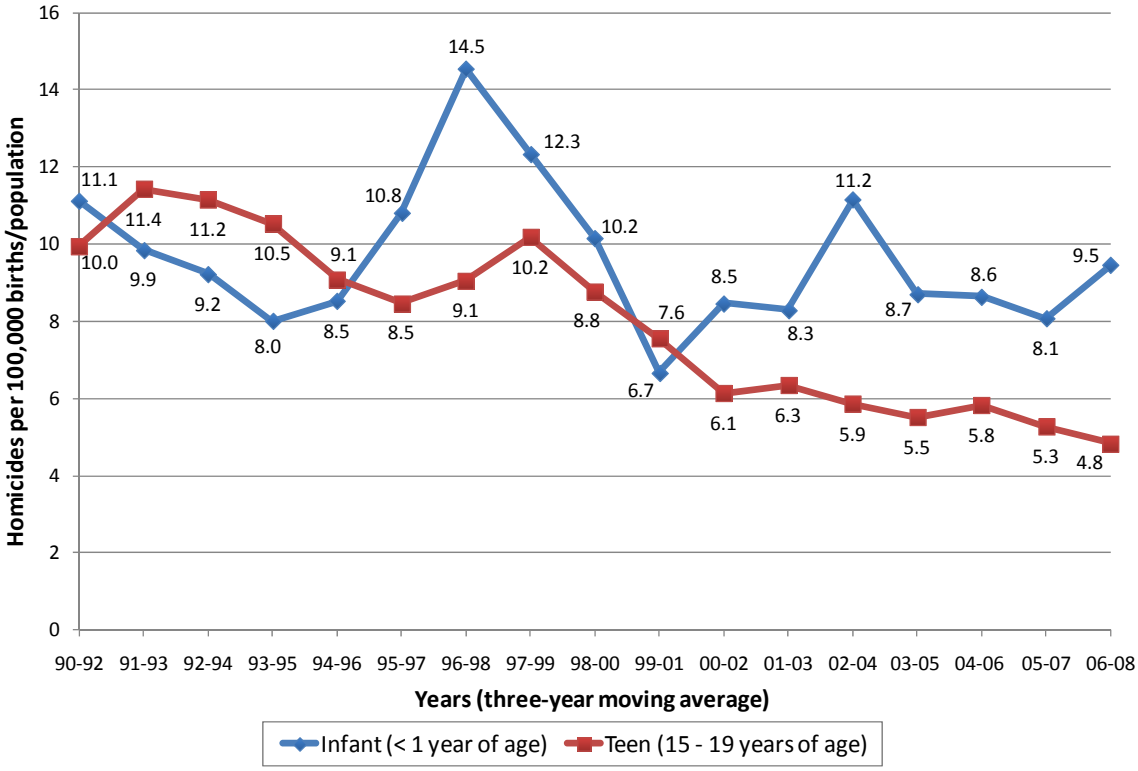

Figure 37. Infant and Teen Homicide Rates, 3-Year Moving Averages
Colorado, 1990-1992 to 2006–2008
Source: Colorado Department of Public Health and Environment, Colorado Child Fatality Prevention System

Sudden Infant Death Syndrome

Sudden infant death syndrome or SIDS, defined as "sudden death of an infant under one year of age, which remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history."[10] Infants are at highest risk for sudden infant death syndrome during the first six months of age, and are most vulnerable in their second and third months. Male babies are at higher risk than females. Other risk factors include preterm and/or at a low weight birth, birth during the fall or winter months, exposure to tobacco smoke, and overheating while sleeping.[28] In addition, the risk of sudden infant death is higher among infants born to women with inadequate prenatal care, placental abnormalities, inadequate weight gain during pregnancy, anemia, a history of sexually transmitted or urinary tract infections, women who smoke or use drugs, and women 20 years of age and younger.[28]

To help prevent cases of sudden infant death syndrome, the American Academy of Pediatrics released guidelines in 1992 for infants to be placed in a non-prone sleep position (not on the stomach). By 2005, these guidelines were updated to include use of a pacifier while sleeping, avoiding soft bedding and soft objects in the infant's sleep environment, prohibiting co-sleeping (sleeping with an infant), and promoting room sharing (infant sleeps in the same room as the caregiver).[20, 29] Implementation of these recommendations have helped reduce Colorado's rate

of sudden infant death syndrome significantly, from 2 per 1,000 live births in 1990 to 0.5 per 1,000 live births in 2008. However, Colorado is still not meeting the Healthy People 2010 Objective 16-1, which is to reduce deaths from sudden infant death syndrome to 0.25 per 1,000 live births. In 2008, 81 percent of Colorado women reported placing infants on their back to sleep.[30] This result surpasses Healthy People 2010 Objective 16-13, of 70 percent.[1414]

Increased adherence to safe-sleep recommendations does not completely explain the reduction in sudden infant death syndrome rates. National studies indicate that the decline in rates may also be attributed to changes in the classification of death by coroners and medical examiners.[29] As the rates of sudden infant death syndrome have declined over time, infant mortality due to accidental suffocation and strangulation in bed, plus deaths reported as unknown or unspecified have increased (from 2.8 per 100,000 in 1984 to 12.5 per 100,000 live births in 2004).[31] Coroners and medical examiners are becoming less likely to report an infant death as sudden infant death syndrome without a thorough death scene investigation or when there is sufficient evidence that the infant death occurred in an unsafe sleep environment.[32]

One of the leading risk factors for sudden unexpected infant death is co-sleeping. Data from the Colorado Child Fatality Prevention System provides a comprehensive picture of sleep-related infant deaths in Colorado.[27] Between 2004 and 2006, approximately 159 Colorado infant deaths were identified as a sleep-related death by the review team. As seen in Figure 38, over half (55 percent) of the sleep-related deaths occurred in an adult bed, couch, or futon; approximately one-third (30 percent) occurred in a crib or bassinette; 9 percent occurred in other places including the playpen, car seat, and stroller; and in 6 percent of the sleep-related cases, the location was unknown.

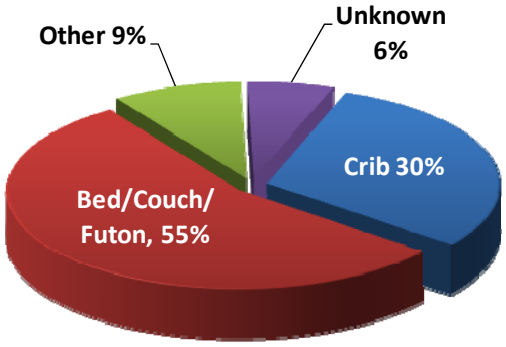

Figure 38. Location of Sleep-related Infant Deaths, Colorado, 2004-2006
Source: Colorado Department of Public Health and Environment, Colorado Child Fatality Prevention System

Of the 159 sleep-related infant deaths identified, 73 (45.9 percent) occurred while co-sleeping. In approximately 32 of the 73 (44 percent) co-sleeping cases, two or more persons shared the bed with the newborn – studies show an association between sudden infant death syndrome and co-sleeping with two or more individuals.[29] In terms of race/ethnicity, the majority of co-sleeping infant deaths occurred among the White/non-Hispanic population (57.5 percent), followed by the White/Hispanic (21.9 percent), Black/African American (17.8 percent), and American Indian/Native American (2.7 percent) populations. However, when accounting for the

proportion of live births to Black/African American and American Indian/Alaskan Native American women in Colorado, the percentage of co-sleeping deaths is disproportionately higher than among other racial and ethnic groups.[27]

Neonatal Infant Mortality

Infant deaths can be analyzed further by classifying age groups as neonatal (less than 28 days) or postneonatal (28 days to less than one year). The mortality rate among neonates is consistently higher than the mortality rate during the postneonatal period. In terms of neonatal deaths, racial and ethnic disparities exist among Black/African American infants and White/Hispanic infants when compared to other racial and ethnic groups.

As seen in Figure 39, the three-year average neonatal mortality rate has consistently been significantly higher for Black/African American infants, at 2-3 times that of other groups for most time periods. The neonatal mortality rate is also consistently higher among White/Hispanic infants, when compared to White/non-Hispanic and Asian American/Pacific Islander infants. (Data were suppressed for the Native American/Alaskan Native population, due to fewer than three infant deaths in some of the three-year averages). A decrease in the Black/African American neonatal mortality rate was observed during the 2006–2008 period. It is difficult to determine if this decrease was due to fluctuations in live births or infant deaths or a combination of both. Also, the rate appears to be increasing among the Hispanic population. Only the Asian American/Pacific Islander population has met Healthy People 2010 Objective 16-1, which is no more than 2.9 infant deaths per 1,000 live births.

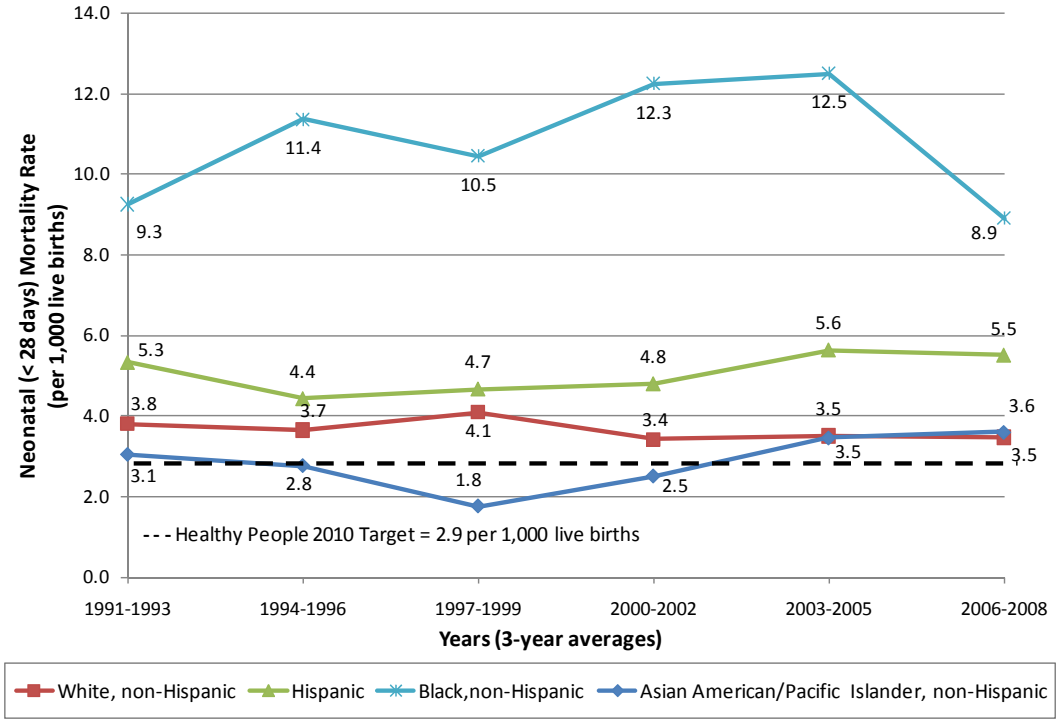

Figure 39. Neonatal (<28 days) Mortality Rates by Select Racial/Ethnic Populations Three-Year Averages, Colorado Residents, 1991-1993 to 2006–2008

Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Postneonatal Infant Mortality

Over time, the neonatal infant mortality rate has remained constant; however, the postneonatal (28 days to less than one year) infant mortality rate has decreased from 3.6 per 1,000 live births (1991–1993) to 1.4 per 1,000 live births (2006–2008). Similar to neonatal mortality, racial and ethnic disparities exist in postneonatal mortality.[xx] As seen in Figure 40, the three-year average postneonatal mortality rate is significantly higher for Black/African American infants compared to the White/Hispanic and White/Non-Hispanic populations. Unlike the neonatal mortality rates, the postneonatal mortality rate is decreasing over time among all three populations; however, no group has declined to the Healthy People 2010 Objective 16-1 of 1.2 deaths per 1,000 live births.

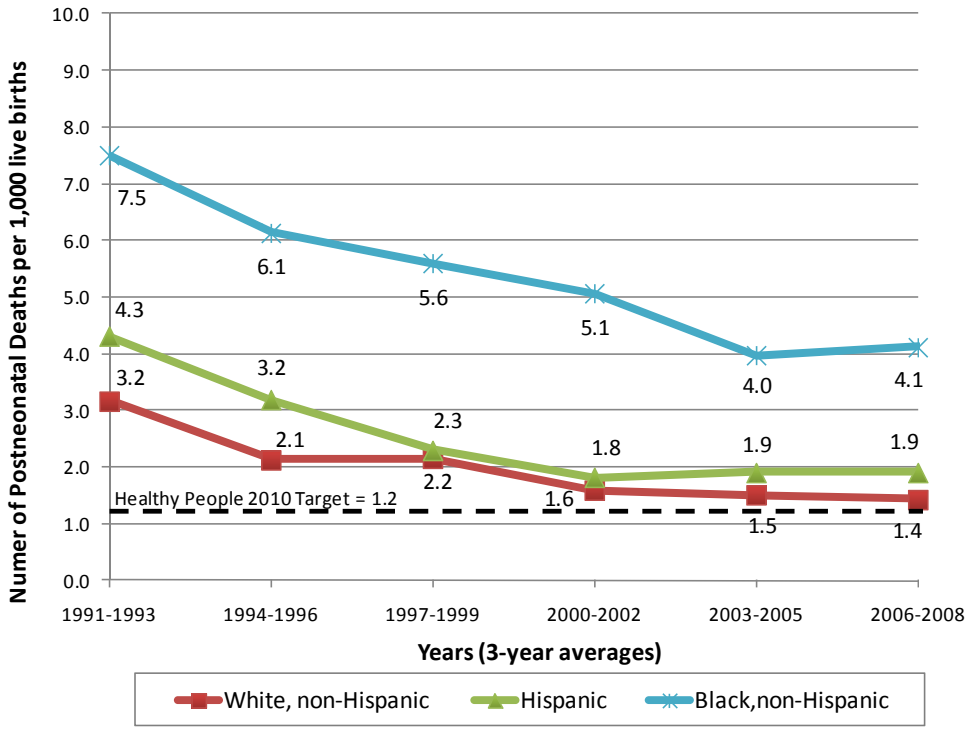

Figure 40. Postneonatal (28 days to <1 Year) Mortality Rates by Select Racial/Ethnic Populations 3-Year Averages, Colorado, 1991-1993 to 2006-2008

Source: Colorado Department of Public Health and Environment, Colorado Vital Statistics

Section 3: Infant Morbidity

Infant morbidity refers to adverse infant conditions that occur after birth and before one year of age. Factors affecting infant morbidity include premature birth and low birth weight, injury, environmental exposures such as secondhand smoke, and access to care for infant health.

[xx] Data was suppressed for the Asian American/Pacific and Native American/Alaskan Native populations, due to fewer than three infant deaths in some of the three-year averages.

Low birth weight

A low birthweight infant is defined as weighing less than 2500 grams at birth (5 pounds, 8 ounces or less). Low weight can be associated with increased morbidity including long-term developmental and neurological complications and disabilities, and infant mortality. Low birth weight is a common result of a preterm birth (a gestational age of less than 37 weeks), accounting for 65 percent of low birthweight infants born in Colorado, while 35 percent of those with a low birth weight are born at term.

In 2007-2008, 8.9 percent of Colorado live births were classified as low birthweight and approximately 1.2 percent were classified as very low birthweight (<1,500 grams). Colorado's low birthweight rate has fluctuated little over the past ten years and is higher than the U.S. rate (approximately 8 percent each year). Both the U.S. and Colorado low birthweight rates exceed Healthy People 2010 Objective 16.1, which is to reduce the proportion of low weight births to 5 percent of all live births.

In both Colorado and the U.S., racial and ethnic health disparities exist in the area of low weight births. According to the latest Colorado birth certificate data available (2007-2008), Black/African American infants had the highest proportion of low weight births, compared to all live births within that population, at 15.1 percent. This is up to 1.75 times higher than other racial and ethnic groups. Asian American/Pacific Islander infants also had a low birthweight rate higher than other racial and ethnic groups for the same time period, at 11.2 percent. Figure 41 illustrates low weight births as a percentage of all live births, by race and ethnicity. The percentages have remained stable over time and are similar to national rates.

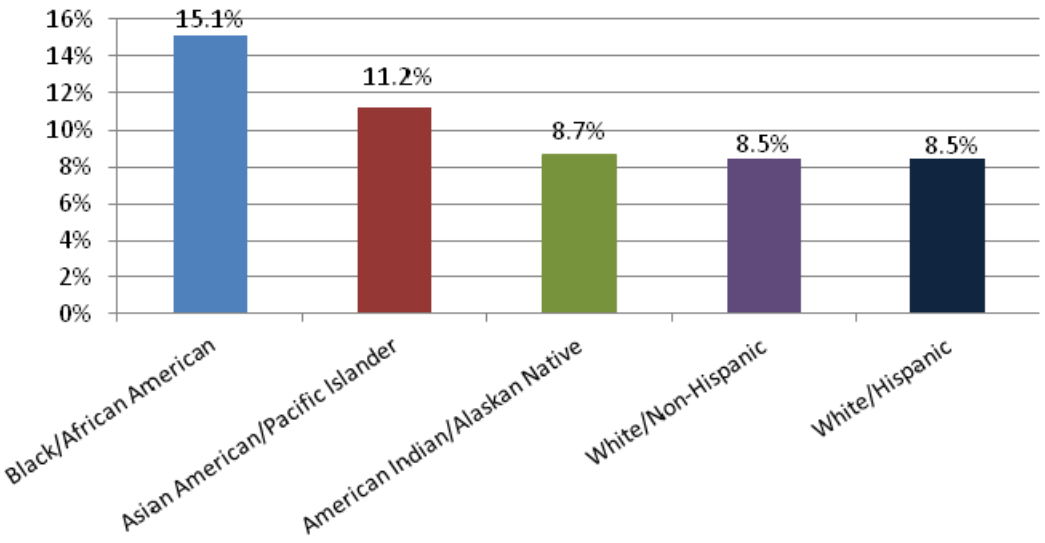

Figure 41. Low Weight Births as a Percent of Live Births by Race and Ethnicity, Colorado, 2007-2008

Colorado Department of Public Health and Environment, Birth Certificate Data

White/Non-Hispanic infants make up the largest proportion of births in the state, and therefore have the greatest number of low weight births. Of the approximately 6,000 low birth weight

infants born in Colorado each year, 55 percent or approximately 3,300, occur among White/Non-Hispanic Infants. Twenty-five percent occur among and White/Hispanic infants, the second largest racial and ethnic group by population.

In 2000, the Colorado Department of Public Health and Environment examined the problem of low birth weight in a report entitled *Tipping the Scales: Weighing in on Solutions to the Low Birth Weight Problem in Colorado,* which focused on births between 1995 and 1997. Along with non-modifiable factors contributing to low birth weight (such as premature rupture of the membranes), the report identified two important modifiable factors: smoking and inadequate weight gain during pregnancy.

In a recent analysis of the 2007-2008 birth cohorts, similar observations were identified. In 1995-1997, the low birthweight rate for women who did not gain enough weight during pregnancy was 9.4 percent, and by 2007-2008 this increased to 11.6 percent. For smoking, the low birthweight rate was 13.4 percent (1995-1997), higher than the 12.3 percent observed in 2007-2008. Figure 42 shows low birthweight rates for singleton births (2007-2008) by weight gain (based on the 1990 Institute of Medicine's recommendations), and pregnancy smoking status. Across all weight gain categories, the low birthweight rate was higher for smokers compared to nonsmokers with the greatest rate observed among women who were both underweight and smokers (19.5 percent).

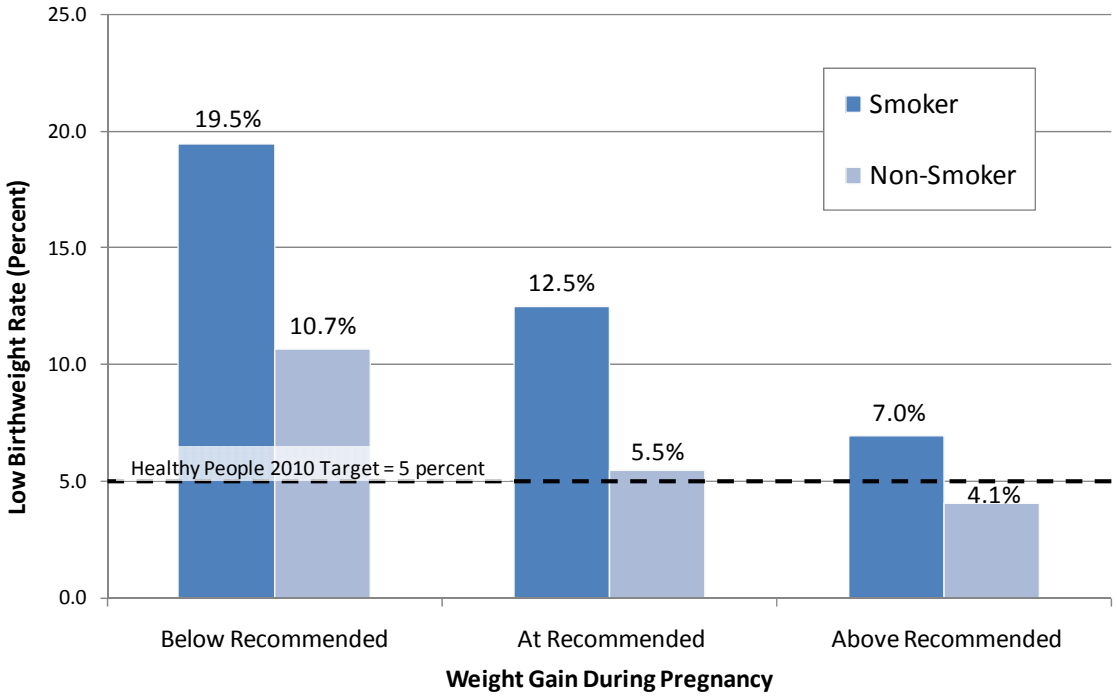

Figure 42. Low Birthweight Rates by Recommended Weight Gain Category and Smoking Status During Pregnancy, Colorado, 2007-2008
Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Using birth certificate data for 2007-2008, a relative risk analysis was performed to measure the association between a women having the two risk factors of inadequate weight gain and smoking during pregnancy, and then giving birth to a low birthweight baby. Compared to women with adequate and excessive weight gain, the probability of low birth weight is almost two times as high [RR = 1.74 (95% CI = 1.66, 1.83)] among women with inadequate weight gain. Similarly, compared to women who did not smoke during pregnancy, the probability of low birth weight is almost two times as high [RR = 1.81 (95% CI = 1.69, 1.94)] among women who smoked during pregnancy. Women who smoked and had inadequate weight gain during pregnancy were almost four times more likely [RR = 3.66 (95% CI = 3.35, 3.99)] to have a low birthweight baby compared to women who did not smoke and gained adequate weight during pregnancy.[33]

Premature birth

Defined as birth between 20 and 37 weeks gestation, premature birth is the leading cause of death among infants. The United States has a high proportion of premature births compared to other industrialized nations. All preterm infants are at a significant risk for health problems and the earlier the birth, the greater the risk.[34] Preterm delivery is associated with lifelong intellectual disabilities, cerebral palsy, breathing and respiratory problems, vision and hearing loss, and feeding and digestive problems.

