

**Summary of Reported Hepatitis A Cases in Colorado,  
2000-2009**



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March 2011

## EXECUTIVE SUMMARY

- The rate of reported hepatitis A cases in Colorado has declined dramatically during 2000-2009. It is likely that increased pediatric use of the hepatitis A vaccine is the reason for this decline.
- In 2000 a total of 212 cases were reported compared with a historic low of 26 cases in 2007.
- During 2005-2009 the average incidence per year was 0.8 cases per 100,000 persons, or an average of 41 reported cases per year in Colorado.
- The largest declines have been among children under 10 years of age, particularly children age 5-9, whose average annual incidence rates declined from 4.1 cases per 100,000 during 2000-2004 to 0.4 cases per 100,000 persons during 2005-2009.
- In recent years (2005-2009), the highest rates of reported illness have been among persons 15-19 years (1.1 per 100,000); persons 20-39 years (1.1 per 100,000) and persons 80 years and older (1.2 per 100,000).
- During 2005-2009 rates of hepatitis A illness were higher among Hispanics than other racial or ethnic groups. The average incidence rate for White non-Hispanic persons was 0.7 per 100,000 and the rate for Hispanic persons was 1.1 per 100,000, approximately 55% higher. While this is a substantial disparity, the difference between the two groups has decreased over time.
- During 2004-2009, international travel was the most frequently reported risk factor for hepatitis A infection, with 46.5% of cases reporting international travel during the 2-6 weeks before onset of symptoms.
- Public health efforts to educate travelers about the importance of hepatitis A vaccine might further decrease incidence.
- While persons who handle food are not at increased risk for hepatitis A, even a single case in a food handler can result in a large and costly public health investigation. Food service employers wishing to decrease their risk of a hepatitis A exposure at their establishment could consider hepatitis A vaccination for workers, in addition to continuing to monitor and enforce regulations that pertain to hand hygiene and bare hand contact with ready to eat foods.
- Rapid reporting and case investigation remain very important to limiting potential spread from reported cases to others in the community.

## LIST OF TABLES AND FIGURES

Figure 1. Incidence rates of reported hepatitis A infections in Colorado and the United States, 2000-2009

Figure 2. Incidence rates of hepatitis A in Colorado by sex, 2000-2009

Figure 3. Hepatitis A incidence rates by age group during 2000-2009 in Colorado

Table 1. Annual and 5-year incidence rates of hepatitis A cases in Colorado, by age group, 2000-2009

Figure 4: Average incidence rate of hepatitis A cases in Colorado during 2005-2009, by age and sex

Table 2: Rates of hepatitis A by race and ethnicity, Colorado, 2005-2009

Table 3. Clinical characteristics of hepatitis A cases reported 2004-2009 in Colorado

Table 4. Reported exposure to potential risk factors for hepatitis A infection among hepatitis A cases in Colorado, 2004-2009.

Table 5. International travel among reported hepatitis A cases, 2004-2009, in Colorado, among those for whom that information was known

Table 6. Average hepatitis A incidence rates in Colorado by County, 2005-2009

Figure 5: Average annual incidence rate of hepatitis A cases during 2005-2009 in Colorado (map)

## Summary of Reported Hepatitis A Cases in Colorado, 2000-2009

The purpose of this report is to describe the current epidemiology of hepatitis A infection in Colorado, document shifts in the epidemiology of hepatitis A that have occurred over the past ten years, and guide future prevention efforts.

### **Methods:**

Hepatitis A is a reportable condition in Colorado. Because timely case investigation is important to prevent further transmission, Colorado Board of Health Regulation 6 CCR 1009-1 stipulates that tests that are IgM positive for hepatitis A virus be reported to public health within 24 hours of diagnosis. When a case is reported, an epidemiologist from the local or state health department contacts the health care provider and/or the patient to determine whether the report meets the case definition, to collect clinical, demographic and risk factor information, and to conduct disease control activities, as necessary. These procedures are detailed in the Colorado Department of Public Health and Environment (CDPHE) Hepatitis A Manual located at: [www.cdphe.state.co.us/dc/Epidemiology/manual/HepA\\_manual.pdf](http://www.cdphe.state.co.us/dc/Epidemiology/manual/HepA_manual.pdf). CDPHE uses the Council of State and Territorial Epidemiologists (CSTE) case definitions for case status that are found at: [www.cdc.gov/ncphi/diss/nndss/casedef/index.htm](http://www.cdc.gov/ncphi/diss/nndss/casedef/index.htm). Starting in 2004, CDPHE began collaboration with the Centers for Disease Control and Prevention (CDC) to perform enhanced surveillance for viral hepatitis as part of the Emerging Infections Program Network. Several new exposure questions were added to routine data collection and CDPHE began to monitor completeness of case reports more closely.