Known risk factors for preterm delivery include a history of preterm delivery; uterine, cervical or placental dysfunction; lifestyle and environmental risks (smoking cigarettes, drinking alcohol, using illicit drugs, poor nutrition, and stressful life events); and medical risks (high blood pressure, diabetes, clotting disorders, being underweight or overweight before pregnancy, multiple miscarriages or abortions, and physical injury or trauma).[35] Another major factor influencing the rise in preterm births is the use of assisted reproductive technology for conception, which increases the likelihood of multiple births and therefore, preterm births.[35]

In 2006, the rate of premature births in the United States was 12.8 percent. In Colorado, the rate of preterm delivery is lower, but has been rising. As illustrated in Figure 43, the percentage of live births delivered preterm in 2000 was 9.0 percent, which increased to 9.6 percent by 2008. While small numbers may help explain the variation among the American Indian/Alaskan Native and Asian American/Pacific Islander populations, the Black/African American population in Colorado continuously demonstrates the highest rate of preterm delivery compared to all other racial/ethnic groups; this disparity is observed over time and is also seen nationally.

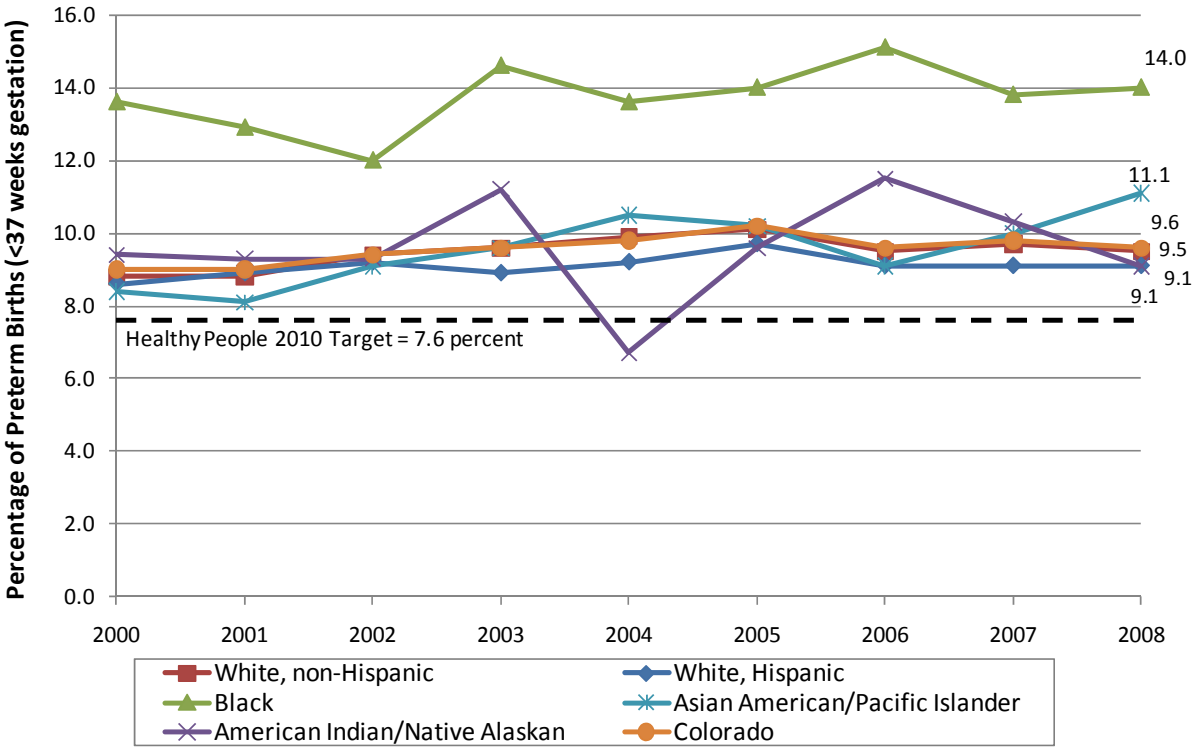

Figure 43. Percent of Live Births Delivered Preterm (< 37 weeks gestation)
Colorado Total Births and Births by Race and Ethnicity, 2000-2008
Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Preterm infants born between 34 and 36 weeks have fewer complications than infants born earlier, but are still at risk for jaundice, breathing problems, longer hospital stays, and an increased risk of death in the first year of life.[36] The rates of late preterm delivery (defined as births between 34-36 weeks) have risen both nationally, in Colorado, and among all age groups. In the United States, the rate has increased 19 percent between the time periods 1990-1991 and 2005-2006 (from 6.8 percent of live births to 8.1 percent of live births respectively). During this same time period, Colorado experienced a 22 percent increase from 6.4 percent to 7.8 percent of all live births. Women under 20 years of age and women ages 40 and older are the most likely to have a late preterm delivery.[36] Although many factors contribute to late preterm delivery, recent research suggests that the increasing use of induction of labor and cesarean delivery at 34 to 36 weeks is a contributing factor.[37-38]

Neural Tube Defects

Neural tube defects such as anencephaly and spina bifida are two causes of infant morbidity that can be prevented. During 2001– 2005, the Colorado prevalence of anencephaly (1.3 per 10,000 live births) and spina bifida (3.4 per 10,000 live births) were lower than the prevalence observed in the United States (2.5 per 10,000 live births and 3.7 per 10,000 live births, respectively). Colorado is close to meeting Healthy People 2010 Objective 16-15 to reduce the occurrence of spina bifida and other neural tube defects to 3 per 10,000 live births.[39] One successful prevention strategy is the use of folic acid to reduce neural tube defects. For

pregnant women, folic acid should be consumed every day in the form of a prenatal vitamin or a multivitamin. In Colorado during 2008, only 33 percent of women reported taking such a supplement every day in the month prior to pregnancy, according to PRAMS. This result is far below Healthy People 2010 Objective 16-16, which is to increase the proportion of pregnancies to 80 percent that begin with an optimum level of folic acid.[14, 40]

Access to Health Care

Visiting a health care professional after hospital discharge enhances the health of the infant by reducing morbidity through checkups, preventive services and follow-up. In Colorado, the proportion of infants who see a health care worker within the first week after leaving the hospital is increasing. In 2004, 91 percent of infants were seen by a health care worker during the first week post discharge, which increased to 94 percent by 2008.[14]

After the initial visit with a health care worker, the infant is scheduled for well-baby checkups that occur every two months for the first six months. In 2008, almost all (98 percent) Colorado infants had a well-baby checkup. Well-baby exams are most likely to occur when the infant is covered by some type of health insurance. In 2008, 55 percent of Colorado infants were covered by private insurance or an HMO, 38 percent were covered by Medicaid, 4 percent were covered by Child Health Plan Plus, and 2 percent of infants had no insurance.[14] Health insurance coverage for infants in Colorado is quite good, which is reflected in the high proportion receiving health checkups within the first several months of life.

Screening[xxi]

Screening for disorders is also enhanced among infants with health insurance. Screening for metabolic conditions, conducted between three and five days after birth, identifies those that may lead to significant morbidity or mortality. A second screening is conducted between 8 and 14 days of age to identify conditions that may have been missed during the first round of screening. Each year, an average of 70,000 Colorado infants are screened, and of those, 2,000 have a positive or abnormal screen, with about 100 ultimately diagnosed with a disease.

In addition to metabolic screening, all Colorado infants are screened for hearing disorders. Approximately 200 infants are identified with significant hearing loss at birth. In 2008, 97.8 percent of Colorado infants participated in a hearing screening. The Healthy People 2010 objective specific to newborn screening is being reassessed, but a modified objective specific to both screening and follow-up is proposed for Healthy People 2020 (MICH HP2020-22).

Injury Hospitalizations

Injury requiring hospitalization is rare among infants less than one year of age. In 2008, in a population of 71,067 infants, only 211 infants were hospitalized for injury, including 128 males and 83 females. Among the male infants, 57 percent of the hospitalizations were due to unintentional injuries (i.e., falls and other accidents), and 24 percent were due to intentional injuries (i.e., child abuse and neglect). In 19 percent of cases, the cause was undetermined.

[xxi] See http://www.cdphe.state.co.us/ps/hcp/nbms/index.html about the Colorado Newborn Screening Programs.

Similarly among female infants, 57 percent of hospitalizations were due to unintentional injuries, while 31 percent were due to intentional injuries. The cause was undetermined in 12 percent of cases.

As seen in Figure 44, the hospitalization rate of infants for unintentional injuries has been decreasing over time for both genders, while the intentional injury hospitalization rate has remained fairly constant. Most notable is the disproportionate rate of males hospitalized for injuries compared to females.

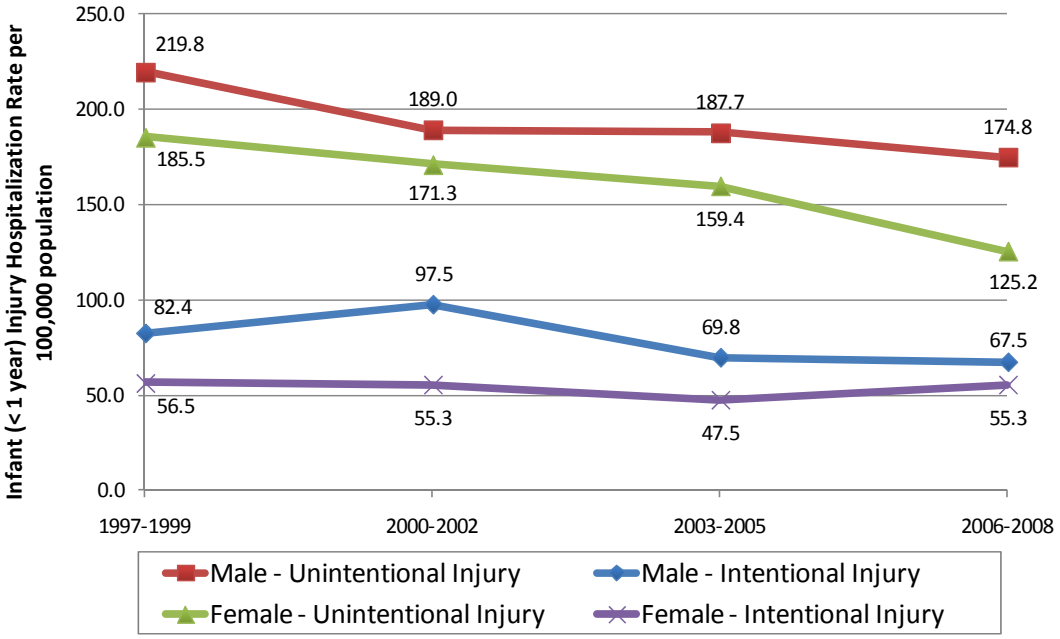

Figure 44. Unintentional and Intentional Injury Hospitalization by Gender
Two-year Annual Average Rates per 100,000 Population, Colorado, 1997-1999 to 2006-2008
Source: Colorado Trauma Registry, Hospitalization Data

Secondhand Smoke Exposure

Secondhand smoke is the smoke that comes from the burning end of a cigarette, cigar, or pipe, which is also exhaled by smokers. In many instances, exposure to secondhand smoke presents health hazards comparable to smoking. Infants exposed to secondhand smoke are at risk for sudden infant death syndrome, and children living in homes where people smoke are more likely to get sick with respiratory problems.

As seen in Chapter 3, the percentage of women who report smoking after delivery is decreasing with a greater proportion of Hispanic women (all races) remaining nonsmoking compared to non-Hispanic women (all races). Over five years, the prevalence of smoking in the same room as the infant has decreased from 5.2 percent in 2002 to 2.1 percent in 2007.[14] In 2008, 2.2 percent of Colorado women reported a husband/partner smoking in the house, and 3.4 percent reported that someone else besides the mother, husband/partner smoked in the house.[14]

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Chapter 5 – Child Health

Childhood is a period of immense growth and development—physically, mentally, socially, and emotionally. Family and community support are key to optimal growth and development. This chapter highlights indicators of children's health in Colorado, ranging from behavioral and environmental factors impacting health status to major causes of morbidity and mortality, as well as access to health care. This chapter also profiles issues pertinent to children with special health care needs.

Section 1: Aspects of Health

General Health Status

Based on results from the Colorado Child Health Survey, almost all Colorado children have good health overall, and this proportion has not changed from 2004 to 2008. An estimated 97 percent of children ages 1-14 years old had excellent, very good, or good health as reported by their parents or guardians. Hispanic children (all races)[xxii] have somewhat lower rates of good health (92 percent) compared to all other race and ethnic groups in Colorado.[1] Another measure of general health status is the number of school days missed due to illness or injury. Approximately 83 percent of children ages 6-11 years old missed 10 or fewer days of school due to illness or injury.[2]

Community Influences/Assets

The Colorado Child Health Survey and the National Survey of Children's Health also provide data on community and school environments for children. Based on results from the 2005-2008 Colorado Child Health Survey, 99 percent of children in Colorado live in neighborhoods that are always or usually safe. Similarly, 97 percent of Hispanic and low income children live in neighborhoods that are always or usually safe. Regarding school safety, a lower and different pattern emerges. Overall, 91 percent of children attend schools that are always or usually safe; however, this proportion is significantly lower for Hispanic children (all races) (82 percent) and low-income children (83 percent).[1]

In addition, eighty-eight percent of children ages 6-11 years old are usually or always engaged in school.[2] Engagement in school was defined by two questions asked of children's parents:

1) How often the child cared about doing well in school and
2) How often the child did all required homework in the past month.

Different measures of parent involvement with children suggest that Colorado parents are involved in their children's learning. Two-thirds of children ages 1-5 years old were read to

[xxii] Unless otherwise noted in this chapter, for results from the Colorado Child Health Survey, "Hispanic" refers to children of all races whose ethnicity is Hispanic, "White/non-Hispanic" refers to children whose race is White and the ethnicity is not Hispanic, and "Black/non-Hispanic" refers to children whose race is Black/African American and whose ethnicity is not Hispanic.

every day and three-fourths of parents of children ages 5-14 years old reported volunteering at their child's school.[1]

Children with Special Health Care Needs

Children with special health care needs are children who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition that requires health and related services beyond that required by "typical" children generally. In Colorado there are an estimated 162,000 children ages 1-14 years old with special health care needs, close to 18 percent of all children of that age.[3]

Table 11. Demographic Characteristics of Children with Special Health Care Needs Ages 0-17 Years, Colorado and the U.S., 2005-2006

Characteristics	% in Colorado	% in United States
All children	13	14
Age Group (in years)		
0-5	8	9
6-11	13	16
12-17	16	17
Sex		
Male	15	16
Female	10	12
Household Income		
0-99% FPL	10	14
100-199% FPL	12	14
200-399% FPL	13	14
400% FPL or more	13	14
Ethnicity		
Non-Hispanic	14	15
Hispanic	9	8

FPL = federal poverty level

Source: National Survey of Children with Special Health Care Needs, Data Resource Center for Child and Adolescent Health, Child and Adolescent Health Measurement Initiative.

Data from The National Survey of Children with Special Health Care Needs in 2005/2006 demonstrate that 13 percent of Colorado children ages 0-17 years old had special health care needs, less than the 14 percent prevalence for the United States as a whole; 20 percent of all households have one or more children with special health care needs. This percentage is similar for urban, suburban, and rural areas of the state. Table 11 shows that the prevalence of children with special health care needs is lower in most subpopulations in Colorado, compared to the nation. Several other findings, as shown in Table 11, include:

- Children ages 0-5 years old are the lowest proportion (8 percent) of children with special health care needs, and children ages 12-17 years old are the highest (16 percent).
- The percentage of children with special health care needs does not vary by household income and family size, as measured by the federal poverty level.

- Close to 15 percent of all males and 10 percent of all females have special health care needs.
- Close to 9 percent of Hispanic children (all races) have special health care needs, compared to approximately 14 percent of non-Hispanic children.

Among children with special health care needs in Colorado, 23 percent have health conditions that consistently affect their daily activities. However, these conditions do not keep children from attending school. The survey found that approximately 86 percent of children with special health care needs in Colorado have 10 or fewer school absences in the past year due to illness or injury.[2]

Oral Health Status

Ninety percent of Colorado children ages 1-14 years old are reported to have good, very good, or excellent teeth.[1] This percentage has remained steady since 2004, the first year of data collection, and is similar for children with special health care needs (89 percent) compared to typical children (91 percent).[1] However, only 76 percent of White/Hispanic children's teeth were reported to be in excellent, very good, or good condition, a significantly lower percentage than among White/Non-Hispanic (95 percent) and Black/African American (90 percent) children.[1] As children get older, the percentage with oral health problems increases. Eighty-seven percent of children ages 1-5 years old do not manifest oral health problems, compared to 67 percent of older children ages 6-11 years old.[2]

Oral disease is preventable; yet dental caries (both treated and untreated tooth decay) is one of the most common childhood diseases.[4] During 2004-2008, the two most prevalent oral health issues among Colorado children ages 1-14 were crooked teeth and cavities, as reported by parents in the Colorado Child Health Survey. Two Healthy People 2010 Objectives address children's teeth. Objective 21-1 proposes to reduce to 42 percent the children with dental caries in their primary and permanent teeth. Objective 21-2 proposes to reduce to 21 percent the children with untreated dental decay. Based on data from the Colorado Oral Health Surveillance System, the percentage of children in kindergarten with a history of dental caries and untreated decay declined in 2007, moving closer to the targets. In 2007, 47 percent of 6-8 year olds in kindergarten had a history of dental caries, a decrease from 52 percent in 2004. Close to 22 percent of 6-8 year olds had untreated decay in 2007, a decrease from 28 percent in 2004.

Both a history of dental caries and untreated dental decay are highly correlated with income. Children who attend schools with a large proportion of children receiving free or reduced-price lunches are likely to come from lower income families. Figure 45 shows that kindergarten children who attended schools where at least 75 percent of children were eligible for the reduced-priced lunch program demonstrated a much higher prevalence of dental caries and untreated decay. Despite decreasing from 2004 to 2007, both measures among kindergartners at these schools remained much higher than the 2010 targets. Only kindergartners who attended schools with fewer than 25 percent of children in the lunch program met the Healthy People 2010 target.

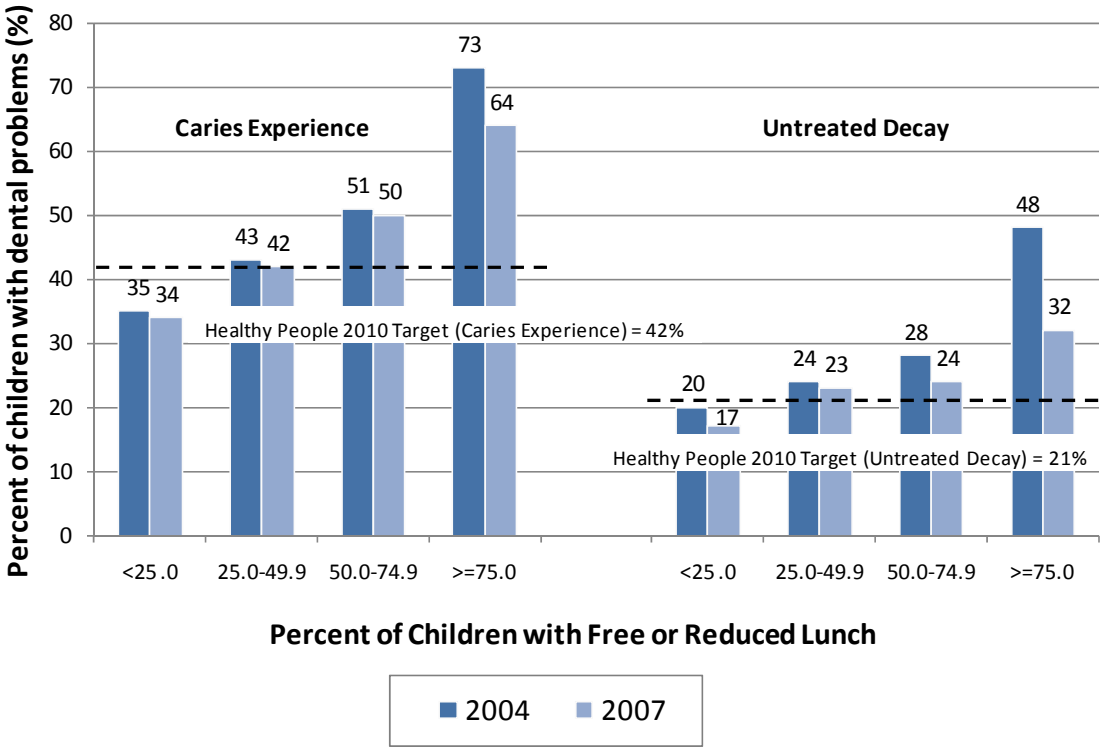

Figure 45. Kindergarten Children with Untreated Decay or Dental Caries, in Schools Grouped by the Percent of Students Receiving Reduced-Priced Lunches, Colorado, 2004 and 2007

Source: Colorado Department of Public Health and Environment, Oral Health Surveillance System

Dental sealants can be applied to prevent dental caries. Healthy People 2010 Objective 21-8 proposes to increase to 50 percent the proportion of children who have received dental sealants on their molar teeth. Colorado has not met this target. Figure 46 shows that the percentage of third grade children with dental sealants, grouped by the proportion of their school's student population who receive free or reduced-price lunches, a proxy for income. As shown in Figure 46, during 2007, 47 percent of children in third grade who attended public schools in Colorado where less than 25 percent of the school's student population receives free or reduced-price lunches received dental sealants. In comparison, only 28 percent of children in third grade where 75 percent or more of the school's student population received free or reduced-price lunches had dental sealants applied. Even the results for children in schools with fewer than 25 percent of students in the free and reduced lunch program did not met the Healthy People 2010 target.

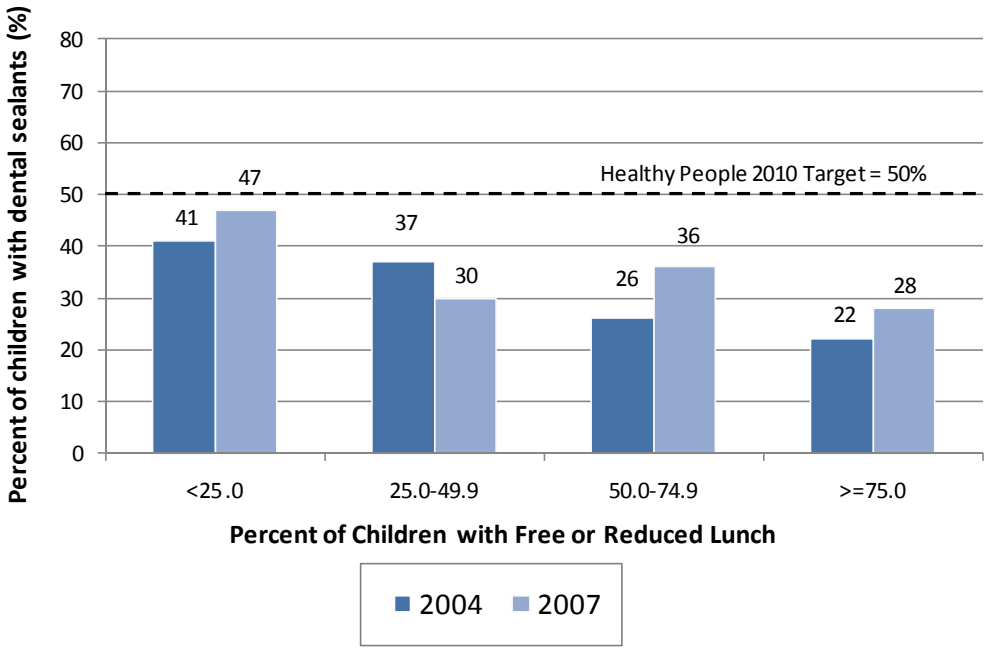

Figure 46. Third Grade Children with Dental Sealants in Schools Grouped by the Percentage of Students Receiving Reduced-Price Lunches, Colorado, 2004 and 2007
Source: Colorado Department of Public Health and Environment, Oral Health Surveillance System

Mental and Behavioral Health Status

About a quarter of children ages 1-14 years old in Colorado have difficulties with emotions, concentration, behavior, or their ability to get along with others.[1] Families of these children were asked to rate the severity of these problems. Of children with these problems, over 50 percent were rated as moderate or severe.[5] Children with special health care needs demonstrate higher rates of behavioral health problems. Healthy People 2010 Objective 6-2 proposes to reduce the proportion of children and adolescents with disabilities who are reported to be sad, unhappy or depressed to 17 percent. Approximately 24 percent of children with special health care needs ages 0-5 years old, and 44 percent of children ages 6-11 years old experienced one or more emotional or behavioral difficulties.[6] Thirty percent of children with special health care needs ages 6-11 years old are reported to experience difficulties with anxiety or depression.[6]

Section 2: Health Behaviors and Risk Factors

A variety of health behaviors can influence an individual's health trajectory during childhood which is one of the critical periods of development in the life course. Data pertinent to health behaviors for children and children with special health care needs are detailed in this section.

Immunizations

Healthy People 2010 Objective 14-22 proposes to achieve and maintain effective vaccination levels among the population of young children at 90 percent for universally recommended

individual vaccines and at 80 percent for the total series of doses.[7] For children ages 19-35 months, the recommended total series includes:

- four or more doses of diphtheria, tetanus, and pertussis vaccine (DTaP)
- three or more doses of polio vaccine
- one or more doses of measles, mumps, and rubella vaccine (MMR)
- three or more doses of Haemophilus influenza type b vaccine (Hib)
- three or more doses of hepatitis B vaccine
- one or more doses of varicella (chickenpox) vaccine.

Before 2005, the National Immunization Survey measured the number of children who received the first five vaccines in the list above, called the 4:3:1:3:3 series. In 2005, the definition of a fully immunized child, ages 19-35 months, expanded to include a varicella vaccination; this vaccination series is called 4:3:1:3:3:1.[7] Figure 47 shows the percentage of children vaccinated in Colorado for both of these series. In 2008, 78.2 of all children in the U.S. were fully immunized; Colorado's rate of 79.4 percent was the 9th highest rate of fully vaccinated children among the 50 states.[7] This rate has not changed significantly since 2005. The percentage of children vaccinated for the 4:3:1:3:3 series has increased significantly over the decade; from 71.6 percent in 2000 to 80.7 in 2008.[8]

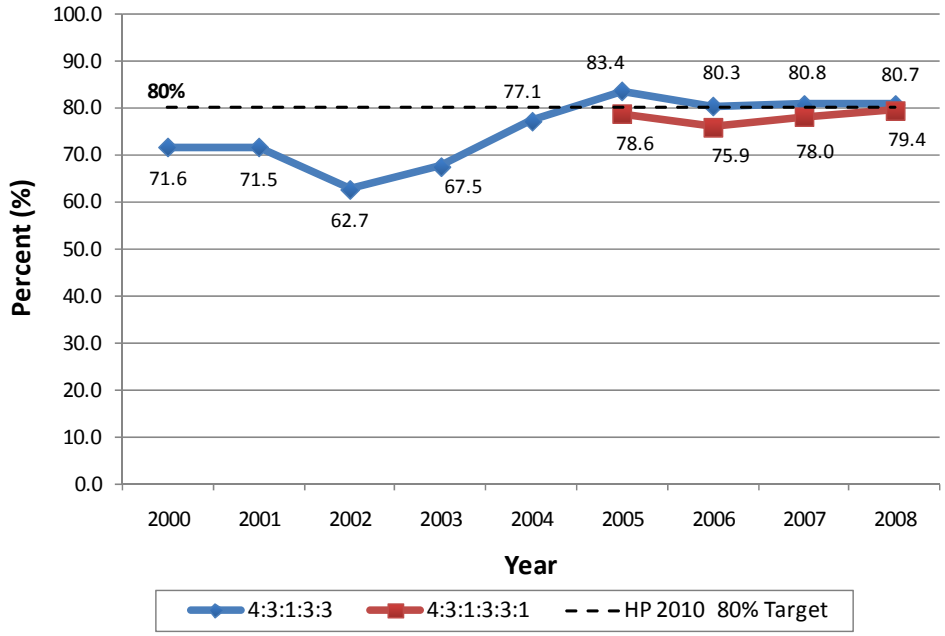

Figure 47. Estimated Vaccination Coverage among Colorado Children Ages 19-35 Months, by Series, 2000-2008
Source: National Immunization Survey

Influenza vaccine is recommended yearly for children ages 6 months to 18 years old. To fully immunize children who are younger than 9 years old and who have never had an influenza vaccine, the recommendation is that these children receive two doses spaced at least 4 weeks apart. Limited data are available on influenza coverage. Data from September through

December of 2006 found that 26 percent of children ages 6-23 months were fully vaccinated for influenza.[9] This result was slightly higher but not significantly different from the national average of 21 percent.

Other recommended vaccines include a tetanus and diphtheria booster (Td) for children who have completed the DTaP (a combination vaccine against diphtheria, tetanus and pertussis) previously. The booster is recommended for children ages 11-12 years old. Three doses of human papillomavirus vaccine (HPV) are recommended for older girls. The first of three doses of human papillomavirus vaccine (HPV) can be started when girls are ages 11-12 years old. Meningococcal conjugate vaccine (MCV) can be administered at age 11 or 12 years old.[10] No data are available to estimate the percentage of coverage for these three vaccines.

Parents seem to rely on their children's primary health care providers for information about vaccines. The Colorado Child Health Survey asked parents of children ages 1-5 years old where they get their information about vaccines. The most frequently mentioned source was from the doctor or the doctor's office (87 percent). The second most frequently mentioned source of information on vaccines was the Internet (13 percent).[1]

Physical Activity

Regular physical activity is important to maintain health and well-being in children. Physical activity builds strong bones, decreases the likelihood of developing obesity and risk factors for type 2 diabetes and heart disease, and may promote positive mental health.[11] Current standards recommend that children ages 6 years and older participate in 60 minutes or more of physical activity each day.[12] Based on data from the National Survey of Children's Health, approximately 33 percent of Colorado children ages 6-11 engage in daily vigorous physical activity, similar to the estimated 31 percent of children nationwide.

Respondents to the Colorado Child Health Survey were asked how many hours in a typical week their child spends playing sports or doing some other physical activity, such as dancing, roller skating or bicycling. An estimated 54 percent of children ages 6-14 spend 7 or more hours a week in such physical activity.[1] This estimate was similar for children living in metropolitan and rural counties.

Watching television and playing computer games ("screen time") may decrease time devoted to physical activity. The American Academy of Pediatrics recommends that children ages 2 years and older should spend no more than 2 hours a day watching TV, playing video games, and using the computer (on-screen activity).[13] In 2008, approximately 70 percent of Colorado children met this recommendation.[1] In Colorado, slightly more than half of children ages 6-14 met the recommended level of physical activity, regardless of their amount of screen time. Among children who spent 2 or more hours a day in on-screen activity, 52 percent also participated in the recommended 7 or more hours of physical activity a week. In comparison, 57 percent of children who spent less than 2 or more hours in on-screen activity met the recommended level of physical activity.[1] These results suggest continued promotion of physical

activity among all children, regardless of their level of screen time, to increase the percentage that meets the recommended daily amount.

Nutrition

Fruits and vegetables are important for optimal child growth, weight management, and chronic disease prevention. The Healthy People 2010 Objectives 19-5 and 19-6 (related to fruit and vegetable consumption, respectively) propose to increase the proportion of children ages 2 years and older who consume 2 or more servings of fruit to 75 percent, and who consume 3 or more servings of vegetables to 50 percent. Though this behavior has increased significantly since 2004, the percentage of Colorado's children ages 2-14 who consume the recommended amount of fruits and vegetables is far from meeting the target (Figure 48). While 48 percent of children ages 2-14 in 2008 ate 2 or more servings of fruit a day, only 11 percent ate 3 or more servings of vegetables. Only 10 percent consumed the recommended amounts of both fruits and vegetables.

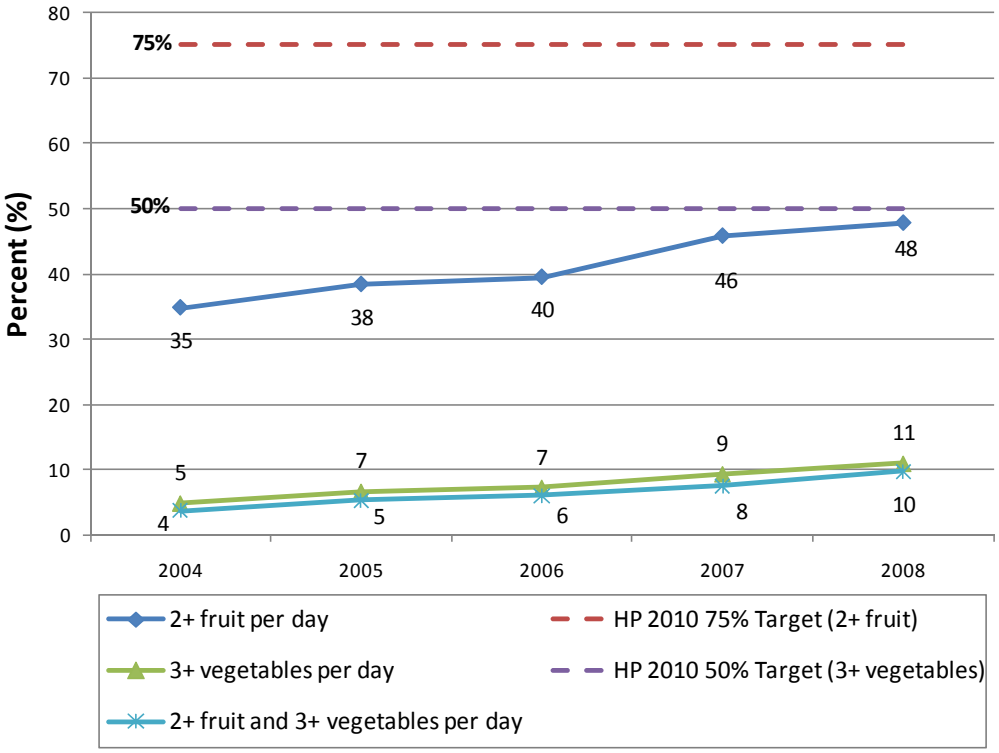

Figure 48. Fruit and Vegetable Consumption Among Children Ages 2-14, Colorado, 2004-2008
Source: Colorado Department of Public Health and Environment, Colorado Child Health Survey

A study of Colorado children and their families in 2005 highlights the family's influence on children's consumption of fruits and vegetables.[14] Children were three times more likely to eat 5 or more servings of fruits or vegetables daily if their parents did so. Children who had a family meal at least once a day were two times more likely to eat 5 servings of fruits and vegetables a day than children whose families did not eat together. Children ages 1-5 years old were more likely to eat the recommended servings of fruits and vegetables than children ages 6-14 years old.

Weight

Maintaining a healthy weight is just as important to child health as it is to adult health. Healthy weight is defined using a body mass index (BMI), which is a measure of weight adjusted for height. For children, a healthy weight is defined as a BMI at or above the 5th percentile for age and below the 85th percentile. Children with a BMI below the 5th percentile are considered underweight and children with a BMI at or above the 85th percentile and lower than the 95th percentile are overweight. Children with a BMI at or above the 95th percentile are considered obese.[15]

Children who are obese are at risk for health problems during youth and adulthood. They are more likely to have high blood pressure, high cholesterol, and type 2 diabetes than are other children. Several studies indicate that obese children are more likely to be obese as adults than non-obese children.[16] Childhood obesity is a major health issue in the United States. Data from national surveys show that the prevalence of obesity has increased for children of all ages. Results from national surveys in 2003-2006 compared to results from 1988-1994 show an increase in obesity among:

- Children ages 2-5 years old from 7.2 percent to 12.4 percent,
- Children ages 6-11 years old from 11.3 percent to 17.0 percent, and
- Children ages 12-19 years old from 10.5 percent to 17.6 percent.[17]

Healthy People 2010 Objective 19-3 proposes to reduce the proportion of children who are obese to 5 percent for all ages. Close to 14 percent of Colorado's children ages 2-14 years are obese. Children with special health care needs demonstrated an obesity prevalence (15 percent) similar to typical children (13 percent).[1]

Several factors within the home environment are associated with obesity in Colorado's children. Children in Colorado are over two times more likely to be overweight or obese if a parent is obese.[14] In Colorado, 40 percent of parents whose child is obese said that they often or sometimes rely on low-cost food to feed their children due to financial constraints. In contrast, a significantly lower proportion of all parents (28 percent), parents whose children were overweight (29 percent) or underweight (26 percent) often or sometimes rely on low-cost food to feed their children.[1]

The weight status of low-income children younger than 5 years old is monitored by the Pediatric Nutrition Surveillance System.[18] Data are collected at the clinic level for low-income children in federally funded maternal and child health programs. In 2008, 107,314 children were followed in Colorado. Over 39 percent of children were infants (less than 12 months old) and close to 41 percent were between age 2 and 5. The majority of the children in this survey[xxiii] were Hispanic ethnicity (59.6 percent) of all races. The remaining children were non-

[xxiii] The data results from this survey were presented for the racial groups Black/African American, Asian/Pacific Islander, American Indian/Alaskan Native and multiple races, excluding children of Hispanic ethnicity, because the results for Hispanic children of all races were grouped together.

Hispanic and the following racial groups: White/non-Hispanic (28 percent), Black/African American, (6.4 percent), Asian/Pacific Islander (1.4 percent), American Indian/Alaskan Native (1.0 percent) and multiple races (3.3 percent).

The Pediatric Nutrition Surveillance System uses the same definitions for underweight, overweight, and obese, as defined above. According to this System, the percentage of low-income children younger than age 5 years old who are overweight and underweight has remained steady in the past 5 years both in Colorado and nationally.[18] In 2008, 8.2 percent of Colorado low-income children under age 5 years old were obese, compared to 13.9 percent nationally. In 2008, 3.5 percent of Colorado low-income children under age 5 years old were underweight, compared to 4.5 percent nationally. Among low-income children ages 2 and older, the White/Hispanic (10.8 percent) and American Indian/Alaskan Native (12.2 percent) populations had the highest proportion of children who were overweight. The Black/African American (5.5 percent) and Asian/Pacific Islander (4.9 percent) populations demonstrated the highest rates of underweight among low-income children younger than age 5. Age was associated with obesity but not underweight. Obesity rates increase as children age: 6.8 percent of low-income infants were obese, compared to 10.7 percent of low-income children age 4.

The Pediatric Nutrition Surveillance System also monitors stature. Short stature may be a marker for overall child health and nutrition status. While short stature may be associated with short parental stature and/or low birth weight, it can also result from growth restriction due to chronic malnutrition, recurrent illness, or both. Healthy People 2010 Objective 19-4 proposes to reduce growth retardation among low-income children (younger than 5 years old) to 5 percent. According to the Pediatric Nutrition Surveillance System, the proportion of low-income children with short stature in Colorado has remained constant at 8 percent for the last five years.[18] Similarly, the national rate of short stature (6.2 percent) has not varied significantly during this time period; however, it is lower than the Colorado rate. Short stature decreases with increased age. Infants had the highest rate of short stature (11.2 percent); the oldest children (4 years old) had the lowest (3.9 percent). The short stature of infants may reflect the large proportion of low birth weight and premature infants in this population.

Section 3: Morbidity and Mortality

Deaths among children (after infancy) present public health professionals with an opportunity for prevention and for a continued commitment to increasing life expectancy. Therefore, Healthy People 2010 Objective 16-2 proposes to reduce mortality among children to:

- 25.0 deaths per 100,000 children ages 1-4 years old,
- 14.3 deaths per 100,000 children ages 5-9 years old, and
- 16.8 deaths per 100,000 children ages 10-14 years old.

The 2006-2008 annual average three-year death rate for children in Colorado meets and exceeds (is lower than) the targets for children ages 5-9 years old and 10-14 years old. The rate

for children ages 1-4 years old was only slightly higher than the 2010 target. The mortality rates for Colorado children in these age groups were:

- 25.4 deaths per 100,000 children ages 1-4 years old,
- 12.1 deaths per 100,000 children ages 5-9 years old, and
- 15.2 deaths per 100,000 children ages 10-14 years old.[19, xxiv]

From 2006 to 2008, 31 percent of deaths among children ages 1-14 years old were to Hispanic children of all races; 7 percent were to Black/African American non-Hispanic children, and 57 percent to White/non-Hispanic children. Non-Hispanic children of all other races accounted for 6 percent of all childhood deaths during this time.[19]

Injury

Unintentional injury is the leading cause of death for children. Historically called "accidents," many unintentional injuries are preventable with the implementation of appropriate safety strategies. Intentional injuries are defined as those in which there was intent to cause harm, such as suicide and homicide.

During 2006-2008, unintentional injury was the leading cause of death for all age groups, accounting for 26.7 percent of the 217 deaths in children ages 1-4; 29.3 percent of the 123 deaths of children ages 5-9; and 33.8 percent of deaths in children ages 10-14. Over 11 percent of deaths to children ages 1-4 years old were due to homicide.

Table 12. Injury Death Rates per 100,000 Children by Age Group Colorado and the United States, 2004-2006

Age Groups	Colorado Rate	United States Rate
Ages 1-4 years old		
Unintentional Injuries	7.6	10.1
Intentional Injuries		
Suicide	n/a	n/a
Homicide	2.9	2.3
Ages 5-9 years old		
Unintentional Injuries	3.8	5.5
Intentional Injuries		
Suicide	n/a	n/a
Homicide	0.5	0.7
Ages 10-14 years old		
Unintentional Injuries	4.7	6.6
Intentional Injuries		
Suicide	1.2	1.2
Homicide	1.1	1.1

Source: Colorado Health Information Dataset, Colorado Department of Public Health and Environment; Web-based Injury Statistics Query and Reporting System, Centers for Disease Control and Prevention

[xxiv] Death rates by race and ethnicity cannot be figured because population estimates by age and race/ethnicity do not exist in Colorado, for non-census years.

Table 12 compares the injury death rates for children in Colorado and the U.S. for unintentional injuries and two intentional injuries: suicide and homicide. The death rates from unintentional injuries are lower for Colorado than the national rates; rates of intentional injuries are similar to national data.

The major cause of unintentional injury for children has consistently been associated with motor vehicle-related incidents. Deaths due to motor vehicle injuries have declined for children 1-14 years old, from 4.6 during the time period 2000-2002, to 2.7 during 2006-2008. There were a total of 52 intentional injury deaths among this age group in Colorado during 2006-2008.[20] Homicide was the leading cause of intentional deaths among children ages 1-9 years old, and suicide among children ages 10-14 years old. The homicide rate for children ages 1-14 years old has remained constant since 2000-2002, at 1.3 homicide deaths per 100,000 children. The suicide rate for this same age group has declined from 1.1 deaths by suicide per 100,000 children in 2000-2002 to 0.6 in 2006-2008. Because of the small number of suicide deaths in this age group, it is unknown whether this decrease is significant or an ongoing trend.