For this report, we summarized all confirmed cases reported among Colorado residents during 2000-2009. To calculate incidence rates, we used 2000-2009 population estimates from the Demography Section of the Colorado Department of Local Affairs that include estimates by age, sex, county, and race/ethnicity.

These data have several limitations. As with most surveillance data for communicable diseases, reported cases likely underestimate the true incidence of hepatitis A in Colorado. This occurs because infection with hepatitis A may be asymptomatic (particularly among children under five), ill persons may have mild illness and not seek care, appropriate diagnostic testing may not be ordered or may be falsely negative, and finally, diagnosed cases may not be reported to public health. Information reported here is primarily collected from patient interviews. When patients are unable to be located or refuse all or part of a public health interview, we attempt to collect necessary data from health care providers, however exposure data is often limited in those circumstances.

For more information about hepatitis A transmission, prevention and vaccination, or for nationwide data please visit [www.cdc.gov/hepatitis](http://www.cdc.gov/hepatitis).

### **Findings:**

The rate of reported hepatitis A cases in Colorado has declined considerably since 2000 (Figure 1). In 2000, a total of 212 cases were reported compared with a historic low of 26 cases in 2007. There was an increase in reported cases during 2008-2009. The cause of this increase is not

known. During 2005-2009 the average incidence per year was 0.84 cases per 100,000 persons, or an average of 41 reported cases per year in Colorado. The incidence rate of hepatitis A in the United States has also declined since 2000. In contrast with Colorado, the overall United States rate did not increase in 2008. National data have not yet been published for 2009.

Historically, the incidence rate of hepatitis A was higher among males than females. Since 2000, there has been a large and sustained decline for both sexes and since 20004 the rates among males and females have essentially been the same (Figure 2).

The age distribution of hepatitis A rates has changed substantially during 2000-2009 (Figure 3 and Table 1). The largest declines have been among children under 10 years of age, particularly children age 5-9, whose average annual incidence rates declined from 4.10 cases per 100,000 during 2000-2004 to 0.36 cases per 100,000 persons during 2005-2009.

In recent years (2005-2009), the highest rates of reported illness have been among persons 15-19 years (1.12 per 100,000); persons 20-39 years (1.11 per 100,000) and persons 80 years and older (1.17 per 100,000). During 2005-2009 the largest burden of illness has been among adults ages 20-39 and 40-59, with a combined average of 27 cases reported per year among persons in those age groups.

Age and sex-specific rates for cases reported during 2005-2009 show no clear pattern (Figure 4). Rates were higher for males among persons in the following age categories: 1-4 years, 5-9 years, 20-39 years and 80+ years.

During 2005-2009 rates of hepatitis A illness were higher among Hispanics than other racial or ethnic groups (Table 2). The average incidence rate for White non-Hispanic persons was 0.72 per 100,000 and the rate for Hispanic persons was 1.12 per 100,000, approximately 55% higher. While this is a substantial disparity, the difference between the two groups has decreased over time. For example, in a CDPHE summary of hepatitis A cases during 1989-1993 there was a greater than a five-fold difference in incidence rates between White non-Hispanics and Hispanics ([http://www.cdphe.state.co.us/dc/Hepatitis/hepa/hav\\_1998.pdf](http://www.cdphe.state.co.us/dc/Hepatitis/hepa/hav_1998.pdf)). Because 88% of cases reported themselves to be White non-Hispanic or Hispanic, rates for other racial/ethnic groups may not be reliable.

The most commonly reported symptoms among cases were fatigue, dark urine, jaundice, and nausea (Table 3). Twenty-seven percent of cases during 2004-2009 were hospitalized. One death was reported in an elderly patient who had renal and hepatic failure. No source for that patient's infection was determined.