Boys have higher rates of injury mortality and injury hospitalizations than girls of the same age. Figures 49 and 50 indicate that these rates have been decreasing for both boys and girls during the last decade. The three-year annual average injury death rate declined 32 percent overall, and the injury hospitalization rate declined 29 percent from the time period 2000-2002 to 2006-2008. The rate of decline was similar for both boys and girls for both rates.[20-21]

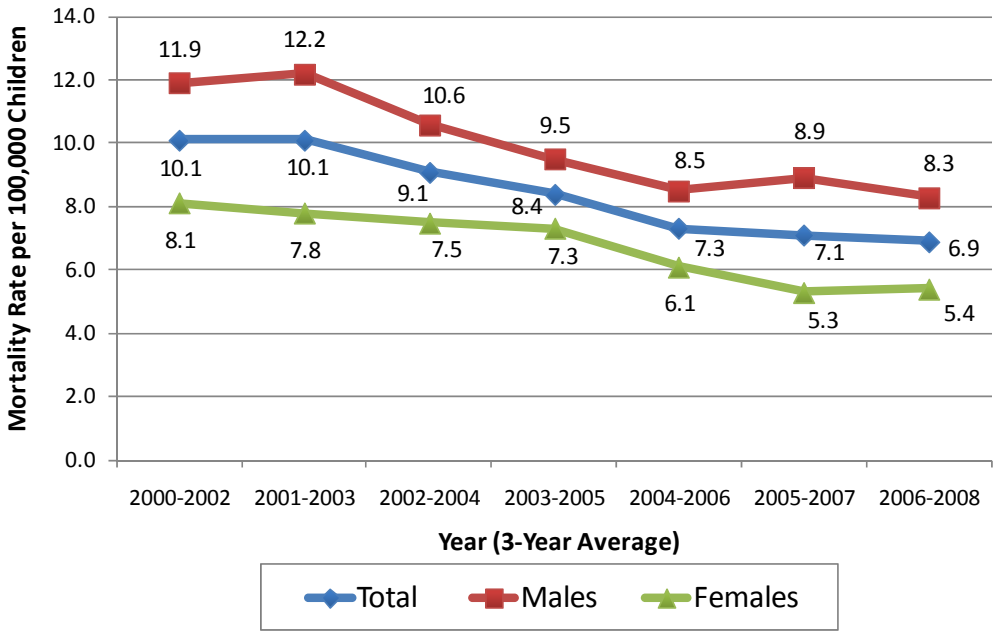

Figure 49. Injury Death Rates for Children Ages 1-14 Years Old by Gender, 3-Year Annual Average, Colorado, 2000-2002 to 2006-2008

Source: Colorado Health Information Dataset, Colorado Department of Public Health and Environment

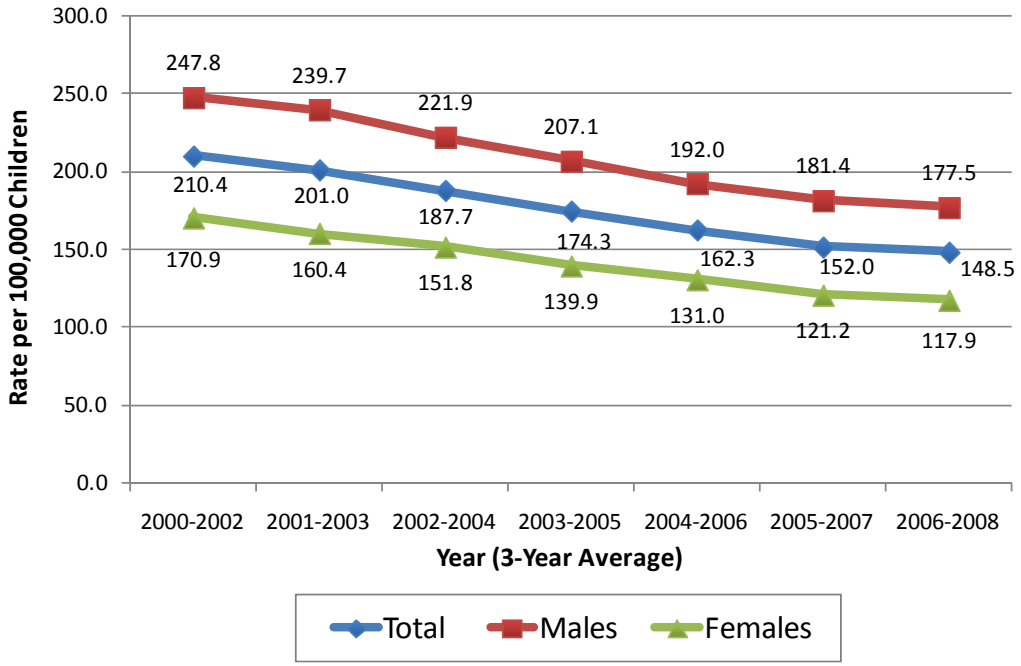

Figure 50. Injury Hospitalization Rates for Children Ages 1-14 Years Old, by Gender 3-Year Annual Average, Colorado, 2000-2002 to 2006-2008

Source: Colorado Health Information Dataset, Colorado Department of Public Health and Environment

While injury deaths and hospitalizations are important, they represent only a small portion of injury to children. Based on data from the Colorado Child Health Survey, five percent of children ages 1-14 sustained injuries that required medical attention during the three months prior to the survey. Approximately 44 percent of injuries occurred in the home and 44 percent of injuries were treated at an emergency department.[1] Studies show that children with disabilities have higher rates of injury.[34] A proposed Healthy People 2020 Objective is to reduce nonfatal injuries among people with disabilities. In Colorado, the proportion of children with special health care needs who sustained injuries was slightly higher compared to children without special health care needs (7 percent vs. 5 percent). This difference was not statistically significant.[1]

Injury hospitalizations represent the more severe type of nonfatal injury. As noted above, the rate of injury hospitalization has declined in the past decade. The major causes of injury hospitalization differ by age group (Table 13). Falls are the leading cause of injury hospitalization for all three age groups, and motor vehicle crashes are also in the top three leading causes for all age groups. Poisoning is the second leading cause of injury hospitalization for children ages 1-4 years old.

Table 13. Three Leading Causes of Injury Hospitalization for Children by Age, Colorado, 2006-2008

Cause	Ages 1-4 Years			Ages 5-9 Years			Ages 10-14 Years		
	Rank	#	%	Rank	#	%	Rank	#	%
Falls	1	480	30	1	494	39	1	460	22
Poisonings	2	194	14						
Motor vehicle crashes	3	151	11	2	243	19	2	432	20
All other road crashes				3	113	10			
Suicide Attempts							3	263	13

Source: Health Statistics Section, Colorado Department of Public Health and Environment

Hospitalizations for suicide attempts are documented among children as young as 5-9 year olds. Between 2006 and 2008, there were 8 hospitalizations for attempted suicide among children this age. As shown in Table 13, for the three-year period 2006-2008, there were a total of 263 hospitalizations for suicide attempts by children ages 10-14 years old, the third leading cause of injury hospitalizations for children this age.[21] The hospitalization rate related to suicide attempts was close to four times higher for girls age 10 to 14 years old (42.9 per 100,000 girls) than boys of the same age (11.8 per 100,000 boys), based on a three-year annual average rate from 2006-2008. These data on suicide attempts are not representative of all attempts as they are limited solely to those resulting in an inpatient hospitalization. No data are available on children who attempted suicide and were treated and released from emergency departments or other outpatient medical facilities. Among children ages 10-14 years old, the suicide death rate was higher for boys (2.6 per 100,000) and more than double that of girls (0.6); in contrast, hospitalizations for a suicide attempts was higher for girls than boys.[21]

Motor Vehicle-Related Injuries

As noted above, motor vehicle-related incidents constitute one of the major causes of injury deaths and hospitalizations among children. One method of reducing motor vehicle deaths and hospitalizations includes the proper use of child safety seats, booster seats, and seat belts. Healthy People 2010 Objective 15-20 proposes to increase the use of age-appropriate child restraints in motor vehicles to 100 percent. Based on data from the Colorado Child Health Survey, 93 percent of children ages 1-14 years old always used some type of restraint when riding in a car, van, or truck.[1]

Since 2003, Colorado law (expanded to cover 6 and 7 year olds in 2010) has mandated that:

- Children must ride in rear-facing car seats in a rear seat of the vehicle until they are at least 1 year old and weigh at least 20 pounds
- Children ages 1-4 years old and who weigh 20 to 40 pounds must be restrained in a rear-facing or forward-facing car seat according to manufacturer's instructions
- Children ages 4 years old through 7 years old must be properly restrained in a child restraint system according to the manufacturer's instructions (usually this will be a booster seat for this age group).
- Children ages 8-17 years old must be restrained in a seat belt or child restraint system according to the manufacturer's instructions in all seating positions.[22]

In April 2010, the Colorado General Assembly enhanced Colorado's booster seat law by passing legislation that requires children ages 4-7 to be properly restrained in a booster seat. This new law, which will go into effect on August 1, 2010, improves Colorado's current law that only mandates 4- and 5-year- olds to be in booster seats. Additionally, the new law requires all children under age 1 to be properly restrained in the rear seat of a vehicle and makes all of the child passenger safety laws subject to primary enforcement.

Studies show that the use of booster seats significantly reduces the risk of injury among children ages 4-8 years compared to children using adult seatbelts.[23-24] Booster seat usage by this age group has increased significantly in Colorado since 2001, when only 15 percent who always use a child safety restraint used a booster seat as the restraint method, compared to results from 2007,[25] when 50 percent who always use a restraint used a booster seat.[1]

In Colorado, the use of booster seats varies by age and family income. Younger children were more likely to use booster seats. Among children who always used some type of safety restraint in 2007, 69 percent of 4-5 year olds used booster seats compared to 36 percent of 6-8 year olds.[1] Use of booster seats among 4-8 year olds increased with increasing household income. Among those children who always use some type of restraint, 31 percent of children ages 4-8 living in households with incomes of less than $25,000 used booster seats, compared to 45 percent of children in households with incomes of $25,000 to $50,000, and 57 percent of children in households with incomes over $50,000.[1]

Injuries to Bicyclists

Bicycling is an excellent means to increase physical activity and combat obesity. According to results from the 2006 Colorado Child Health Survey, 81 percent of children ages 5-14 rode a bike; of those, 46 percent rode two or more hours a week.[1] Biking provides healthy exercise but also presents opportunity for injury. Deaths due to bicycle riding are few: from 2004 to 2006 there were only two bicycle-related injury deaths in Colorado among children ages 5-14.[26] Yet, nonfatal bicycle injuries are significant, including traumatic brain injuries that can be debilitating.

The average annual rate of acute care hospitalization for injuries sustained in a bicycle crash has declined over the past decade. From 2000-2002 to 2006-2008 there was a 30 percent drop in the rate of hospitalizations for bicycle crash injuries for Colorado children ages 5 to 14, from 19.2 acute care hospitalizations in Colorado per 100,000 children, to 13.3 hospitalizations per 100,000 children. Similarly, the hospitalization rate for bicycle-related injuries that resulted in traumatic brain injury declined from 7.0 to 5.1 over the same period, a drop of 30 percent as well. The rate of hospitalizations for all bicycle-related injuries (and for the subset that resulted in traumatic brain injury) has consistently been higher for boys than girls of this age.

Use of bicycle helmets has been shown to prevent many head injuries due to bicycle crashes.[27] In 2006, 54 percent of children ages 5 to 14 years old always wore a bicycle helmet when riding a bike, according to their parent or caregiver.[1] Another study of Colorado children found two

groups of children with significantly lower rates of bicycle helmet use: children in low-income households (less than $25,000 per year) and children living in rural counties.[27]

Legislation mandating helmet use has been shown to increase usage and decrease traumatic brain injuries among young bicyclists.[27] Healthy People 2010 Objective 15-24 strives to increase the number of states with laws requiring bicycle helmets for bicycle riders.

Child Abuse and Neglect

Homicide was the third leading cause of death for children in Colorado, and assault accounted for 67 hospitalizations for children ages 1-4 during 2006-2008.[19-21] Federal law defines child abuse and neglect as:

- any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitations; or
- an act or failure to act which presents an imminent risk of serious harm.

Child maltreatment is comprised of four major categories: neglect, physical abuse, sexual abuse, and emotional abuse. Healthy People 2010 Objective 15-33 proposes to decrease child maltreatment cases to 10.3 per 1,000 children under age 18. Colorado has met this target as measured by the number of confirmed child abuse and neglect cases. The Colorado rate of maltreatment was lower in 2002 at 6.5 per 1,000 children under age 18; however, it increased to 8.6 in 2008.[28] The national rate during this same time period varied little, from 12.4 in 2001 to 12.1 in 2007.[29] In Colorado, the number of confirmed cases is collected by county agencies and definitions sometimes vary by county. It is unclear whether the recent rise in maltreatment cases is due to changes in definition, investigation, and/or reporting procedures over time, or whether this represents a true rise in maltreatment.

Based on a review of death certificates for children under age 18, the Colorado Child Fatality Review Team found that of all the 63 deaths due to child abuse and neglect in Colorado from 2004 through 2006, over 60 percent of the perpetrators were one of the child's biological parents. The majority of perpetrators were ages 20-29 (53 percent); one-quarter were 30-39 years old.[30]

Chronic Health Conditions

The National Survey of Children's Health estimates that 10 percent of Colorado's children ages 5 years old and younger and close to 20 percent of children ages 6-11 currently report one or more chronic health conditions. Ten percent of children ages 6-11 have chronic conditions that are moderate or severe. The most prevalent conditions include asthma, learning difficulties, addition deficit disorder, speech problems, and developmental delays.[2]

Children with special health care needs comprise a large percentage of children with chronic medical conditions. Only 18 percent of children with special health care needs have no current chronic medical conditions, compared to 93 percent of typical children.[2] Although children with special health care needs may have multiple health conditions, the most prevalent conditions

include allergies, asthma, depression or other emotional problems, frequent headaches or migraines, and developmental delays.[6]

Asthma

Asthma is a chronic lung condition that affects both children and adults. The Colorado Child Health Survey reports two measures of asthma prevalence: current and lifetime. Lifetime asthma is reported if the parent notes that a doctor, nurse, or other health professional has at some time said that the child has asthma. Children are classified as currently asthmatic when they report lifetime asthma and also respond "yes" when asked if they still have asthma. In 2008, the lifetime prevalence of asthma among Colorado children ages 1-14 years old was 10 percent; the prevalence of current asthma was close to 7 percent.[31] These results did not vary significantly from 2004 to 2008.

The prevalence of current and lifetime asthma increases by age. Ten to 14 year olds had the highest lifetime (17 percent) incidence and current (13 percent) prevalence, compared to 5-9 year olds (12 percent and 9 percent) and 1-4 year olds (7 percent and 4 percent).[31] Children with special health care needs have much higher rates of asthma compared to the general population of children; about 36 percent of children with special health care needs younger than age 11 have asthma.[6] Because of small population sizes, reliable prevalence estimates for childhood asthma in Colorado by race and ethnicity are not available. However, national data from 2007 show that Black/African American children younger than 18 years of age have higher rates of current asthma (15.7 percent), compared to White/Non-Hispanic (8.0 percent) or Hispanic[xxv] (7.1 percent) children of the same age.[2]

Asthma is a chronic condition that can be controlled through proper health management. Therefore, hospitalizations for asthma and visits to emergency departments and urgent care centers for this condition suggest uncontrolled asthma. In 2007 and 2008, close to 7 percent of children who have ever been diagnosed with asthma were hospitalized for asthma, and 19 to 20 percent had one or more visits to an emergency department or urgent care center for asthma.[1]

Secondhand Smoke

Secondhand smoke can lead to a variety of health issues in children including exacerbated asthma, acute respiratory infections, middle-ear disease, respiratory symptoms, and slowed lung growth.[32] A primary source of exposure to secondhand smoke for children occurs in the home.[32] Healthy People 2010 Objective 27-9 proposes to reduce the proportion of children who are regularly exposed to tobacco smoke at home to 10 percent. In 2008, almost 82 percent of children lived in households where no members smoked and 93 percent lived in households where smoking was not allowed anywhere inside the house.[1] Ninety-six percent of parents reported that smoking had not occurred in the home in the last 7 days, up from 93 percent in 2004; a statistically significant increase.[1] In recognition that children are exposed to

[xxv] The results in this survey were presented for children whose ethnicity was Hispanic, regardless of their race.

secondhand smoke in other places and that there is no risk-free level of secondhand smoke, the secondhand smoke objective proposed for Healthy People 2020 dropped the phrase "at home."

Section 4: Access to Health Care

Health Insurance Coverage

Children need access to regular preventive and primary care and to specialty services when acute and chronic conditions occur. One measure of access is having health insurance, defined here as any health insurance, including insurance funded publicly (by the government) or funded privately (by individuals and/or private employers). Healthy People 2010 Objective 1-1 proposes to increase the proportion of persons with health insurance coverage to 100 percent. Based on data from the Colorado Child Health Survey, 92 percent of children ages 1-14 had some form of health insurance in 2008; this percentage has not varied significantly since 2004. Children with special health care needs are significantly more likely to have health insurance (93 percent) than children without special health care needs (89 percent).[1] Thirty-two percent of Hispanic children (all races) are without either private or public health insurance compared to 12 percent of Black/non-Hispanic children and 8 percent of White/Non-Hispanic children (2004-2008 data).[1]

Governmental health insurance provides a safety net for low-income children, particularly for children of color. Thirty-four percent of Black/non-Hispanic children and Hispanic[xxvi] children ages 1-14 years old participate in public health insurance programs.[1]

Health insurance benefits do not consistently provide coverage comprehensive enough to address the broad array of needs. Adequacy as defined by the National Survey of Children's Health includes offering benefits and covering services that meet a child's needs; allowing a child to see the health care providers that he or she needs with reasonable out-of-pocket expenses. Among insured children in Colorado, 16 percent of children ages 5 years and younger and 28 percent of children ages 6-11 do not have adequate health insurance coverage.[2] Among children with special health care needs who are younger than 18 years of age *and who have health insurance*, 27 percent do not have adequate health insurance to cover their needs.[2]

Children without health insurance are less likely to access health care. Only 70 percent of children without health insurance received all the health care that they needed in 2007-2008, compared to 94 percent of children with private health insurance and 89 percent with public health insurance.[1] Families consistently report that children do not receive all the health care they need due to the cost of care and the lack of health insurance.[1]

[xxvi] Unless otherwise noted in this chapter, for results from the Colorado Child Health Survey, "Hispanic" refers to children of all races whose ethnicity is Hispanic, "White/non-Hispanic" refers to children whose race is White and the ethnicity is not Hispanic, and "Black/non-Hispanic" refers to children whose race is Black/African American and whose ethnicity is not Hispanic.

Children with special health care needs are less likely to receive all needed health care. Approximately 86 percent of these children access all needed care, compared to 92 percent of other children.[1] On the National Survey of Children with Special Health Care Needs, families were asked if their child with special health care needs received needed service/equipment in the last 12 months. Eighty percent of children ages birth to 12 received all needed care. However, one quarter of children with special health care needs experienced problems accessing a needed referral.[6]

Medical Home

A medical home is defined as care that is "accessible, continuous, comprehensive, family-centered, coordinated, compassionate, and culturally effective." [33] In 2007, 65 percent of Colorado children younger than age 6 years old and 60 percent of children ages 6-11 years old met the definition of having a medical home.[2] However, only 43 percent of Colorado's children with special health care needs younger than 18 years of age received coordinated, ongoing, comprehensive care within a medical home, compared to children without such needs.[2]

Questions regarding having a personal doctor or nurse have been asked on the Colorado Child Health Survey. From 2004 through 2007, the survey asked families if there were one or more health care providers that they considered to be their child's personal doctor or nurse; 66 percent of children in Colorado had such a provider. This percentage did not vary by race or ethnicity. Approximately 71 percent of children with special health care needs had such a provider.[1]

Young children are more likely to receive preventive health care than older children. Almost 97 percent of children younger than 6 years of age in Colorado received one or more preventive medical care visits during the previous 12 months, compared to 86 percent of children ages 6-11 years old in 2007.[2] An important component of primary care, especially for young children, includes screening for developmental problems and addressing parental concerns about development. Among children ages 1-5 years old, 44 percent of families reported that their child had been screened for developmental problems in the last 12 months. Eight percent of families of young children in Colorado had concerns about their child's development or behavior, according to results from 2007. A little more than half of these families (51 percent) reported that their child's health care provider had addressed their concerns.[1]

Children should be screened early and continuously in order to identify special health care needs. Younger children were less likely to receive this kind of screening than older children. In Colorado, 46 percent of children ages 0-5 years old and 72 percent of children ages 6-11 years old had early and continuous screening, defined as receiving any preventive medical and dental care during the past 12 months prior to the survey (2005-2006 data).[6]

School-Based Health Centers[xxvii]

School-based health centers provide one source of comprehensive health care services. School-based primary health care includes physical exams, immunizations, care for acute illness and injury and diagnosis and treatment of chronic conditions. Mental health services are often included. In Colorado, there are eight elementary schools with on-site school-based health centers and five elementary schools that have access to care through mobile clinics. School-based health centers are discussed further in the chapter on adolescent health.

Access to Oral Health Care

Healthy People 2010 Objective 21-10 proposes to increase the proportion of children and adults who use the oral health care system each year to 56 percent. Based on data from the Colorado Child Health Survey from 2006-2008, 88 percent of Colorado's children ages 1-14 years old have a regular source of dental care.[5] This percentage is the same for children with special health care needs. Two groups of children are at risk of not having a regular source of dental care: children living in rural areas and Hispanic[xxviii] children (of all races). Only 80 percent of children living in a rural area have a regular source of dental care, compared to children in the Denver metro (90 percent) or other metro areas (89 percent) in 2006-2008. A significantly smaller proportion of Hispanic children (74 percent) have a regular source of dental care, compared to Black/non-Hispanic children (92 percent) or White/non-Hispanic (92 percent) children.[1] Not surprisingly, from 2004-2008, Colorado children living in households with incomes at or below 200 percent of the federal poverty level are less likely to have obtained all of the dental care that they needed in the past year (83 percent) compared to children living in families with higher incomes (96 percent).[1] Visits for preventive oral care occur more often among older children. Results from the National Survey of Children's Health showed that 50 percent of Colorado children ages 1-5 years old and 90 percent of children ages 6-11 years old had seen a dentist for preventive dental care in the past 12 months prior to the survey in 2007.[2]

Access to Mental Health Services

Healthy People 2010 Objective 18-7 proposes to increase the proportion of children with mental health problems who receive treatment. Based on data from the 2005-2007 Colorado Child Health Survey, 28 percent of children ages 1-14 were having difficulties with emotions, concentration, behavior or their ability to get along with other people. Thirty-eight percent of these children had ever received counseling for these difficulties. Figure 51 shows that the rate of counseling was highest for children with the most severe difficulties. Among children with severe difficulties, 60 percent were currently receiving counseling; however, many with moderate to severe problems had not received services.

[xxvii] See http://www.cdphe.state.co.us/ps/school/ for more information.

[xxviii] Unless otherwise noted in this chapter, for results from the Colorado Child Health Survey, "Hispanic" refers to children of all races whose ethnicity is Hispanic, "White/non-Hispanic" refers to children whose race is White and the ethnicity is not Hispanic, and "Black/non-Hispanic" refers to children whose race is Black/African American and whose ethnicity is not Hispanic.