At the time of public health interview, 15 (6%) reported ever receiving hepatitis A vaccine. Of these, seven received hepatitis A vaccine for post-exposure prophylaxis following contact with a known case and one received vaccine only one week before travel to the area in which she was exposed. Of the remaining seven cases, three reported receiving two or more doses of hepatitis A vaccine at least one year prior to infection; four reported receiving only a single dose of hepatitis A vaccine prior to hepatitis A infection. In the absence of additional information, it appears that at least three cases may represent vaccine failures.

During 2004-2009, international travel was the most frequently reported risk factor for hepatitis A infection, with 46.5% of cases reporting international travel during the 2-6 weeks before onset of symptoms (Table 4). This was followed by having a household member who traveled internationally in the preceding three months (30.9%), consumption of raw shellfish (14.5%), and having contact with a person diagnosed with hepatitis A (11.7%). Overall, 54% of cases reported that either they had traveled internationally or a member of their household had traveled in the previous 3 months.

Of those cases who traveled internationally, 61% (73) reported traveling to Mexico. Other regions include: Central America (excluding Mexico), South America or the Caribbean 18.4% (22); Asia 6.7% (8); Africa 6.7% (8); the Middle East 3.4% (4); and 'other' 3.4% (4).

The proportion of cases that traveled internationally during 2004-2009 varied (Table 5). In particular, it appeared that the proportion of cases reporting international travel had steadily decreased since 2005 from 59% to 42% in 2009. However, the Chi-square test for trend examining cases 2005-2009 was not statistically significant.

Hispanic cases reported international travel slightly more frequently than white non-Hispanics cases, [32 (52%) compared with 75 (46%), respectively], however this difference was not statistically significant ( $p=0.4$ ) and is unlikely to explain the disparity in incidence between the two groups.

Having a household member who traveled is the second most common risk factor reported. In 2009, four cases were reported among persons who had had close contact with infants who had recently been adopted from counties in which hepatitis A has high endemicity.

There was no substantial variation over time in other exposures that are commonly associated with illness, such as child care center attendance or consumption of raw shellfish. Only 8 cases (3.1%) reported during this time period worked as food handlers.

Geographically, incidence rates for each county during 2005-2009 are reported in Table 6 and displayed in Figure 5. Overall, incidence rates were highest in Western slope counties, followed by metropolitan Denver and then Eastern and Southeastern counties where few cases were reported.

## **Discussion**

The rate of reported hepatitis A cases in Colorado has declined dramatically during 2000-2009 with the largest declines among children under 10 years of age. It is likely that increased pediatric use of the hepatitis A vaccine is the reason for this decline.

Hepatitis A vaccine is safe and effective. The vaccine was licensed in 1995 and the first recommendations for its use published in late 1996. During the 1990's, Colorado was considered an 'intermediate incidence' state, with a rate of hepatitis A infection between 10 and 20 cases per 100,000, above the national average of 10 cases per 100,000 persons. As such, in September 1998 CDPHE made hepatitis A vaccine available to children age two and greater in six counties (Adams, Arapahoe, Boulder, Denver, Jefferson and Weld) through the Vaccine for

Children (VFC) Program, and this was expanded to all Colorado counties in 2000. In 2006, the Advisory Committee on Immunization Practices (ACIP) recommended hepatitis A vaccine for all children at age one year. Hepatitis A vaccine remains a recommended, and not required, vaccine in Colorado.

The age distribution of cases reported during 2005-2009 suggests that this strategy has been highly effective in Colorado.

The relatively higher rates of hepatitis A among persons over 80 is surprising. The 1988-1994 National Health and Nutrition Examination Survey (NHanesIII) found that anti-HAV prevalence among persons > 70 years was 75% (1). The majority of the hepatitis A cases among persons over 80 reported in recent years have met the CSTE case definition, but only barely, having liver enzymes that are above normal but not as elevated as typical hepatitis A cases. This may be due to a combination of false positive IgM results and a relatively broad case definition. CSTE is evaluating changes to the case definition now that may result in a more specific case definition with clearly defined minimum liver enzyme levels.

In addition to the broad recommendation for all children at one year of age, ACIP recommends the hepatitis A vaccine for the following groups:

- Persons traveling to or working in countries that have high or intermediate rates of hepatitis A
- Men who have sex with men
- Users of illegal injection and noninjection drugs
- Persons who work with HAV-infected primates or with HAV in a research laboratory
- Persons who have chronic liver disease or clotting-factor disorders
- Household members and other close personal contacts (e.g., regular babysitters) of adopted children newly arriving from countries with high or intermediate hepatitis A endemicity

Nearly half of all reported cases during 2004-2009 had traveled internationally before onset of illness. Public health efforts to educate travelers about the importance of hepatitis A vaccine might further decrease incidence. Among reported cases, it might be useful to ascertain the reason for international travel (such as work, visiting family members, tourism, etc.) and the reason cases were not vaccinated for hepatitis A before travel to further target vaccination efforts. In addition, CDPHE has encouraged adoption agencies in Colorado that facilitate international adoptions to notify prospective parents of the importance of vaccinating all household members and close contacts in anticipation of an international adoption.

CDPHE makes adult hepatitis A vaccine available for public health agencies and clinics in Colorado to vaccinate men who have sex with men, injection drug users, and contacts of known hepatitis A cases. However, resources to fund adult vaccine are not stable.

While persons who handle food are not at increased risk for hepatitis A, even a single case in a food handler can result in a large and costly public health investigation. This is in part because a person infected with hepatitis A virus is infectious for two weeks before onset of symptoms and another week after onset. Large public post-exposure clinics were held in 2003 and 2009 because

an infected food handler worked while infectious and was determined to have less than adequate hand hygiene while handling ready to eat foods. Food service employers wishing to decrease their risk of a hepatitis A exposure at their establishment could consider hepatitis A vaccination for workers, in addition to continuing to monitor and enforce regulations that pertain to hand hygiene and bare hand contact with ready to eat foods.

Rapid reporting and case investigation remain very important to limiting potential spread from reported cases to others in the community. Local public health agencies have years of expertise in investigating hepatitis A cases, and CDPHE is available for consultation for any confirmed or suspected case.

1. CDC. Prevention of Hepatitis A through active or passive immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2006;55(No. RR-77).

Figure 1. Incidence rates of reported hepatitis A infections in Colorado and the United States, 2000-2009