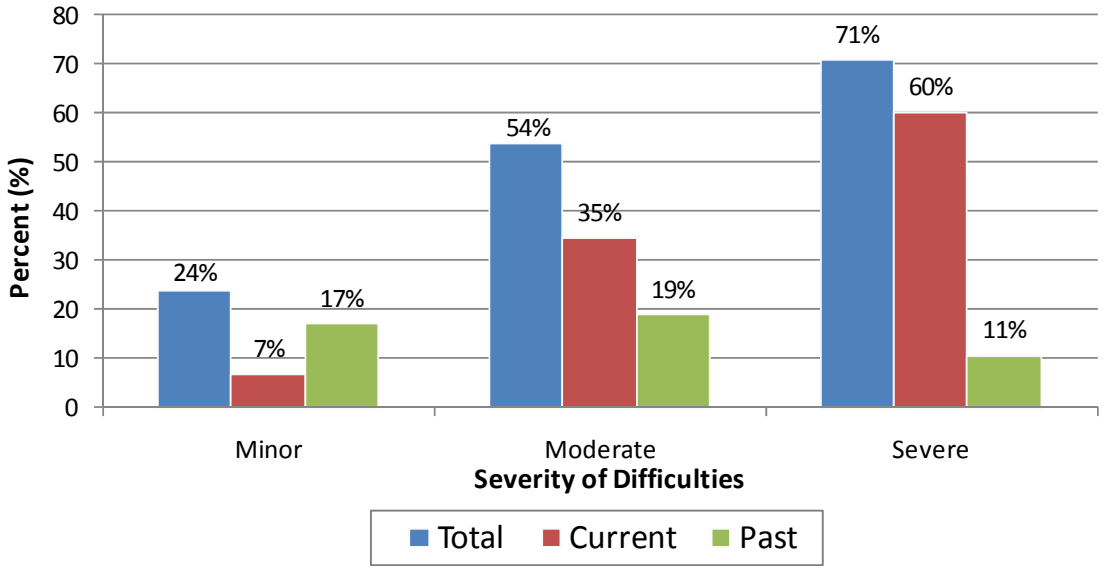

Figure 51. Percent of Children with Social/Emotional Difficulties Receiving Counseling by Severity of Difficulties and Timing of Counseling, Colorado, 2005-2007
Source: Colorado Department of Public Health and Environment, Colorado Child Health Survey

Family-Centered Care for Children with Special Health Care Needs

In Colorado, there are approximately 162,000 children younger than 18 years of age with special health care needs. Survey data from the National Survey of Children with Special Health Care Needs in 2005-2006 suggest a larger financial and time burden for parents of children with special health care needs (Table 14). In Colorado, twenty-eight percent of families with children with special health care needs reported $1,000 or more in out-of-pocket medical expenses and 24 percent reported that the child's health condition had caused financial difficulties for the family. These percentages were much higher than the national results for families whose children who did not have special health care needs (Table 14). Eight percent of families with children with special health care needs in Colorado spent 11 hours or more per week providing or coordinating the child's care. Twenty-one percent of Colorado families whose children have a special health care needs had to reduce their hours or stop working because of the child's health conditions, compared to only 4 percent of U.S. families whose children did not have a special health care need.

Family-centered care is an important marker of quality health care for children with special health care needs and part of a quality medical home approach. Family-centered care includes the following approaches by health care providers:

- Spending enough time with families
- Listening carefully
- Providing needed information
- Helping families to feel like partners
- Being culturally sensitive
- Using interpreters when needed

Table 14. Impact of Health Care Needs on Families, Colorado Children with Special Health Care Needs and U.S. Children without Special Health Care Needs, Ages 0-17 Years Old, 2005-2006

Impact Indicator	Colorado CSHCN* Families	United States Non-CSHCN* Families
Percent with $1,000 or more out of pocket in medical care expenses per year for the child	**28**	**8**
Percent whose child's health conditions cause financial problems for the family	**24**	**4**
Percent whose families spend 11 or more hours per week providing or coordinating child's health care	**8**	**3**
Percent whose family members had to cut back or stop working because of child's health conditions	**21**	**4**

*CSHCN = children with special health care needs

Source: National Survey of Children with Special Health Care Needs, Data Resource Center for Child and Adolescent Health, Child and Adolescent Health Measurement Initiative.

In Colorado during 2005-2006, an estimated 73 percent of families with children with special health care needs from birth through age 5 years old reported family-centered care. From the same survey, 66 percent of Colorado families with older children with special health care needs ages 6 to 11 years old reported family-centered care.[6]

The need for services is vital to support optimal functioning and well-being among children with special health care needs. In the National Survey of Children with Special Health Care Needs from 2005-2006, families were queried about family support. Approximately 16 percent of families of 1-5-year olds and 18 percent of families of 6-11 year olds reported a need for family support services. Mostly these needs were met. Only 5 percent of all families of children with special health care needs of all ages reported any unmet need for family support services.[6] Finally, receiving help in the transition from childhood to adulthood is an important element of services for children with special health care needs. Less than half of Colorado's children with special health care needs (47 percent) received the services necessary to help in the transition to adult health care, work and independence; not statistically different from the 41 percent of children with special health care needs nationwide.[6] No information was available to evaluate whether receiving the necessary services varied by the age of the child.

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Chapter 6 – Adolescent Health

Adolescence marks the transition from childhood to adulthood, a critical period in the life course. Health issues of particular importance to adolescents include injury from motor vehicle crashes, suicide, teen pregnancy, sexually transmitted infections, and behavioral risk factors including smoking, poor diet, and lack of physical activity, all of which can influence the development of chronic disease later in life.

Section 1: Health Status

Both nationally and in Colorado, measures of general health and well-being for adolescents are consistently positive. In 2005, 93 percent of Colorado students in grades 9-12 who were attending public schools reported that their health, in general, was good, very good, or excellent, regardless of race/ethnicity and similar to national data.[1-2] These results were similar to those reported by parents of Colorado youth ages 12-17 years old: 98 percent of parents reported that their child's health was good, very good, or excellent on the National Survey of Children's Health in 2007.[3] In terms of oral health, 94 percent of parents of Colorado youth ages 12-17 reported that their child's teeth were in excellent, very good, or good condition, comparable to national figures (92 percent).[3] In terms of the number of school days missed due to illness, the percentage of U.S students who did not miss any school days was statistically higher at 24 percent, compared to only 18 percent of Colorado students who did not miss school.[3]

Contributors to Good Health

There are many social determinants of health that directly influence a person's behavior and also predispose them to certain health conditions. Some of these determinants can be characterized as "personal" and others as "community" assets. The more positive assets a person experiences or exhibits, including those that are supported by others, the more likely an individual is to engage in healthy behaviors and demonstrate better health status overall.

Personal Assets

Overall adolescent health status includes social and personal assets along with general physical and mental health. Ninety-four percent of Colorado youth ages 12-17 years old exhibit positive social skills.[3] Students who feel connected to their schools are less likely to engage in health risk behaviors including tobacco and alcohol use, violence-related activity, and early sexual activity. School engagement was defined, in the National Survey of Children's Health in 2007, by asking: how often the child/youth cared about doing well in school and how often the child/youth did all the required homework in the past month. A total of 78 percent of youth were usually or always engaged in school.[3] In addition, one-third of Colorado youth ages 12-17 were involved in some type of community or service work a few times a month or more.

Community Assets

A supportive and safe community contributes to healthy youth development and growth. This type of neighborhood can be defined as one where people assist each other, where trustworthy adults live and can partner with parents, and where neighbors watch each other's children.[3] In 2007, almost 85 percent of Colorado families reported that their children, ages 12- 17 years old, lived in a supportive neighborhood; 90 percent felt that their neighborhood or community was usually or always safe.[3]

Feeling safe at school is also important for positive adolescent health and development. While the vast majority of students reportedly do feel safe at school, there is a small percentage that do not. According to the 2009 Colorado Youth Risk Behavior Survey, 5 percent of Colorado high school students reported missing school on one or more days within the last 30 days because they felt unsafe at school or on their way to or from school. Also in 2009, 8 percent of students reportedly had been threatened or injured with a weapon on school property one or more times in the past year.[2]

Mental Health

In 2009, 25 percent of Colorado high school students reported experiencing depression in the past 12 months, similar to the result for the U.S.[4] Depression was defined as feeling sad or hopeless almost every day for more than two weeks in a row, to the extent that a student stopped doing his or her usual activities. From a previous analysis of the Youth Risk Behavior Survey from 2005 for the United States and Colorado, both national and Colorado surveys found that White/Hispanic students (national – 36 percent, Colorado – 34 percent) were more apt to report depression than White/Non-Hispanic students (national- 26 percent, Colorado – 23 percent).[1, 4] Female students also reported being depressed more often than males. Over one-third (37 percent) of females in Colorado public high schools reported feelings of sadness compared to 14 percent of male students.[1, 4] Nationally, this difference was somewhat closer: 37 percent of females and 20 percent of males reported depression.[1, 4]

The National Survey of Children's Health measures other areas of mental and behavioral health. Based on family report during 2007 approximately 8 percent of Colorado youth ages 12-17 years old consistently exhibited problematic social behavior, defined as at least two problems in the following areas: arguing too much, disobedience, bullying or cruelty to others, stubbornness, sullenness or irritability. The survey also estimated that 9 percent of youth were taking medication for one or more of the following problems: attention deficit hyperactivity disorder (ADHD), emotions, concentration, or behavior.[3]

Chronic Health Conditions

Approximately 28 percent of Colorado youth ages 12-17 have at least one chronic health condition, and 11 percent have a condition that is considered to be moderate or severe.[3] Based on results from the National Survey of Children's Health, the most common health conditions for youth this age are asthma, attention deficit disorder (ADD), and learning disabilities. Each of these conditions was found in 7 to 10 percent of all adolescents. Not surprisingly, youth with special health care needs demonstrate much higher rates of these chronic problems; close to

40 percent have asthma and 29 percent have ADD.[5] The prevalence of learning disabilities was not collected on the National Survey of Children with Special Health Care Needs.

Youth with Special Health Care Needs

As reported in the chapter on child health, youth with special health care needs include adolescents who have or are at increased risk for chronic physical, developmental, behavioral, or emotional conditions that require health and related services beyond that required by youth generally. Approximately 16 percent of Colorado youth ages 12-17 years old meet the definition of children with special health care needs; this is similar to the national percentage. Males outnumber females with the majority of youth (57 percent) with special health care needs being male.[5]

Twenty-two percent of children with special health care needs ages 12-17 years old have health conditions that consistently and often greatly affect their daily activities, and close to 40 percent have conditions that parents rate as moderate or severe; yet, only 17 percent miss more than 11 days of school due to health problems.[5]

Section 2: Youth Risk Behaviors

Engaging in unhealthy behaviors can lead to health consequences for youth, both while they are young and also as they age. Many behaviors that are formed early in life are likely to continue into adulthood. Some actions could have an immediate impact on an adolescent's health such as an unplanned pregnancy, contracting a sexually transmitted infection, or being injured in a car crash either while driving impaired or not wearing a seatbelt. Other health behaviors take longer to produce health problems such as smoking, overeating and lack of exercise. This section examines health behaviors that are most likely to lead to morbidity and mortality either during adolescence or later in the life span.

Sexual Activity

Responsible sexual activity, defined for adolescents as either abstinence from sexual intercourse or the use of condoms and other birth control methods when sexual activity occurs, prevents unintended pregnancy and sexually transmitted diseases. Healthy People 2010 Objective 25-11 seeks to increase the proportion of adolescents who abstain from sexual intercourse or use condoms if currently sexually active to 95 percent. Nationwide the proportion of high school students who report ever having sexual intercourse has declined significantly from 1991 to 2007. However, the proportion who are currently sexually active, i.e., have had sexual intercourse within the last 3 months, has shown no change during this time.[6] The same is true for Colorado. From 1995 to 2005, the proportion of students who said that they ever had sexual intercourse decreased from 47 percent to 39 percent; the proportion who were currently sexually active has stayed constant at 31 and 30 percent respectively.[4] In 2009, 40 percent of Colorado students in public high schools had ever had sexual intercourse, not significantly different from 2005.[4]

Students who were currently sexually active were asked what one method that they or their partner used to prevent pregnancy before or during their last sexual intercourse. They were also asked as a separate question about whether or not they used a condom the last time. In 2005, proportionally more males (79 percent) reported using condoms than females (60 percent); more females (22 percent) reported using birth control pills than males (10 percent). The actual use of condoms and birth control pills may be higher if respondents to the survey only answered for themselves and not their partners; also males may not have known whether their partner was using birth control.[7]

Substance Use

Using substances as an adolescent, such as tobacco, alcohol and other drugs, is a predicator of continued use or abuse as an adult. Table 15 provides data from 2005 which compares the current use (in the past 30 days) and ever used (lifetime usage) for both Colorado and the U.S.[7] The rates of use are similar, with Colorado youth having somewhat lower rates of current cigarette use.

Table 15. Substance Use Among High School Students, Colorado and United States, 2005
Percent Engaging in Current Use and Who Have Ever Used (Lifetime Usage)

Substance Type	Colorado	United States
Cigarettes		
Current Use	**18.7%**	**23.3%**
Ever Used	**48.8%**	**54.3%**
Alcohol		
Current Use	**47.7%**	**43.3%**
Ever Used	**75.9%**	**74.3%**
Marijuana		
Current Use	**22.7%**	**20.2%**
Ever Used	**42.4%**	**38.4%**
Cocaine		
Current Use	**2.7%**	**3.4%**
Ever Used	**8.1%**	**7.6%**

Source: 2006 Colorado Healthy Kids Survey Report

Tobacco

Tobacco use is a leading cause of preventable mortality and morbidity in the U.S. Preventing tobacco use in adolescence is critical to ensure health over the lifetime, and almost half of adult smokers started smoking in high school. Healthy People 2010 Objective 27.2 is to reduce tobacco use by adolescents during the past month to 16 percent. Based on the 2005 Youth Risk Behavior Survey data above (Table 15), Colorado had not met this target. However, the Healthy Kids Colorado Survey on Tobacco and Health showed the prevalence of smoking in this age group had decreased to 15 percent in 2006, which did meet the Healthy People objective.[8]

Based on data from the Healthy Kids Survey on Tobacco and Health, the percentage of both middle and high school students who had ever smoked a cigarette decreased between 2001

and 2006.[8] In 2001, 26 percent of middle school students had ever smoked; in 2006, only 17 percent had ever smoked. The percentage of high school students who ever smoked decreased from 64 percent in 2001 to 43 percent in 2006. Current smoking rates among high school students decreased significantly, from 18 to 15 percent during this same time. No change was seen in current smoking rates among middle school students; three percent were current smokers in both years. Smoking prevalences for males and females were similar for both measures of smoking (ever smoked or currently smokes) in 2006.

The prevalence of current smoking increased with age (Figure 52) during both 2001 and 2006.[8] Smoking rates jumped between 8th and 9th grade, with 9th graders smoking at a rate three times the rate of the 8th graders. Also smokers in the 12th grade reported much higher prevalence than any other grade. In 2006, a significantly smaller percentage of students in grades 8, 9, 11, and 12 were current smokers, compared to results from 2001.

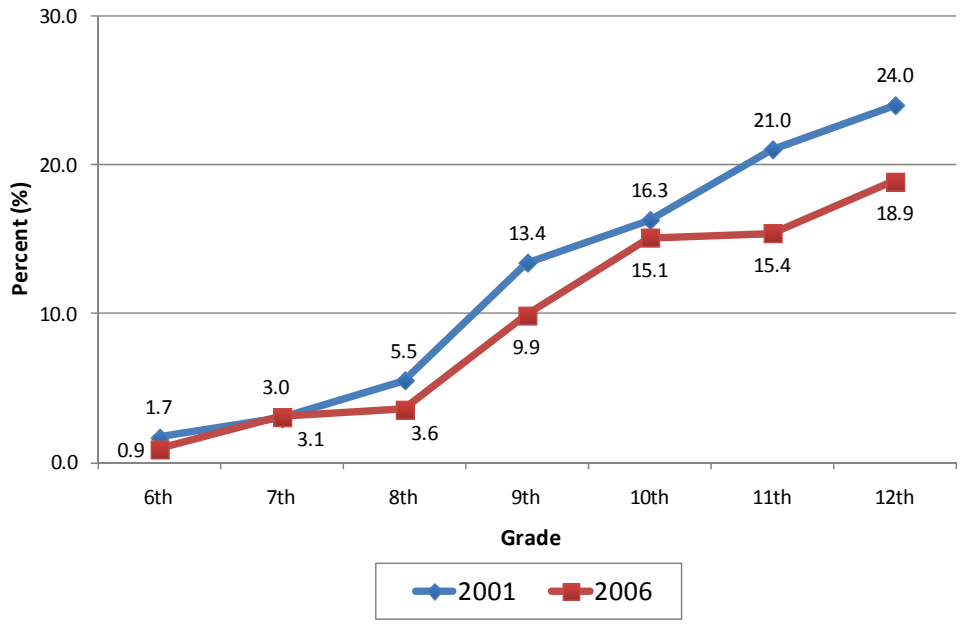


Figure 52. Prevalence of Current Smokers in Middle and High School by Grade, Colorado, 2001 and 2006

Source: Colorado Healthy Kids Survey on Tobacco and Health

Smoking frequency---combined with quantity of cigarettes smoked---indicate dependence on tobacco.[8] Both of these measures decreased among students between 2001 and 2006. In 2001, 20 percent of high school smokers in Colorado reported smoking 10 or more cigarettes a day, and by 2006 only 11 percent reported smoking 10 or more cigarettes a day. Students in 12th grade (19 percent) were most likely to smoke daily. Two other levels of frequency and quantity of smoking include "established" (those who smoked 100 or more cigarettes in their lifetime), and "frequent" (those who smoked on 20 or more days during the past 30 days).[8] In 2006, 56 percent of current high school smokers were classified as established smokers, and 44

percent were classified as frequent smokers. These two rates decreased from 2001 when 70 percent were established smokers and 51 percent were frequent smokers.

Among current high school smokers, 63 percent said that they had tried to quit smoking in the past year; up from 55 percent in 2001.[8] Female students (68 percent) were significantly more likely to attempt to quit than male students (59 percent). In 2006, among those high school students who were currently smoking despite attempting to quit in the past year, only 9 percent used any assistance in trying to quit smoking, such as nicotine replacement therapy, a support program, or medication. The previous proportion was higher in 2001: 14 percent used assistance in trying to quit in 2001. Similarly, the use of nicotine replacement therapy declined from 11 percent in 2001 to 5 percent in 2006.

Use of tobacco in forms other than cigarettes remains a health hazard to adolescents. Cigar use, for example, increased from 2001 to 2006. In 2006, 1 in 6 high school students (16 percent) had smoked a cigar in the past 30 days; up from 1 in 8 in 2001. Over 21 percent of high school males were current cigar smokers in 2006 compared to 11 percent of females. Smokeless tobacco use (chew and moist snuff, also known as spit tobacco) remained level from 2001 to 2006 although use of such products is highest among high school males. Twelve percent of high school males reported smokeless tobacco use in the past 30 days compared to 3 percent of high school females and middle school males and 1 percent of middle school females.[8]

All states including Colorado prohibit the sale of tobacco to minors under the age of 18. Colorado also prohibits furnishing tobacco product samples or single cigarettes to a minor, and cigarette vending machines are required to have lockout devices in public, youth-accessible places. Despite legal restrictions, underage smokers still manage to purchase cigarettes. Clerks are not required to ask for proof of age for purchase of tobacco products. In 2006 more than half of underage high school current smokers who tried to buy cigarettes were able to do so, similar to the percentage in 2001. In 2006, the two most common ways for underage smokers to get access to cigarettes were to have someone else buy the cigarettes for them or for someone else to give them cigarettes.[8]

Colorado law requires schools to be completely tobacco-free for students, staff, and visitors. However, more than one-third of middle school current smokers and half of high school current smokers reported smoking on school grounds at least once in the previous 30 days.[8]

Alcohol

Rates of alcohol use by Colorado high school students are similar to those nationwide (Table 15). In 2005, 30 percent of students reported binge drinking, defined as 5 or more alcoholic drinks on one or more occasions in the past 30 days. Healthy People 2010 Objective 26-11 proposes to reduce the proportion of young persons engaging in binge drinking of alcoholic beverages to 25 percent. Colorado has not yet met this goal. As with cigarettes, alcohol use increases as students get older. In Colorado, during 2005, 61 percent of 12th graders reported that they drank alcohol during the past 30 days, nearly double that of 9th graders (33 percent).

Rates of alcohol use are similar for males and females, but males (33 percent) are more likely to report using alcohol before the age of 13 than females (22 percent). Still, a large proportion of high school students experienced drinking before high school.[7]

Marijuana

Healthy People 2010 Objective 26-10b proposes to reduce the proportion of high school students who used marijuana in the past 30 days to less than 1 percent. In 2005, Youth Risk Behavior Survey data show that close to 23 percent of Colorado students had used marijuana in that time period, a level of use well above the goal. More students use marijuana than use cigarettes. The highest rate of marijuana use was among 12th graders with over 35 percent reporting use in the last 30 days compared to 13 percent of 9th graders. Males were more likely to first use marijuana before age 13 (12 percent) than girls (8 percent).[7]

Attitudes and Behaviors Associated with Substance Use

In 2005, among Colorado high school students, using tobacco, alcohol, or marijuana in the last 30 days was associated with being sexually active during the past three months (Figure 53).[7] Compared to high school students who were not sexually active during the past three months, sexually active students were almost twice as likely to drink alcohol in the past 30 days; nearly three times as likely to engage in binge drinking and cigarette use; and almost four times as likely to use marijuana. A similar pattern was observed for lifetime substance use and ever having had sexual intercourse.

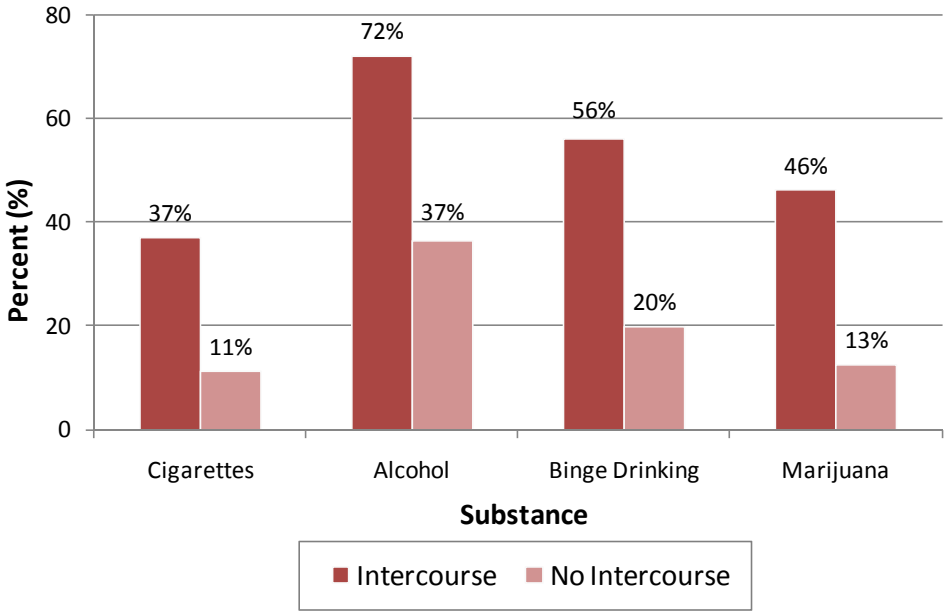


Figure 53. Prevalence of Substance Use in Past 30 Days among Colorado High School Students by Sexual Activity in Past Three Months, 2006
Source: Healthy Kids Colorado Survey Report

The association between substance use and participation in sports among high school students has also been investigated.[7] For most substances, athletes were less likely to use substances than non-athletes but the difference in prevalence for athletes and non-athletes was small: for cigarettes, 17 percent of athletes smoked versus 22 percent of non-athletes; for alcohol, 45 percent of athletes were drinkers versus 51 percent of non-athletes; for binge drinking 29 percent of athletes admitted binging versus 34 percent of non-athletes; and for marijuana, 20 percent of athletes reported use versus 28 percent of non-athletes (2006). One exception is for smokeless tobacco products: athletes were close to twice as likely to use chewing tobacco (11 percent) as non-athletes (6 percent).[7]

Safety Behaviors

Proper seat belt use can help to prevent fatal and non-fatal motor-vehicle related injuries. From 2004 to 2006, over 70 percent of youth 15-17 who died from motor-vehicle related injuries were not wearing a seat belt at the time of the crash.[9] Colorado law mandates that all adolescent drivers and passengers be restrained in a seat belt.[10] Healthy People 2010 Objective 15-19 seeks to increase the proportion of adolescents who wear seat belts to 84 percent. Based on self-report of seat belt use in the Youth Risk Behavior Survey, Colorado has just met that objective. In 2009, 84.5 percent of Colorado high school students reported wearing seatbelts always or most of the time.[2] Colorado does not have a primary safety belt law for those over age 17, which means that a driver can only be cited for belt use after being stopped for some other traffic offense.

Traumatic brain injury occurred in over half (54 percent) of all hospitalizations to bicyclists 15 to 19 years old from 2006 to 2008.[11] Wearing a bicycle helmet is the most effective way of preventing head injuries and fatalities due to bicycle-related crashes; approximately 85 to 88 percent of bicycle-related traumatic brain injuries could be prevented by helmet use.[12] Very few high school students use helmets. Of the 73 percent of students who had ridden a bicycle in the past year in 2005, 71 percent rarely or never wore a helmet.[13] If helmet use could increase to the level of seat belt use, bicycle-related injuries could be substantially reduced. The National Highway Traffic Safety Administration suggests that a law requiring the use of bicycle helmets, along with education and high-visibility enforcement is the most promising way to increase bicycle helmet use.[12] Colorado, currently, does not have a law requiring cyclists to wear bicycle helmets.

Health Behaviors to Prevent Chronic Disease

Good nutrition and physical activity contribute to a reduced risk for development of a chronic disease in adulthood such as heart disease, cancer, and stroke. Together these promote a healthy weight and prevent overweight and obesity. Healthy People 2010 objectives which encourage healthy behaviors in adolescence include:

- Reduce the percent of obese adolescents who are at or above the sex- and age-specific 95th percentile of Body Mass Index (BMI) to 5 percent (Healthy People 2010 Objective 19-3b).

- Increase the percent of adolescents in grades 9 to 12 who engage in 20 minutes or more of vigorous activity 3 or more days per week to 85 percent (Healthy People 2010 Objective 22-7).
- Increase the proportion of adolescents who participate in daily school physical education to 50 percent (HP 22-9).
- Increase the proportion of adolescents who view television 2 or fewer hours on a school day to 75 percent (HP 22-11).

Figure 54 compares the results of the 2005 Colorado Youth Risk Behavior Survey on these measures to the national survey.[1] The current National Association for Sport and Physical Education recommendation is for 225 minutes per week of physical education in middle and high schools.[31] A survey of Colorado schools found that 85 percent of schools require that students take a physical education course, compared to 97 percent of schools nationwide,[15] yet only 17 percent of students report having daily physical education.[13] The most recent Centers for Disease Control recommendation encourages children and youth to participate in at least one hour per day of physical activity.[14] Having physical education classes available and encouraging student participation in such classes daily would facilitate meeting that recommendation. The chapter on Child Health discusses other community means to achieve this level of physical activity for all children and youth.

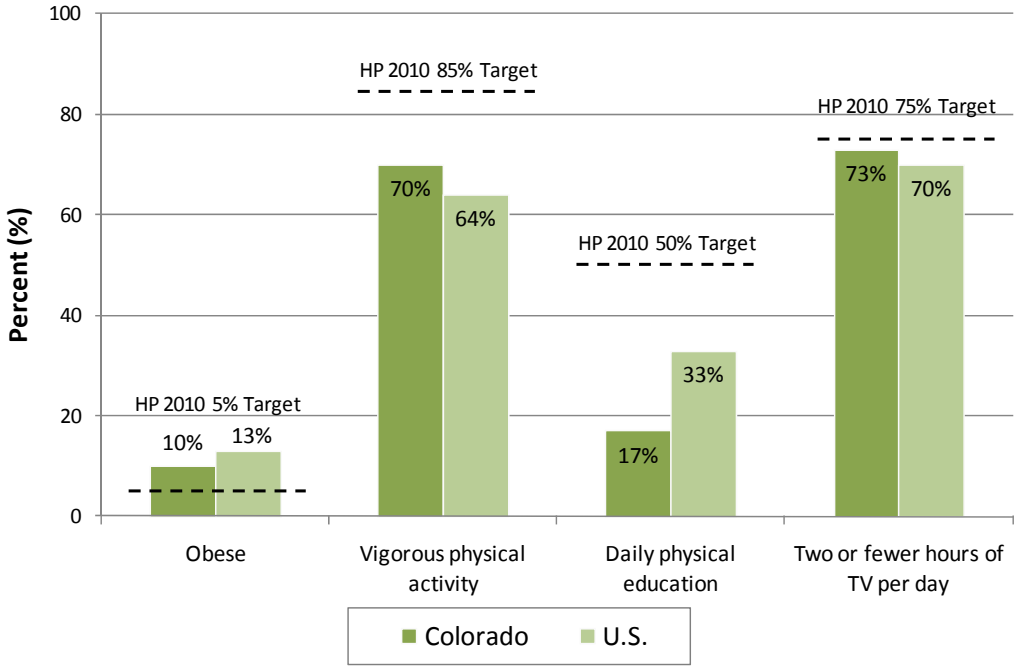


Figure 54. Weight and Physical Activity Measures for High School Students in Colorado and the United States, 2005
Source: Youth Risk Behavior Survey

Although Colorado's percentage of youth who are obese is relatively high compared to the Healthy People 2010 target, the issue of healthy weight needs to be emphasized among all students. A larger proportion of students than could be categorized as overweight report that they are trying to lose weight or view themselves as overweight. In 2005, this is especially true

for females in Colorado public high schools; 59 percent of female and 25 percent of male students report that they are trying to lose weight. Twenty-nine percent of females and close to 20 percent of males describe themselves as overweight.[1] In 2009, 22 percent of Colorado students in public high schools described themselves as slightly or very overweight, compared to 28 percent of students in the U.S.[4]

Many Colorado students reported using healthy strategies to maintain their weight or lose weight. In 2005, almost 65 percent of Colorado high school students said that they exercised and 37 percent reported eating fewer calories or more foods low in fat to maintain their weight or lose weight in the past 30 days. Females were more likely to report exercising (75 percent) and watching their calories (55 percent) than males (55 percent and 24 percent respectively). Five percent of female and 2 percent of male students in Colorado public high schools used purging methods (vomited or took laxatives) and 12 percent of females and 6 percent of males said that they went without eating for 24 or more hours to lose or maintain weight. Five percent of students took diet pills, powders, or liquids.[1]

Colorado high school students are not consuming all five of the recommended daily servings of fruits and vegetables (Figure 55). Sixteen percent of females and 22 percent of males in Colorado eat 5 or more servings of fruits and vegetables every day (2005 data), similar to the national rates. A similar pattern is observed for drinking three or more glass of milk each day. Twelve percent of high school females in Colorado and the U.S. drink 3 or more glasses of milk a day. Compared to females in public high schools, a larger proportion of high school males drink milk (25 percent in Colorado and 21 percent in the U.S.).[1]

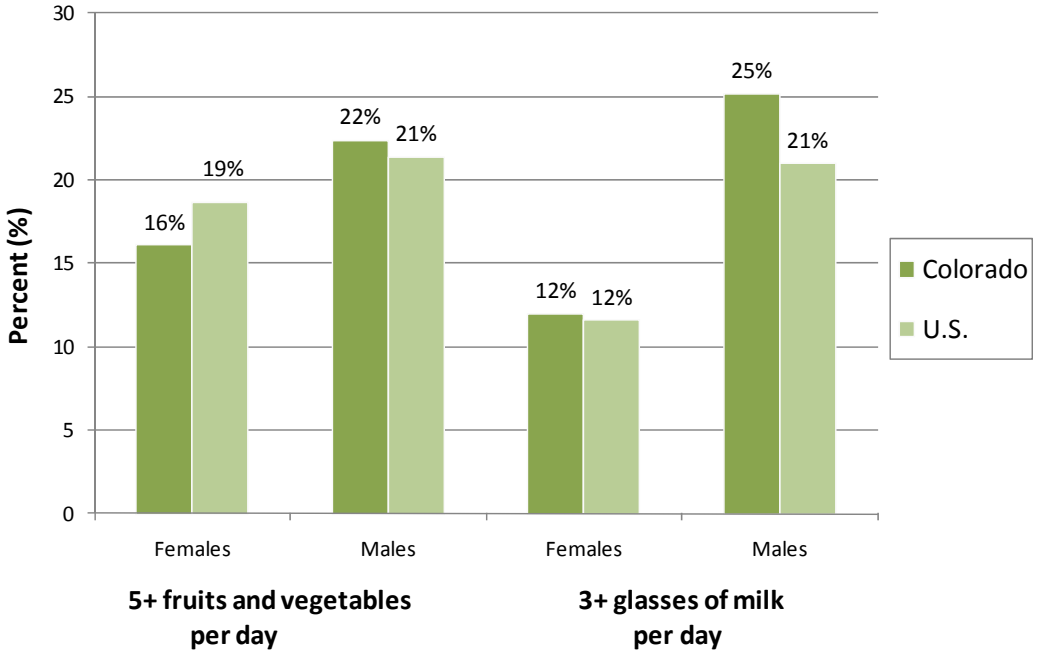


Figure 55. Nutrition Measures for High School Students by Gender, Colorado and the United States, 2005
Source: Youth Risk Behavior Survey

One way to encourage healthy eating is to limit the availability of unhealthy foods in the school environment. Colorado law mandates that schools have policies to ensure that at least 50 percent of all items offered in vending machines be healthful foods or beverages that meet acceptable nutritional standards. Over half of all middle and high schools allow students to purchase candy, salty snacks, cookies and soda pop in school venues, a level that is considerably higher than the 34 percent of schools nationwide.[15]

Section 3: Fatal and Non-Fatal Injuries

One of the major causes of disability and death among adolescents is injury. Unintentional injuries, such as motor-vehicle related injuries, are the leading cause of death for adolescents ages 15-19 years old, accounting for 46 percent of 580 deaths during 2006-2008.[16] Death by suicide is the second leading cause of death among this age group, accounting for 20 percent (117 deaths) of the 580 deaths during 2006-2008.[16] Healthy People 2010 Objective 16-3 is to reduce deaths of adolescents ages 15 to 19 years old to 39.8 deaths per 100,000 adolescents. The 2006-2008 annual average death rate for adolescents in Colorado was 53.9 deaths per 100,000 adolescents, which is far above the Healthy People objective.[17]

Injury

Injury hospitalization and injury death rates are much higher in adolescence compared to childhood. Unintentional injury is the leading cause of death for adolescents accounting for 45 percent of all deaths to 15-17 year olds and 48 percent of deaths to 18-19 year olds.[17] Table 16 compares the injury death rates for Colorado and the U.S. for youth 15-19 in 2004-2006, the most recent data available for the U.S.[16, 18] Colorado has similar but slightly lower unintentional death rates. Intentional death rates are higher in Colorado due to the higher rates of suicide among males and females of this age compared to males and females nationally. The homicide death rates are lower for Colorado males than U.S. males; the female homicide rates are similar.

Table 16. Injury Deaths Rates per 100,000 among Youth Ages 15-19, Colorado and the United States, 2004-2006

Injury Type	HP 2010 Target	Colorado Rate			United States Rate		
		Total	Male	Female	Total	Male	Female
All injuries		**50.0**	**69.3**	**29.5**	**50.6**	**74.0**	**26.0**
Unintentional injuries	17.5	29.8	38.7	20.2	32.0	43.7	19.6
Motor vehicle injuries	9.2	22.8	27.0	18.3	24.1	31.2	16.5
Intentional injuries		19.2	28.9	8.8	17.9	29.2	6.0
Suicide	5.0	13.0	19.1	6.5	7.7	12.1	3.1
Homicide	3.0	5.8	9.1	2.4	10.1	16.8	2.8

Source: Colorado Health Information Dataset, Colorado Department of Public Health and Environment; Web-based Injury Statistics Query and Reporting System, Centers for Disease Control and Prevention

Overall, Colorado adolescents have not met the Healthy People 2010 targets for injury death rates for all populations (Table 16). As with younger children, male adolescents have higher injury death rates for all of these types of injuries than females. In fact, Colorado males are nearly twice as likely to die from unintentional injuries and over three times as likely to die from intentional injuries as females.

Unintentional Injury

Rates of unintentional injury deaths and hospitalizations for Colorado adolescents ages 15-19 years old have been steadily declining since early in the decade. The 3-year average annual unintentional death rate for both males and females 15-19 years old during 2000-2002 in Colorado was 33.1 deaths per 100,000 youths. This rate declined to 25.0 in 2006-2008. The injury hospitalization rate declined from 430.6 hospitalizations per 100,000 youths to 304.8 during this same time period. The decrease in both rates is mainly due to decreasing deaths and hospitalizations from motor vehicle-related incidents, which account for 60 percent of all unintentional injury deaths and 56 percent of all unintentional injury hospitalizations. Figures 56 and 57 show the declining rates of motor vehicle crash deaths and hospitalizations by gender from 2000-2002 to 2006-2008. These results show that while the motor vehicle crash death rates rose for both males and females from 2000-2002 to 2002-2004 the rate declined over 40 percent from 2002-2004 to 2006-2008. Hospitalization rates also declined at a steeper rate after the passage of the strengthened graduated driver's license law.

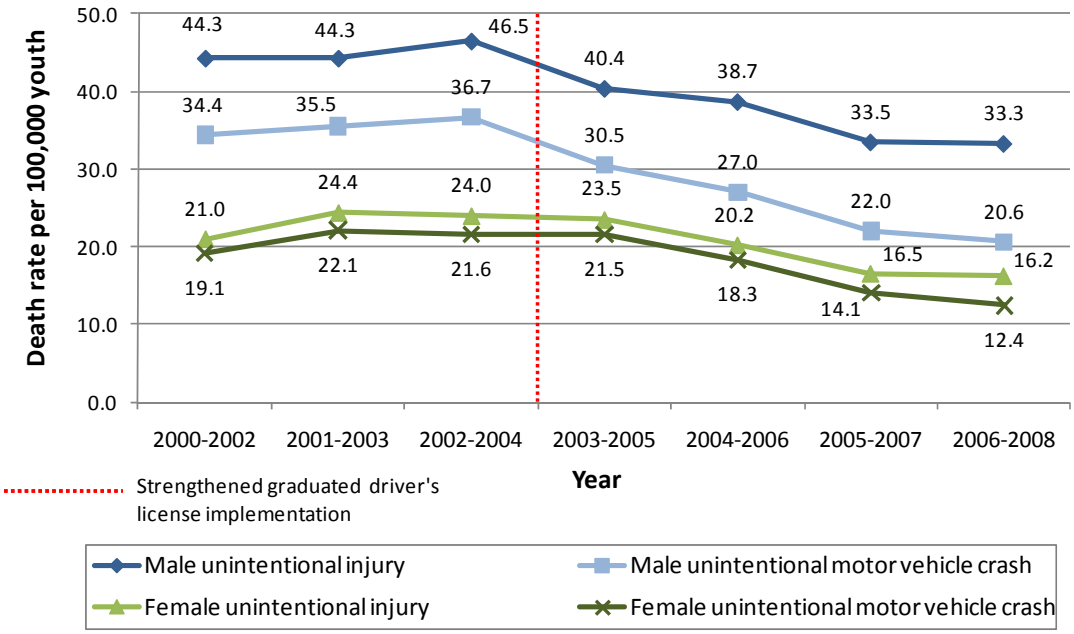


Figure 56. Total Unintentional Injury and Motor Vehicle Crash Injury Death Rates for Youth Ages 15-19 by Sex, Death Certificates, Colorado, 2000-2002 to 2006-2008

Source: Colorado Department of Public Health and Environment, Death Certificate Data

One possible contributor to the decline is the graduated driver's license law (GDL) that was first put into place in 1999 but was strengthened in 2005. The strengthened law is a three-stage

system (learner's permit, restricted or provisional license, and full licensure) for phasing in on-road driving so that beginners obtain their initial driving experience under low-risk conditions. In addition to the three stages Colorado's law includes passenger and nighttime restrictions.[10] The law also provided for intensive education efforts in 2004 before the GDL actually took effect in 2005.

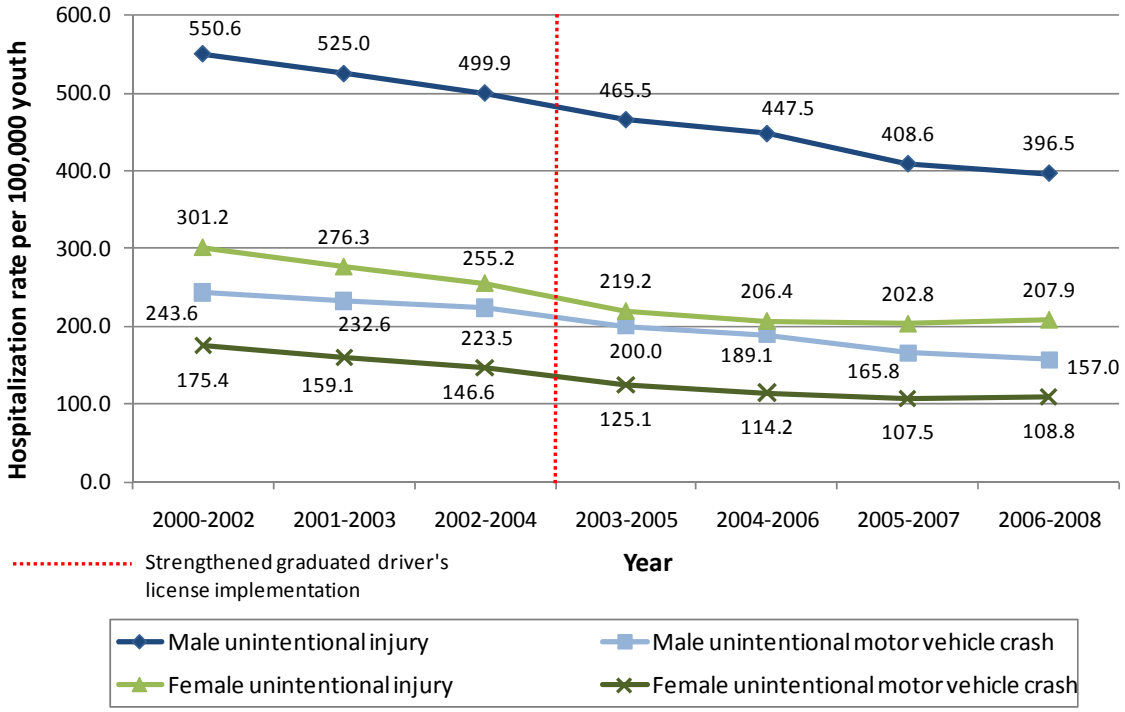


Figure 57. Total Unintentional Injury and Motor Vehicle-Related Injury Hospitalization Rates for Youth Ages 15-19 by Sex, Injury Hospitalization Data, Colorado, 2000-2002 to 2006-2008
Source: Colorado Department of Public Health and Environment, Death Certificate Data

The risk of being in an alcohol-related motor-vehicle crash is greater for younger people than older people at every level of blood alcohol level.[19] In 2004 to 2006, drugs or alcohol were involved in almost 81 percent of motor-vehicle related fatalities to youth ages 15- 17 years old.[9] Colorado has adopted a zero tolerance blood alcohol level, making it illegal for persons under the age of 21 to drive with any measurable amount of alcohol in their blood.[10] Healthy People 2010 Objective 26-06 is to reduce to 30 percent the proportion of adolescents who report that they rode in the past 30 days with a driver who had been drinking alcohol. Based on YRBS data for 2009, Colorado youth meet that objective. Only seven percent of high school students in Colorado reported driving after drinking alcohol within the past 30 days, and 25 percent said that they had ridden with someone who had been drinking within the past 30 days in 2009.[4]

Legislation effective in December, 2009, prohibits youth under the age of 18 from using a cell phone while driving.[20] Further analysis will be needed in the future to evaluate what impact this law has on teen motor-vehicle related injuries.

Bicycle-Related Injuries

Injuries from bicycle-related crashes have not changed since 2000. Between 2006 and 2008, there were 150 hospitalizations due to such injuries, resulting in a three-year annual average rate of 12.3 per 100,000 population age 15 to 19 years old.[11] Males were 5 times more likely to be hospitalized for bicycle-related injuries (a rate of 20.1) than females (a rate of 4.0). Injury hospitalizations give a picture of only those mostly severely injured and do not capture the extent of injuries to all bicyclists. Based on emergency department data at the national level, only 3 percent of youth 15-19 years old seen in the emergency department for bicycle-related injuries were hospitalized, which suggests that hospitalization data undercounts all bicycle-related injuries requiring medical care and that hospitalization data represent more severe injuries.[18]

Intentional Injury

Intentional injuries are those due to self-harm or deliberate harm by others. The two leading major causes of intentional injury are suicide and homicide.

Suicide

Suicide is the second leading cause of death in Colorado for youth ages 15-19 years old. Both males and females have higher rates of suicide deaths compared to the nation (Table 16). Adolescent males have higher rates of suicide deaths than females while females had higher rates of hospitalizations due to suicide attempts. Figures 58 and 59 show that the suicide death rate has declined very little for both males and females in recent years but hospitalizations due to suicide attempts have decreased 13 percent for males and 20 percent for females since 2000-2002.[11, 16]

Suicide death rates vary from year to year and do show a slight decrease in 2005-2007 and 2006-2008 compared to 2004-2006. Yet, it is unclear if this was a true decrease or just random variation. Data from future years will be needed to determine if a true decline in suicide deaths has started.