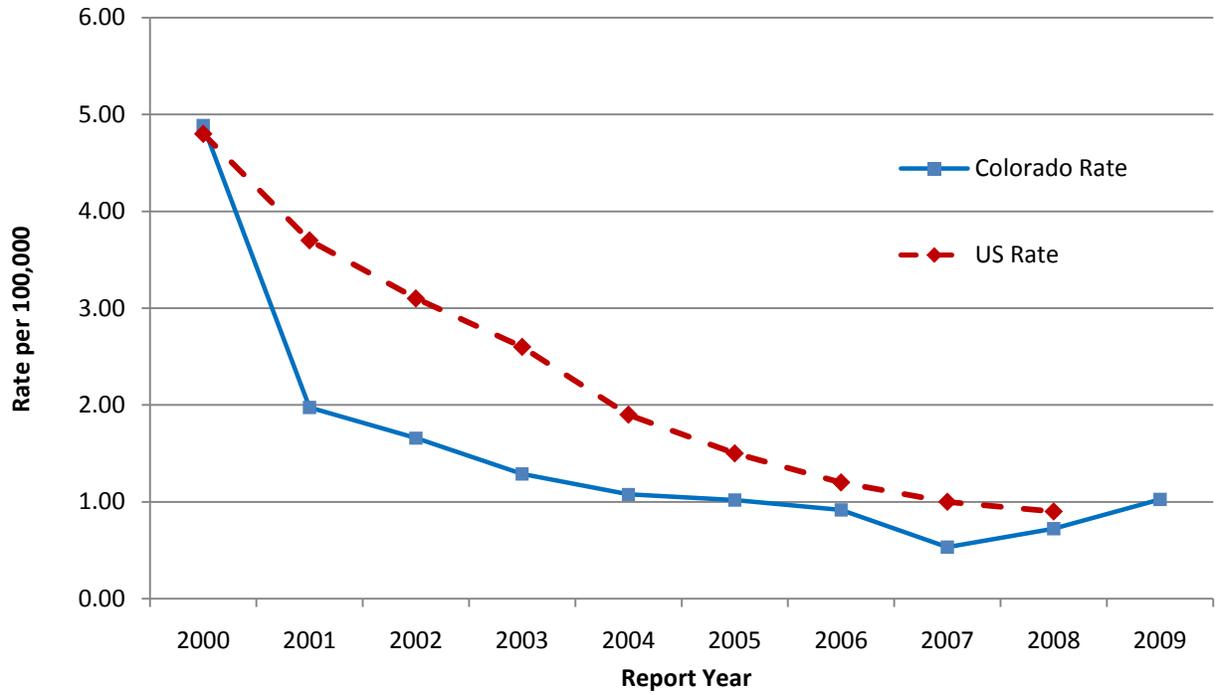


Figure 2. Incidence rates of hepatitis A in Colorado by sex, 2000-2009

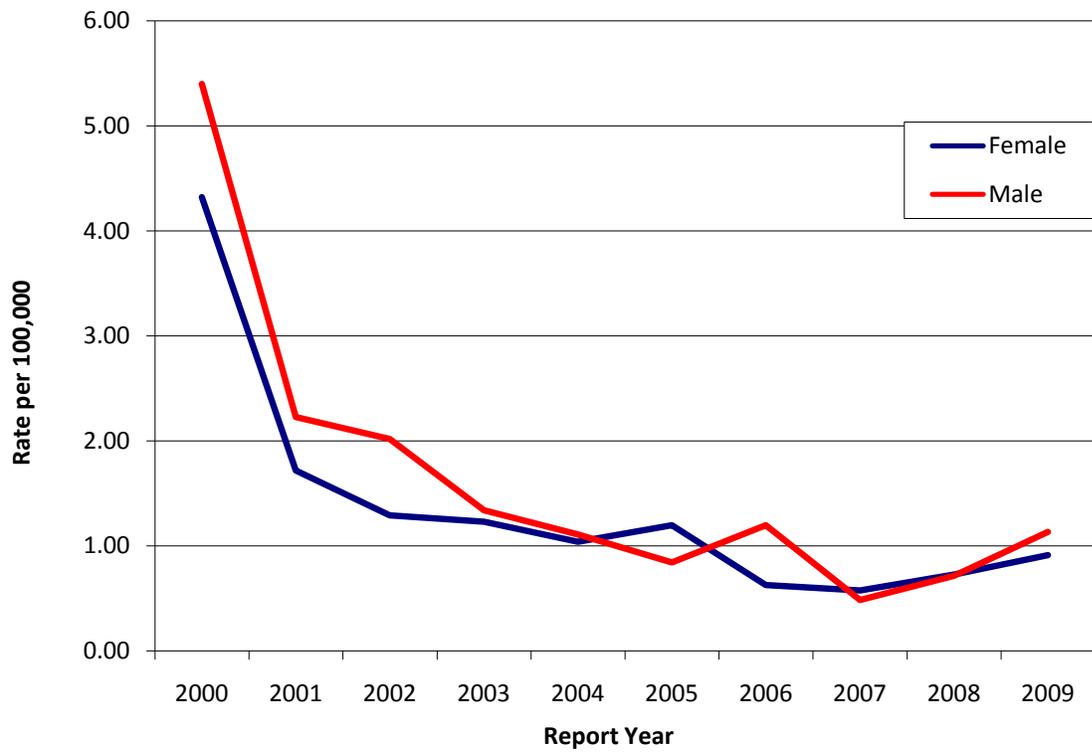


Figure 3. Hepatitis A incidence rates by age group during 2000-2009 in Colorado

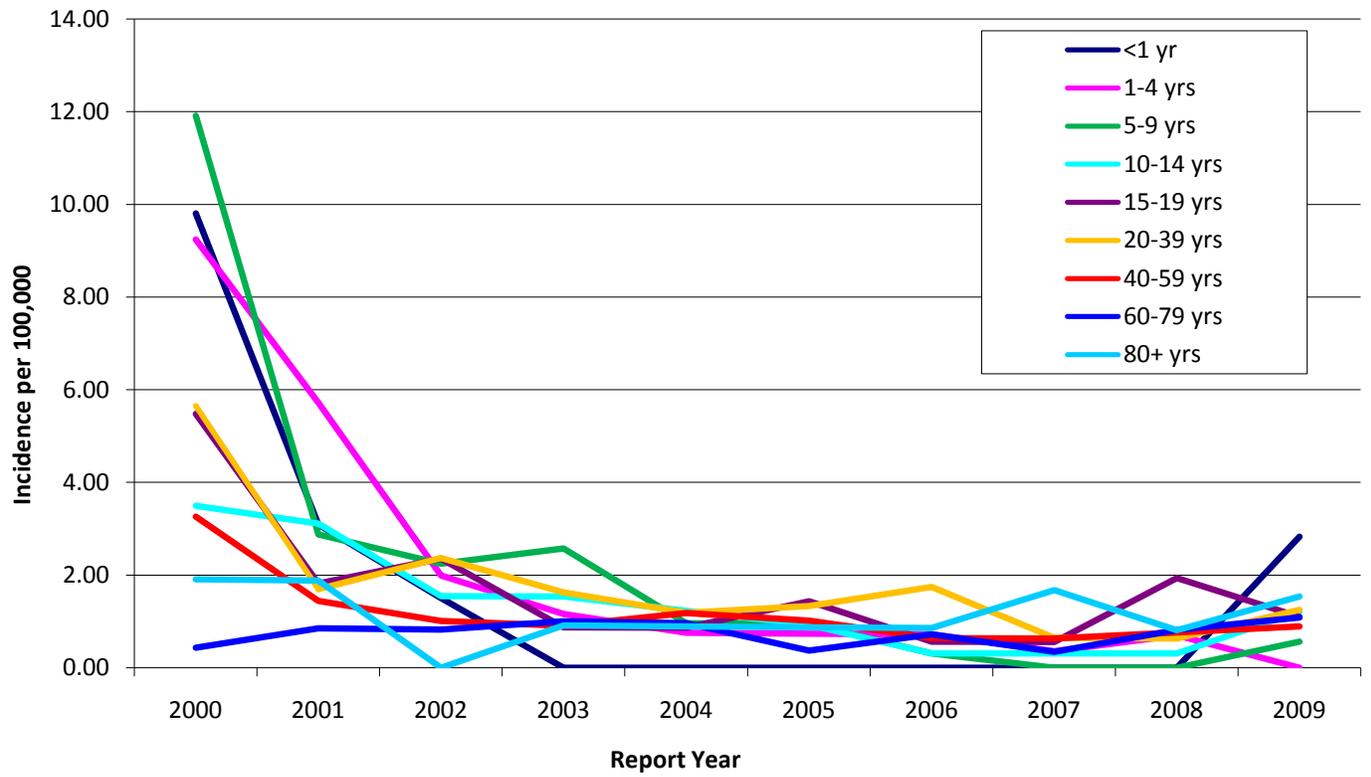


Table 1. Annual and 5-year incidence rates\* of hepatitis A cases in Colorado, by age group, 2000-2009

Age Group	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2000-2004		2005-2009	
											Ave. rate†	Ave. # cases/yr	Ave. rate‡	Ave. # cases/yr
<1 yr	9.81	3.09	1.51	0.00	0.00	0.00	0.00	0.00	0.00	2.83	2.71	1.80	0.57	0.40
1-4 yrs	9.24	5.72	1.99	1.16	0.76	0.74	0.72	0.35	0.70	0.00	3.66	9.20	0.50	1.40
5-9 yrs	11.91	2.87	2.24	2.58	0.96	0.95	0.31	0.00	0.00	0.56	4.10	12.80	0.36	1.20
10-14 yrs	3.50	3.12	1.54	1.54	1.23	0.93	0.31	0.31	0.31	1.22	2.16	7.00	0.62	2.00
15-19 yrs	5.48	1.82	2.36	0.88	0.87	1.44	0.57	0.56	1.94	1.10	2.18	7.40	1.12	4.00
20-39 yrs	5.65	1.70	2.37	1.63	1.18	1.33	1.74	0.64	0.63	1.25	2.50	33.80	1.11	15.60
40-59 yrs	3.26	1.44	1.01	0.91	1.18	1.01	0.64	0.63	0.76	0.89	1.52	19.60	0.79	11.20
60-79 yrs	0.44	0.85	0.83	1.00	0.96	0.37	0.72	0.35	0.82	1.08	0.83	4.00	0.69	4.00
80+ yrs	1.91	1.88	0.00	0.91	0.89	0.87	0.86	1.68	0.81	1.53	1.11	1.20	1.17	1.40

\*Age-specific rates per 100,000 population

† Using mid-point 2002 population data

‡ Using mid-point 2007 population data

Figure 4: Average incidence rate of hepatitis A cases in Colorado during 2005-2009, by age and sex