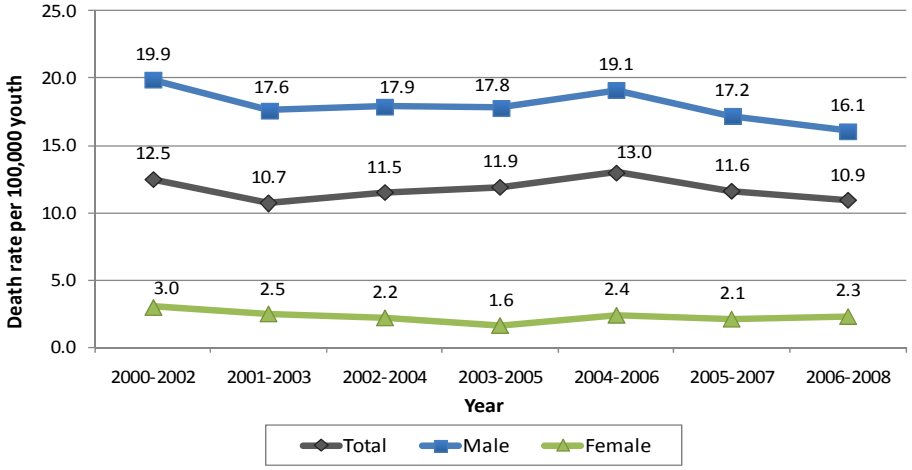


Figure 58. Suicide Death Rates for Youth Ages 15-19 by Sex, Death Certificates, Colorado, 2000-2002 to 2006-2008

Source: Colorado Department of Public Health and Environment, Death Certificate Data

There is a reduction in hospitalizations due to suicide attempts (Figure 59).[11] It is uncertain whether the actual total number of attempts declined or whether those who had attempted suicide were less likely to be hospitalized over this period of time. (Data from emergency departments and outpatient settings on suicide attempts are not easily available to evaluate whether total suicide attempts have declined.) Based on self-reports from high school students in Colorado, the percentage of students who attempted suicide (one or more times during the 12 months before the survey) did not decline from 2005 to 2009. Specifically, the results from the Youth Risk Behavior Survey indicate that 7 percent attempted suicide as reported in 2005 and just under 8 percent attempted suicide in the 12 months prior to being surveyed in 2009.[4] Healthy People 2010 Objective 18-2 seeks to decrease suicide attempts requiring medical attention to 1 percent. Also from this survey, 14 percent of Colorado high school students reported in 2005 and 2009 that they seriously considered attempting suicide during the 12 months before the survey. In contrast, 17 percent of for U.S. high school students in 2005 and 14 percent in 2009 reported that they considered attempting suicide within the past 12 months.[4]

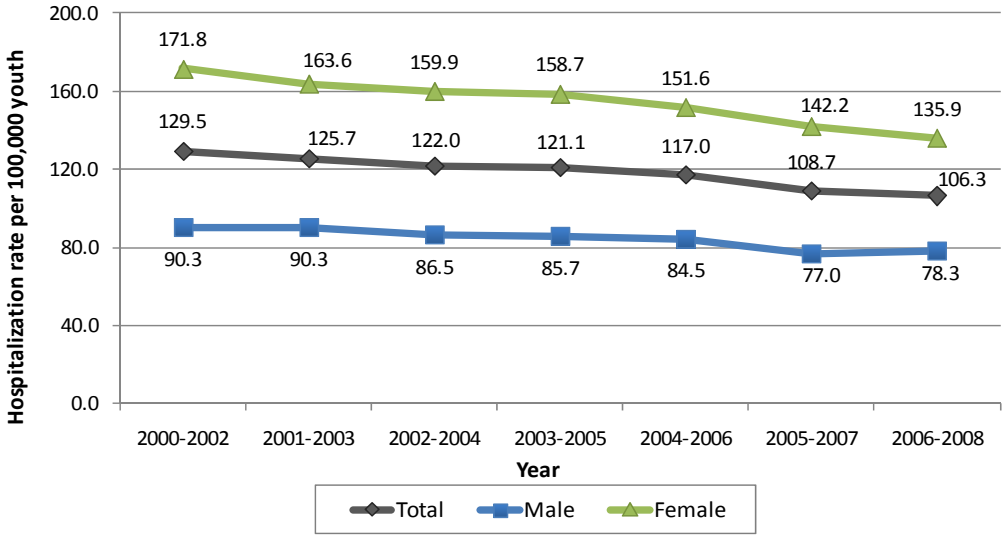


Figure 59. Total Attempted Suicide Hospitalization Rates for Youth Ages 15-19 by Sex, Injury Hospitalization Data, Colorado, 2000-2002 to 2006-2008

Source: Colorado Health Information Dataset, Colorado Department of Public Health and Environment

Based on data from the Colorado Violent Death Reporting System, a study of suicides of all ages in Colorado between 2004 and 2008 showed that suicide among males was associated with problems with alcohol, issues with an intimate partner, job problems, and criminal/legal issues. Suicides among females were associated with a previous diagnosis of a mental health problem, a history of suicide attempt, a relationship problem with someone who was not an intimate partner, and the suicide or death of a friend of family member within the past five years.[21]

Assaults and Homicide

The homicide death rate among adolescents age 15-19 in Colorado continues to be lower than the national rate but has not reached the Healthy People 2010 objective of 3 per 100,000

(Table 16). The difference between the Colorado death rate (5.8) and the national death rate (10.1) is primarily due to a lower male homicide rate (9.1 for Colorado, 16.8 for the nation).[16, 18] In fact, the homicide rate has declined further for Colorado males since the 2004-2006 data shown in the table; in 2006-2008 the male homicide rate declined to 7.2. These data should be tracked in future years to see whether this reduction is a random variation in rates or a true downturn in homicide among males. The same decline was not seen for females but the 2.3 rate in 2004-2006 meets the Healthy People 2010 objective.

Unlike suicide, hospitalizations due to assaults are much higher for male than female adolescents. In 2006-2008 the hospitalization rate was 72.3 per 100,000 males age 15-19 and 14.7 for females of the same age.[11] These rates have fluctuated but have not changed significantly since 2000-2002.

Deaths and hospitalizations do not measure the full impact of violence and assault on Colorado youth. Physical fights usually do not result in hospitalizations and are not measured through hospitalization data. Instead, the Youth Risk Behavior Survey provides data for Healthy People 2010 Objective 15-38, which seeks to reduce to 32 percent or fewer the 9th- to 12th- graders who have engaged in a physical fight. In 2009, 42 percent of males and 22 percent of females reported being in a physical fight in the previous 12 months.[4] In 2009, approximately 9 percent of high school students reported being hit, slapped, or physically hurt on purpose by a boyfriend or girlfriend in the past year; this rate was similar for males and females. In 2009, 25 percent of males and close to 8 percent of females reported carrying some type of weapon, e.g., knife, gun, or club, at least once in the past 30 days. In comparison, Colorado high school students report that a lower percentage carried a weapon on school property (at least one day during the past 30 days before the survey). Specifically, 8 percent of the males and 3 percent of the females in Colorado in 2009 carried a weapon onto school property.

In Colorado from 2006 to 2008 there were 87 deaths and 173 hospitalizations due to firearms among youth ages 15-19 years old.[16] The Healthy People 2010 Objective 15-3 is to reduce the rate of firearm deaths to 4.1 per 100,000. For adolescents, the rate was twice that at 8.1. Furthermore, adolescent males are much more likely to be hospitalized or to die by firearms than females. In 2006-2008, close to 84 percent of all firearm deaths and 90 percent of firearm hospitalizations for 15-19 year olds were to males. The suicide death rate from firearms was seven times higher for males (7.4) compared to females (1.0). It is also important to note for adolescent males that the firearm-related suicide death rate (7.4 per 100,000) is higher than the firearm-related hospitalization rate following suicide attempt (1.4). These data point to the lethality of firearms as a means to suicide.

Young women are more likely than young men to be victims of sexual assault. In 2009 11 percent of female high school students in Colorado and 4 percent of males reported that they been physically forced at some point in their lives to have sexual intercourse when they did not want it. [4]

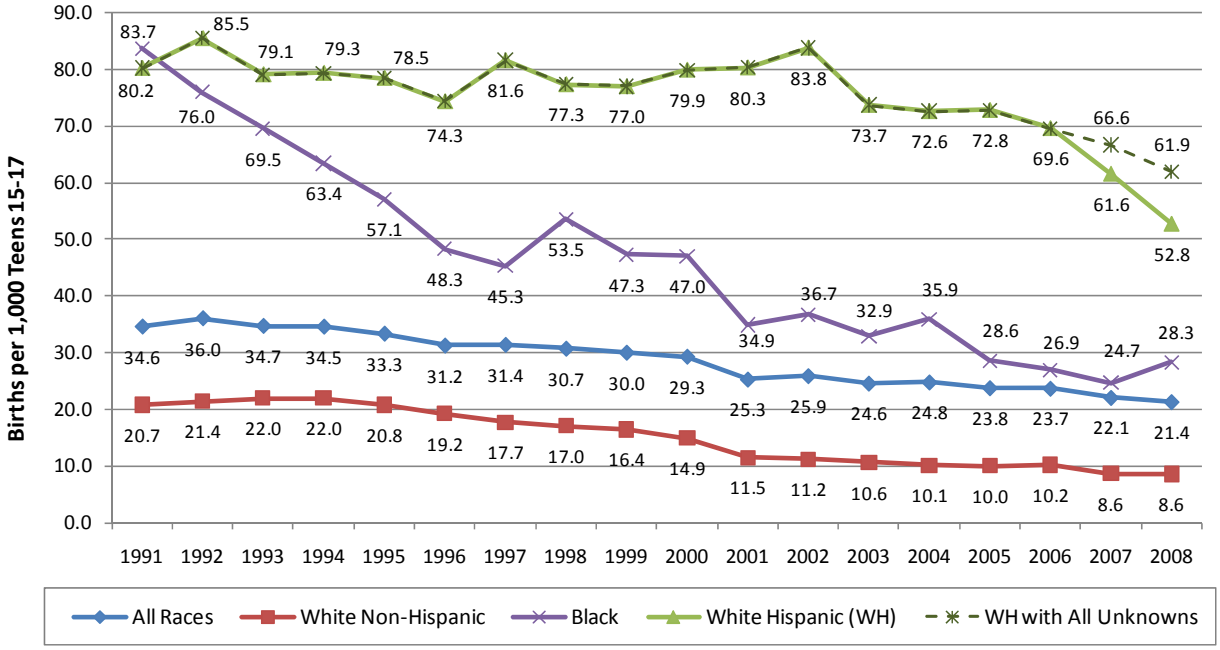
Section 4: Reproductive Health

Responsible sexual activity for adolescents (either abstinence from sexual intercourse or the use of condoms and other birth control methods) prevents unintended pregnancy and sexually transmitted diseases.

Teen Fertility

Healthy People 2010 Objective 9-7 proposes to reduce pregnancies to 43 per 1,000 females ages 15 to 17. This goal includes pregnancies that result in live births, induced and spontaneous abortions. The National Center for Health Statistics estimates that about half (55 percent) of all pregnancies for this age group result in live births.[22] Due to the difficulty in accurately measuring abortions, the data commonly used to measure fertility are limited to births documented by birth certificates.

Figure 60 illustrates a decreasing trend in the fertility rate of adolescents, (the number of live births per 1,000 15-17 year olds), beginning in the 1990s and continuing to 2008 (the latest available data).[23] Since 2000, the fertility rate for all races dropped by 27 percent overall, 42 percent for White/Non-Hispanic females, 40 percent for Black/African American females, and at least 23 percent for White/Hispanic females. Beginning in 2007, the methods used to code ethnicity changed, and a larger portion of births were coded as "ethnicity unknown," which may in part explain the large drop in the fertility rate among White/Hispanic females between 2006 and 2008 (lower green line). In the figure below for years 2007 and 2008, the top dashed line represents the estimated White/Hispanic fertility rate if all births of unknown ethnicity were assumed to be of Hispanic origin.



**The White Hispanic rate beginning in 2007 is based on a new classification of race/ethnicity which understates Hispanic births compared to births in earlier years. The dashed line shown assumes all births of unknown ethnicity are Hispanic.*

Figure 60. Fertility Rates among Females Ages 15-17, by Race/Ethnicity, Colorado, 1991-2008

Source: Colorado Department of Public Health and Environment, Birth Certificate Data

Unintended pregnancies are more likely to result in poor birth outcomes and the pregnancies of young women ages 15 to 19 are more commonly unintended. From 2006 through 2008, 36 percent of pregnancies resulting in a live birth were intended for this age group, compared to 70 percent of pregnancies for women ages 25 to 34, and 77 percent for women ages 35 and older.[24]

Sexually Transmitted Infections

Sexually active adolescents are also at risk for sexually transmitted infections (STI) including chlamydia and gonorrhea. Cases of these two STIs are reported to the Colorado Department of Public Health and Environment's STI/HIV Surveillance Program. Between 2003 and 2007 (the latest available data), there was a significant increase in the incidence of both chlamydia and gonorrhea cases in all age groups statewide. The number of chlamydia cases increased by 33 percent and the number of gonorrhea cases increased by 22 percent (while the population increased by only 4 percent). It is unknown whether these increases represent a true rise or an increase in screening, especially among females.[25] Eighty-two percent of cases of chlamydia and 72 percent of cases of gonorrhea in adolescents occurred in females.

Chlamydia is the more prevalent of the two STIs. In 2007, there were 5,389 cases of chlamydia among Colorado teens ages 15-19 compared to 799 cases of gonorrhea. During the same time period, over 97 percent of cases occurred among people of reproductive age (15-44), and while the 15 to 19 year old age group comprised 17 percent of that population, they accounted for 31 percent of the chlamydia cases and 24 percent of the gonorrhea cases statewide.[26]

Section 5: Access to Care

Health insurance increases access to health care. A Healthy People 2010 objective proposes to increase to 100 percent the proportion of all people with health insurance. Data from the National Survey of Children's Health in 2007 suggest that 86 percent of Colorado youth ages 12-17 years old have health insurance at any given time; 69 percent have private insurance and 17 percent have public insurance.[3] Of those with any kind of health insurance, 74 percent reported adequate insurance, that is, the insurance offered benefits that met the youth's needs and allowed the youth to see the desired health care provider with reasonable out-of-pocket expenses. Fewer youth with special health care needs reported adequate insurance (61 percent).[3] In order to evaluate whether children with special health care needs were getting the care that they needed, the National Survey of Children with Special Health Care Needs asked about 15 specific health care services.[5] The questions asked if the service was needed, and if needed, if the child received the service. Almost 82 percent of youth ages 12-17 years old with special health care needs received needed services. Youth with special health care needs often need referrals for specialist care or services; 72 percent of families with older children with special health care needs reported that they had no problems getting the referrals they needed.

Medical Home

Beyond access to care, a medical home is a team approach to providing quality, comprehensive primary health and related services. A medical home includes primary care and is "accessible, continuous, comprehensive, family centered, coordinated, compassionate, and culturally effective."[27] Over half of all Colorado youth ages 12-17 years old (53 percent) receive care in what would be considered a medical home. Eighty-two percent did see a health care provider for preventive medical care in the last 12 months, and 88 percent saw a dentist for preventive dental care.[3]

One marker of quality health care for children with special health care needs is that families receive family-centered care. Family-centered care includes the following approach by health care providers:

- spending enough time with families
- listening carefully
- providing needed information
- helping families to feel like partners
- being culturally sensitive
- using interpreters when needed

An estimated 66 percent of families of youth with special health care needs ages 12-17 received family-centered care.[5]

School-Based Health Centers

Locating health services within schools can improve access to comprehensive medical and mental health services for all children. School-based health centers complement services provided by school nurses and include direct clinical services such as physical exams, immunizations, mental health and substance abuse services, and care for acute illness, injury and chronic disease.[28] The centers also provide health promotion and disease prevention programs for all students, not just those seen for direct services. The presence of school-based health centers has been associated with decreased fertility rates among Black/African American adolescents in Denver Public Schools.[29]

During the 2008-2009 school year, 40 school-based health centers in Colorado were supported through the Colorado Department of Public Health and Environment's School-Based Health Center Program; these included sites at eight elementary schools, one kindergarten through eighth grade school, 14 middle schools, and 17 high schools. Mobile school-based clinics not funded by this program were also available to five elementary, five middle, and one high school in Arapahoe and Adams counties.[30] Year-end data from the 40 programs funded show that these programs served 23,635 students, approximately 3 percent of the total public school population in Colorado. Each student averaged 3.5 visits during the school year. The majority of students served were low-income (40 percent had Medicaid or Child Health Plan Plus) or uninsured (35%).

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Appendix A – Data Sources, Technical Notes, and Definitions

Data Sources

The following is a description of the data sources used in the Colorado MCH Health Status Report. The majority of these data sources come from state and national population-based surveys; however, some data come from state-level vital records, passive surveillance systems, and other datasets maintained by either the Colorado Department of Public Health and Environment or the Centers for Disease Control and Prevention.

Although the data presented in this report are specific to maternal, child, and infant health at the state level, county and regional-level data are also available as part of the Maternal and Child Health datasets located on the Colorado Department of Public Health and Environment website: http://www.cdphe.state.co.us/hs/mchdata/mchdata.html.

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is sponsored by the Centers for Disease Control and Prevention and is the world's largest, ongoing telephone health survey system of adults 18 years of age and older. Beginning in 1984, the BRFSS purpose is to collect data on health risk behaviors, preventive health practices and health outcomes primarily related to chronic disease and injury. Using random-digit-dialing, BRFSS surveyors collect data from each state and the District of Columbia, Puerto Rico, the United States Virgin Islands and Guam. BRFSS data are used to track changes in trends, develop and evaluate prevention programs, and prioritize resources. For more information on BRFSS, visit: www.cdc.gov/brfss/.

There are a number of limitations of the BRFSS. Households without a land line phone are unable to participate in the survey, and some individuals refuse to participate. Answers are self-reported and are subject to the limitations of self-reported data collection. The physical activity question asks about physical activity during leisure times and excludes physical activity performed as part of an individual's job. Questions specific to diabetes, high blood pressure and high blood cholesterol require a clinical diagnosis and might exclude individuals who have a condition but have not been diagnosed.

Colorado Birth Certificate

Information on Colorado births is collected from the Certificate of Live Birth. Data items are presented as reported on the certificate. Completeness and accuracy of items on the birth certificate may vary by facility and year. Data for all births that occurred within the state of Colorado, resident and nonresident, are collected. Resident births are births to those individuals who reported being residents of Colorado, even if the birth occurred to residents while outside of Colorado. Interstate agreements allow for the exchange of vital information

about births to Colorado residents that occurred in other states. County-specific data are for births reported as occurring for residents of those counties.

Colorado's birth registration system used the 1989 Revision of the U.S. Standard Certificate of Live Birth (unrevised) for births through calendar year 2006; while births in 2007 through the present were registered using the 2003 Revision of the U.S. Standard Certificate of Live Birth (revised). Data items that were collected using both the unrevised certificate and the revised certificate are not directly comparable. For more information, visit http://www.cdphe.state.co.us/hs/vs/.

Colorado Child Health Survey

The Colorado Child Health Survey (CHS) was initiated in 2004 to fill the health data gap in Colorado that exists for children ages 1–14. The purpose of this study is to monitor health conditions and behaviors among children. Topics include, but are not limited to, physical activity, nutrition, access to health and dental care, behavioral health, school health, sun safety, and injury. Parents with a child in the target age range are identified after completing the Behavioral Risk Factor Surveillance System and, if willing to participate, they are called approximately 10 days later to complete the CHS. Approximately 1,000 surveys are completed each year. For more information on CHS, visit: www.cdphe.state.co.us/hs/yrbs/childhealth.html.

Limitations of the CHS include the same selection and participant limitations as identified in the BFRSS. Additionally, the CHS is conducted by proxy, meaning parents are responding to questions specific to a child's health and behaviors contributing to their health. Parents might not accurately respond to questions about their child's health and behaviors.

Colorado Child Fatality Review Prevention System

The Colorado Child Fatality Review Prevention System is a multidisciplinary group of professionals representing public health, medicine, law and law enforcement, child welfare, forensics, mental health, and other special interests related to the health and safety of children. The committee has been reviewing all child deaths in Colorado since 1989 with the following goals:

- To describe trends and patterns of child death in Colorado.
- To identify and investigate the prevalence of risk factors for child death.
- To characterize high-risk groups in terms compatible with the development of public policy.
- To evaluate the service and system responses to children and families who are at high risk and to offer recommendations for improvement in those responses.
- To improve the quality and scope of data necessary for child death investigation and review.

Specific benefits have resulted from the child fatality review process. These include, but are not limited to, a better understanding of how children are dying in Colorado, greater accountability

among professionals, participation in the development of prevention strategies, statewide child death investigation training, stimulation of policy assessment, and improvement in dialogue with the media. The main limitation to the system is difficulty in maintaining updated case reviews as comprehensive reviews of cases require an extraordinary amount of time and commitment from the volunteer review team. The most recent cases include deaths in 2006. For more information, visit: http://www.cdphe.state.co.us/ps/cfrc/.

Colorado Death Certificate
Death data are compiled from information reported on the Certificate of Death. Data items are presented as reported. Information on the certificate concerning time, place, and cause of death is typically supplied by medical personnel or coroners. Demographic information, such as age, race/ethnicity, or occupation, is generally reported on the certificate by funeral directors from information supplied by the available next of kin. Training of physicians, coroners, other medical personnel, and funeral directors is conducted on an ongoing basis to maintain and improve the quality of data supplied on death certificates.

Resident deaths are deaths to those individuals who reported being residents of Colorado, even if the death occurred to residents while outside of Colorado. Interstate agreements allow for the exchange of vital information about deaths to Colorado residents that occurred in other states. County-specific data are for deaths reported as occurring for residents of those counties. For more information, visit http://www.cdphe.state.co.us/hs/vs/.

Colorado Emergency Medical Services Ambulance Trip Report Information Exchange
The Colorado MATRIX (Emergency Medical Services Ambulance Trip Report Information Exchange), maintained by the EMS and Trauma Data Program at the Colorado Department of Public Health and Environment, contains information from patient care reports submitted by pre-hospital transport agencies in Colorado. The variables included in the MATRIX are based on the National Elements subset of the National Emergency Management System Information System. Data collection in Colorado began in 2006 and currently 70% of the 196 ground transport agencies in Colorado are submitting patient care information to the MATRIX. For more information visit: http://www.nemsis.org/.

Colorado Hospital Discharge
The Colorado Hospital Association (CHA) compiles hospital discharge data from all acute care and many specialty hospitals in Colorado. This database includes demographic, diagnostic, procedural, payment and length of stay information on all inpatient admissions. Injury hospitalizations are identified using specific codes from the International Classification of Diseases, Version 9, Clinical Modification (ICD-10-CM). For more information regarding the Colorado Health and Hospital Association and the hospital discharge dataset, please visit the CHHA website at www.cha.com.

Colorado Oral Health Surveillance System
The Colorado Oral Health Surveillance System monitors the burden of oral disease among Coloradans. This surveillance system is the result of a collaborative agreement between the

Centers for Disease Control and Prevention and the Colorado Department of Public Health and Environment. Colorado is one of thirteen states responding to the 2002 federal initiative to test the feasibility of developing state oral health surveillance systems.

The population-based surveillance system collects, analyzes, and disseminates data to inform and support oral health decision-makers in Colorado. With these data, oral disease patterns can be monitored across Colorado's demographic groups. When high-risk groups or behaviors are identified, oral health programs and resources are targeted appropriately. Monitoring oral disease patterns in the population will also identify when disease levels change and emerging trends occur in the state. For more information, visit: http://www.cdphe.state.co.us/pp/oralhealth/COHSS.html.

Colorado Violent Death Reporting System

The Colorado Violent Death Reporting System collects information on violent deaths (homicide, suicide, deaths of undetermined intent, and unintentional firearm-related deaths) occurring within Colorado. Data are collected from a variety of data sources including death certificate, coroner/medical examiner reports, law enforcement investigations, crime lab information, and firearm trace data. The purpose of this robust data collection is to provide a more complete understanding of when, where, and how violent deaths occur. The type of information gathered includes demographics of both the victim and suspect, circumstances preceding the event, alcohol and/or drug use by the victim, the type of location of where the incident occurred, the type of weapon used, and the relationship between the victim and suspect. Colorado is currently one of 17 states funded to collect this data and all data are submitted to the Centers for Disease Control and Prevention to provide a national look at the circumstances surrounding violent death in the United States. For more information, visit: http://www.cdphe.state.co.us/pp/injepi/cvdrs/index.html.

Healthy Kids Colorado Survey

The Healthy Kids Colorado Survey is composed of two modules, the Youth Risk Behavior Survey and Colorado Youth Survey. The Youth Risk Behavior Survey is detailed separately below. Both surveys are administered to a representative sample of ninth through twelfth grade public school students throughout Colorado. While the Youth Risk Behavior Survey assess behaviors that are often established during childhood and early adolescence (tobacco use, diet, physical inactivity, alcohol and drug use), the Colorado Youth Survey assesses risk and protective factors (positive youth development). For more information, visit: http://www.cde.state.co.us/cdeprevention/healthykidscolo.htm.

Healthy People 2010 and 2020

Healthy People 2010 is a set of health objectives for the Nation to achieve over the first decade of the new century. It can be used by many different people, States, communities, professional organizations, and others to help them develop programs to improve health. Healthy People 2010 builds on initiatives pursued over the past two decades. The 1979 Surgeon General's Report, *Healthy People*, and *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* both established national health objectives and served as the basis for

the development of State and community plans. Today, we are preparing for release of the 2020 objectives. Like its predecessors, Healthy People 2020 is currently in the broad consultation process, built on the best scientific knowledge and designed to measure programs over time.

For Healthy People 2010, there are two overarching goals: increase quality and years of healthy life; and, eliminate health disparities. There are twenty-eight focus areas and 467 specific objectives and some objectives have sub objectives specific to a population. And, for each objective is a target to strive to reach. For more information on the objectives used for this report visit Appendix B. For more information, visit: http://www.healthypeople.gov/default.htm.

National Health and Nutrition Examination Survey

The National Health and Nutrition Examination Survey (NHANES) is a program of studies sponsored by the Centers for Disease Control and Prevention. Beginning in the 1960s, the survey's purpose is to assess the health and nutritional status of adults and children in the United States. NHANES is unique because it combines an interview with a physical examination. The survey examines a nationally representative sample of about 5,000 people each year. Study results are used to guide health sciences research. Results directly and indirectly impact programs, services and policy. For more information on NHANES, visit: www.cdc.gov/nchs/nhanes/about_nhanes.htm.

National Immunization Survey

In 1994, the National Immunization Survey (NIS) was started to monitor childhood immunization coverage. Sponsored by the National Center for Immunizations and Respiratory Diseases, the NIS is conducted using a list-assisted random-digit-dialing telephone survey followed by a mailed survey to the child's provider. Eligible children are between 19 and 35 months of age living in the United States at the time of the interview. Data collected relate to recommended vaccinations along with additional information on maternal breastfeeding. Breastfeeding questions were added in 2001 for a sample of respondents and permanently added in 2003. Along with identifying vaccination coverage rates and trends, data are further used to estimate breastfeeding initiation and duration. For more information on the NIS, visit www.cdc.gov/nis/.

The major limitation of the National Immunization Survey is the recall of breastfeeding behaviors (frequency and duration), as many months or years might pass between breastfeeding cessation and survey participation.

National Survey of Children's Health

The National Survey of Children's Health is a national survey that was conducted by telephone in English and Spanish during 2003-2004 and for a second time in 2007-2008. The survey provides a broad range of information about children's health and well-being collected in a manner that allows for comparisons between states and at the national level. Telephone numbers are called at random to identify households with one or more children under 18 years

old. In each household, one child was randomly selected to be the subject of the interview. The survey results are weighted to represent the population of non-institutionalized children 0-17 nationally, and in each state. There are two limitations of this survey: 1) questions may vary between survey years and limit analysis; and, 2) the survey is conducted once every four years. For more information, visit: http://nschdata.org/Content/Default.aspx.

National Survey of Children with Special Health Care Needs
The National Survey of Children with Special Health Care Needs provides information about children with special health care needs in all 50 States and the District of Columbia. In each state, telephone interviewers screened at least 3,000 households with children to identify children with special health care needs. In-depth interviews were conducted with the parents of 750 – 850 children with special health care needs per state in 2001 and again in 2005-2006. There are some limitations to this survey: 1) differences in questions between survey years may limit analysis of trends over time; 2) the survey is only conducted every four years. For more information, visit: http://cshcndata.org/Content/Default.aspx.

Pediatric Nutrition Surveillance System
Each month the Women Infant and Children program at the national level submits participant data to the Pediatric Nutrition Surveillance System data set and this data is used to generate annual reports by the Centers for Disease Control and Prevention. These data reports are organized by clinic, county, local agency, and state. Some of the indicators found in the reports include racial and ethnic distribution, age distribution, growth and anemia indicators, breastfeeding, TV viewing, and smoking in household. Although these reports do provide an in-depth look at behaviors related to nutrition and development, they are restricted to those participants in the Women, Infant, and Children program. For more information, visit: http://www.cdphe.state.co.us/ps/wic/nutritionsurveillance/nutritionsurveillance.html.

Pregnancy Risk Assessment Monitoring System
The Pregnancy Risk Assessment Monitoring System (PRAMS) is a surveillance project of the Centers for Disease Control and Prevention. The goal of the PRAMS is to improve the health of mothers and infants by reducing adverse outcomes such as low birth weight, infant mortality and morbidity, and maternal morbidity. PRAMS provides state-specific data for planning and assessing health programs and for describing maternal experiences that might contribute to maternal and infant health. State-specific, population-based data are collected by mail regarding maternal attitudes and behaviors before, during, and shortly after pregnancy. Women are sampled using data from each state's birth certificate file. For more information on PRAMS, visit www.cdc.gov/PRAMS/index.htm.

Colorado is one of 38 states participating in the Pregnancy Risk Assessment Monitoring System, a risk-factor surveillance system of behaviors and experiences before, during and after pregnancy. Participants in this survey complete written (or telephone as needed) surveys within four months of delivery. It also provides information on hospital best practices for breastfeeding. A limitation of PRAMS data is that it provides estimates of breastfeeding

behavior early on in an infant's life but not estimates of breastfeeding behavior past 20 weeks (about 5 months).

Sexually Transmitted Infection and HIV Surveillance System
The Sexually Transmitted Infection and HIV Surveillance Program at the Colorado Department of Public Health and Environment conducts surveillance and research to characterize and track Sexually Transmitted and HIV infections in Colorado. The Registry Unit collects, compiles and disseminates information on gonorrhea, syphilis, chlamydia, and HIV infection, and contacts health care providers to ensure that clients receive adequate treatment. Staff members identify disease outbreaks and coordinate the response by the Colorado Department of Public Health and Environment, collaborating agencies, and health care providers. The program synthesizes data from multiple sources to develop annual Colorado STI/HIV epidemiological profiles. These reports are used to inform and guide the state STI/HIV programs, and are disseminated to care providers, local health departments, community planning groups, researchers, and the public. For more information, visit: http://www.cdphe.state.co.us/dc/HIVandSTD/surveillance.html.

Youth Risk Behavior Surveillance System
The Youth Risk Behavior Surveillance System (YRBSS) is a national school-based survey supported by the Centers for Disease Control and Prevention. The goal of the YRBSS is to monitor priority health-risk behaviors and health outcomes that contribute to death, disability, and social problems among high school-aged adolescents. Started in 1991, the YRBSS is conducted every two years in select public and private schools across the United States.

A main limitation of the YRBSS is poor survey response rates. Overall response rates in Colorado were 49 percent in 2001, 32 percent in 2003 and 29 percent in 2007. Only in 2005 did the Colorado YRBSS achieve an overall response rate of 60 percent, which is adequate for generalizing to the entire Colorado adolescent population. Because of inadequate response rates, prevalence estimates for adolescent overweight and obesity that are more recent than 2005 are not available and the trends since 2001 cannot be assessed. For more information on the YRBSS, visit www.cdc.gov/HealthyYouth/yrbs/index.htm.

Technical Notes

The following are technical notes specific to the Colorado MCH Health Status Report. The goal of these notes is to provide some context and explanation as to why certain surveillance methods were chosen.

Race/ethnicity data
Race/ethnicity data are self-reported on population-based surveys. The Health Statistics Section at the Colorado Department of Public Health and Environment uses different race/ethnic categories for different age-specific surveys. Adult race/ethnic categories include non-Hispanic White, non-Hispanic Black, Hispanic, Asian Pacific Islander, and Native American Alaskan Native.

Among surveys of children, such as the Colorado Child Health Survey, race/ethnic categories include non-Hispanic White, non-Hispanic Black, Hispanic, Asian, and other. It should be noted that in some cases, the other category is omitted from figures. This omission is due to small numbers, which make estimates unreliable. Interpretation of statistics with small numbers is difficult since confidence intervals are large.

Population-based data and application of weights

This report uses data from many population-based surveys. A population-based survey is a survey that is representative of the population being studied; in this case, it is the population of Colorado. Although a survey sample is not strictly proportional to the population of the state, a weight is applied to account for sample and population differences. Using weighting, survey data are adjusted to reflect the population, and this enables public health officials to generalize conclusions to the entire population of Colorado.

Rates

A rate is defined as the frequency with which an event occurs in a defined population over a specified period of time. Rates are important for comparing experiences between populations at different times, different places, and among different types of people.[xxix] For this report, age-specific rates* were predominantly used.

**Age-specific rates are defined as the number of people within an age group who have a condition of interest per 100,000 people in that age group in the total population of interest (Colorado, United States or a region of Colorado). Age-specific rates are not adjusted. Rather, these represent rates specific to the age group of interest.*

Statistical Significance

Confidence intervals can be used as a conservative test of statistical significance. A statistically significant difference is noted when the confidence interval of one estimate is higher or lower than the confidence interval of another estimate. In other words, one estimate is significantly different than another if the two confidence intervals do not overlap.

Definitions

Adolescent: For the purposes of this report, unless otherwise noted, people in high school (grades 9–12) are considered adolescents.

Adult: For the purposes of this report, unless otherwise noted, people ages 18 years and older are considered adults.

Body mass index (BMI): BMI estimates used within this report are crude estimates of body fat based on an individual's height and weight. BMI is calculated as weight in kilograms divided by height in meters squared (or as weight in pounds times 703 divided by height in inches

[xxix] Last, John M. A Dictionary of Epidemiology. New York, NY. Oxford University Press, 2001.

squared). BMI categories differ for adults (20 years of age and older) and children (ages 2 to 20 years of age). The four BMI categories for adults are underweight (less than 18.5), healthy weight (18.5–24.9), overweight (25.0–29.9), and obese (30.0 or greater). Among children, BMI is based on sex-specific growth charts, and the four categories of BMI are underweight (less than fifth percentile), healthy weight (5^{th}–84^{th} percentile), overweight (85^{th}–94^{th} percentile), and obese (95^{th} percentile or greater).

Child: For the purposes of this report, unless otherwise noted, people ages 1–14 years are considered children.

Demographic: A characteristic describing social or vital statistics about a human population, such as size, growth, density, and distribution.

Epidemic: The occurrence of cases of an illness, health condition, health-related behavior or health-related event in excess of what is normally expected within a population for a given time.

Epidemiology: The study of the distribution of a disease or physiological condition in human populations and of the factors that influence this distribution.

Infants: For the purposes of this report, individuals less than one year of age are considered infants.

Moderate or vigorous physical activity: This report defined moderate or vigorous physical activity as 30 minutes or more per day of moderate activity for five or more days per week or 20 minutes or more per day of vigorous activity for three or more days per week.

Neonatal Infant Mortality: Death of an infant less than 28 days old. Presented as a rate per 1,000 live births, the neonatal infant mortality rate is calculated using the following: numerator is the number of deaths of infants less than 28 days of age and the denominator is the number of live births for that specified year or time period.

Physical inactivity or physically inactive: This report defined a physically inactive person as one who reported having had no leisure-time physical activity in the past 30 days at the time of survey.

Postneonatal Infant Mortality: Death of an infant ages 28 days to less than one year of age. Presented as a rate per 1,000 live births, the numerator is the number of deaths of infants 28 days to less than one year of age and the denominator is the number of live births for that specified year or time period.

Prevalence: Prevalence is defined as the proportion of individuals in a population who have a disease, condition, or attribute of interest at a specified time. Prevalence can also be defined as the number of events in a given population in a specified period.

Appendix B – Selected Healthy People 2010 (HP 2010) and Healthy People 2020 (HP 2020) Objectives

HP 2010 Objective	Proposed HP 2020 Objective	Change from HP 2010				Objective text	Chapter
		Retained	Modified	New	Archived		
Access to Health Services							
1-1	AHS HP2020–1	✓				Increase the proportion of persons with health insurance.	1, 2, 5
1-5	AHS HP2020–3	✓				Increase the proportion of persons with a usual primary care provider.	1
Diabetes							
(Developmental) 5-8	N/A					Decrease the proportion of pregnant women with gestational diabetes.	3
Disability and Secondary Conditions							
6-2	DSC HP2020–2	✓				Reduce the proportion of children and adolescents with disabilities who are reported to be sad, unhappy, or depressed.	5
N/A	DSC HP2020–17			✓		Reduce the proportion of people with disabilities who report on non-fatal unintentional injuries that require medical care.	5
Educational and Community-Based Programs							
7-1	ECBP HP2020–1	✓				Increase high school completion.	1
Family Planning							
9-1	FP HP2020–1	✓				Increase the proportion of pregnancies that are intended.	2
9-3	FP HP2020–6		✓			Increase the proportion of females at risk of unintended pregnancy who used contraception at most recent sexual intercourse.	2
9-7	FP HP2020–8		✓			Reduce pregnancy rates among adolescent females.	6
Heart Disease and Stroke							
12-9	HDS HP2020–13		✓			Reduce the proportion of persons in the population with hypertension.	3
Immunization and Infectious Diseases							
14-22	IID HP2020–18		✓			Achieve and maintain effective vaccination coverage levels for universally recommended vaccines among young children.	5

HP 2010 Objective	Proposed HP 2020 Objective	Change from HP 2010				Objective text	Chapter
		Retained	Modified	New	Archived		
Injury and Violence Prevention							
15-3	IVP HP2020–3	✓				Reduce firearm-related deaths.	6
15-13	IVP HP2020–22		✓			Reduce unintentional injury deaths.	6
15-17	IVP HP2020–25		✓			Reduce nonfatal motor vehicle crash-related injuries.	6
15-19	IVP HP2020–8	✓				Increase use of safety belts.	6
15-20	IVP HP2020–15		✓			Increase age-appropriate vehicle restraint system use in children.	5
15-24	IVP HP2020–10	✓				Increase the number of States and the District of Columbia with laws requiring bicycle helmets for bicycle riders.	5
15-32	IVP HP2020–2	✓				Reduce homicides.	6
15-33	IVP HP2020–29		✓			Reduce nonfatal child maltreatment.	5
15-33	IVP HP2020–30		✓			Reduce child maltreatment deaths.	5
15-38	IVP HP2020–13	✓				Reduce physical fighting among adolescents.	6
Maternal, Infant and Child Health							
16-1	MICH HP2020–15		✓			Reduce fetal and infant deaths.	4
16-2	MICH HP2020–1	✓				Reduce the rate of child deaths.	5
16-3	MICH HP2020–2	✓				Reduce deaths of adolescents and young adults.	6
16-6	MICH HP2020–5	✓				Increase the proportion of pregnant women who receive early and adequate prenatal care.	3
16-9	MICH HP2020–6	✓				Reduce cesarean births among low-risk (full-term, singleton, vertex presentation) women.	4
16-10	MICH HP2020–7	✓				Reduce low birth weight (LBW) and very low birth weight (VLBW).	4
16-11	MICH HP2020–8	✓				Reduce preterm births.	4
16-12	MICH HP2020–17		✓			(Developmental) Increase the proportion of mothers who achieve a recommended weight gain during their pregnancies.	3

HP 2010 Objective	Proposed HP 2020 Objective	Change from HP 2010				Objective text	Chapter
		Retained	Modified	New	Archived		
16-13	MICH HP2020–9	✓				Increase the percentage of healthy full-term infants who are put down to sleep on their backs.	4
16-15	MICH HP2020–20		✓			Reduce the occurrence of neural tube defects.	4
16-16	MICH HP2020–21		✓			Increase the proportion of pregnancies begun with the recommended folic acid level.	2, 4
16-17	MICH HP2020–10	✓				Increase abstinence from alcohol, cigarettes, and illicit drugs among pregnant women.	2, 3
16-19	MICH HP2020–12	✓				Increase the proportion of mothers who breastfeed their babies.	4
16-20	MICH HP2020–22		✓			Ensure appropriate newborn blood-spot screening and follow-up testing.	4
N/A	MICH HP2020–23			✓		Decrease postpartum relapse of smoking among women who quit smoking during pregnancy.	3
N/A	MICH HP2020–24			✓		Increase the percentage of women giving birth who attend a postpartum care visit with a health worker.	4
N/A	MICH HP2020–26			✓		Increase the percentage of employers who have worksite lactation programs.	4
N/A	MICH HP2020–27			✓		Decrease the percentage of breast-fed newborns who receive formula supplementation within the first 2 days of life.	4
N/A	MICH HP2020–27			✓		Increase the percentage of live births that occur in facilities that provide recommended care for lactating mothers and their babies.	4
Mental Health and Mental Disorders							
18-2	MHMD HP2020–2	✓				Reduce the rate of suicide attempts by adolescents.	6
18-7	MHMD HP2020–6	✓				Increase the proportion of children with mental health problems who receive treatment.	5
Nutrition and Weight Status							
19-1	NWS HP2020–1	✓				Increase the proportion of adults who are at a healthy weight.	5
19-2	NWS HP2020–2	✓				Reduce the proportion of adults who are obese.	2, 5, 6

HP 2010 Objective	Proposed HP 2020 Objective	Change from HP 2010				Objective text	Chapter
		Retained	Modified	New	Archived		
19-3	NWS HP2020–5		✓			Reduce the proportion of children and adolescents who are overweight or obese.	5, 6
19-14	N/A				✓	Reduce growth retardation among low-income children under age 5 years.	5
19-5	NWS HP2020–6		✓			Increase the contribution of fruits to the diets of the population aged 2 years and older.	3, 5
19-6	NWS HP2020–7		✓			Increase the variety and contribution of vegetables to the diets of the population aged 2 years and older.	3, 5
19-12	NWS HP2020–3	✓				Reduce iron deficiency among young children and females of childbearing age.	5
19-14	NWS HP2020–4	✓				Reduce iron deficiency among pregnant females.	5
Oral Health							
21-1	OH HP2020–6		✓			Reduce the proportion of children and adolescents who have dental caries experience in their primary or permanent teeth.	5
21-2	OH HP2020–7		✓			Reduce the proportion of children, adolescents, and adults with untreated dental decay.	5
21-8	OH HP2020–10		✓			Increase the proportion of children who have received dental sealants on their molar teeth.	5
21-10	OH HP2020–3	✓				Increase the proportion of children and adults who use the oral health care system each year.	2, 5
Physical Activity and Fitness							
22-1	PAF HP2020–1	✓				Reduce the proportion of adults who engage in no leisure-time physical activity.	3
22-2, 22-3 and 22-4	PAF HP2020–6		✓			Increase the proportion of adults that meet current Federal physical activity guidelines for aerobic physical activity and for muscle strength training.	3
22-6 and 22-7	PAF HP2020–7		✓			Increase the proportion of adolescents that meet current physical activity guidelines for aerobic physical activity and for muscle-strengthening activity.	6

HP 2010 Objective	Proposed HP 2020 Objective	Change from HP 2010				Objective text	Chapter
		Retained	Modified	New	Archived		
22-10	PAF HP2020–4	✓				Increase the proportion of adolescents who spend at least 50 percent of school physical education class time being physically active.	6
22-11	PAF HP2020–8		✓			Increase the proportion of children and adolescents that meet guidelines for television viewing and computer use.	6
22-14	PAF HP2020–10		✓			(Developmental) Increase the proportion of trips made by walking.	3
22-15	PAF HP2020–11		✓			(Developmental) Increase the proportion of trips made by bicycling.	3
Sexually Transmitted Diseases							
25-11	N/A				✓	Increase the proportion of adolescents who abstain from sexual intercourse or use condoms if sexually active.	6
Substance Abuse							
26-6	SA HP2020–4	✓				Reduce the proportion of adolescents who report that they rode, during the previous 30 days, with a driver who had been drinking alcohol.	6
26-10	SA HP2020–6	✓				Reduce past-month use of illicit substances.	6
26-11	SA HP2020–7	✓				Reduce the proportion of persons engaging in binge drinking of alcoholic beverages.	6
26-13	N/A				✓	Reduce the proportion of adults who exceed guidelines for low-risk drinking.	2
Tobacco Use							
27-2	TU HP2020–6		✓			Reduce tobacco use by adolescents.	6
27-9	N/A				✓	Reduce the proportion of children who are regularly exposed to tobacco smoke at home.	5
27-10	TU HP2020–11		✓			Reduce the proportion of nonsmokers exposed to secondhand smoke.	5

Further information can be found on the Healthy People website: http://www.healthypeople.gov/Default.htm.