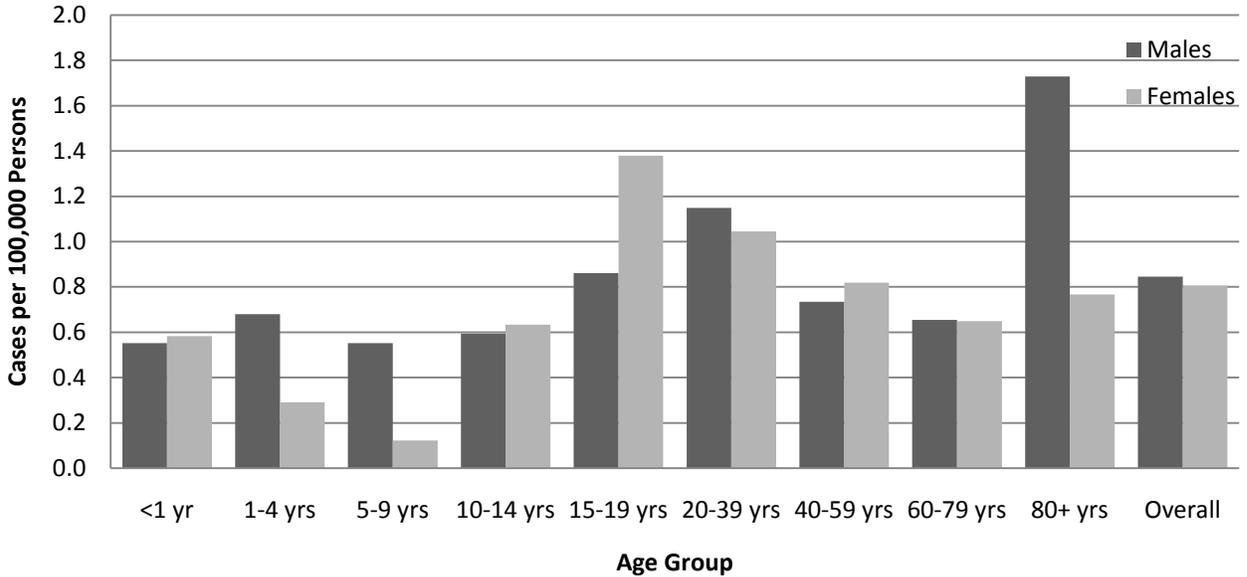


Table 2: Rates of hepatitis A by race and ethnicity, Colorado, 2005-2009\*

Race/Ethnicity	Cases	%	Population†	Rate
White, non-Hispanic	129	62.6%	3,595,897	0.72
Hispanic	51	24.8%	913,388	1.12
Asian/Pacific Islander, non-Hispanic	6	2.9%	134,809	0.89
Black, non-Hispanic	4	1.9%	201,512	0.40
American Indian, non-Hispanic	0	0.0%	50,031	0.00
Missing/unknown	16	7.8%	--	--

\* Data prior to 2004 are too incomplete for analysis (> 10% missing or unknown). While race and ethnicity are collected as separate variables in surveillance data, they are collapsed here because a substantial number of persons who chose 'Hispanic' ethnicity reported race as 'other' and would otherwise be excluded from race-specific rates.

† 2007 population estimates used for mid-point calculation

Table 3. Clinical characteristics of hepatitis A cases reported 2004-2009 in Colorado (n=256)

Characteristic	Number	%
Fatigue	216	84.4%
Dark urine	201	78.5%
Jaundice	192	75.0%
Nausea	191	74.6%
Loss of appetite	175	68.4%
Abdominal pain	160	62.5%
Fever	158	61.7%
Diarrhea	95	37.1%
Hospitalized	69	27.0%
Death	1	0.4%

Table 4. Reported exposure to potential risk factors for hepatitis A infection among hepatitis A cases in Colorado, 2004-2009 (n=256). Exposures during 2-6 weeks prior to onset, unless otherwise noted.

Potential Exposure	Yes		No		Unknown	
	N	%	N	%	N	%
International travel	119	46.5%	129	50.4%	8	3.1%
Member of household traveled internationally in past 3 months	79	30.9%	160	62.5%	17	6.6%
Consumed raw shellfish	37	14.5%	175	68.4%	44	17.2%
Contact with a person diagnosed with hepatitis A*	30	11.7%	205	80.0%	21	8.2%
Patient attends or works in child care setting	13	5.1%	235	91.8%	8	3.1%
Patient has a contact who attends or works in child care	24	9.4%	219	85.6%	13	5.1%
Injects drugs	2	0.8%	228	89.1%	26	10.2%
Used street drugs but did not inject them	11	4.3%	215	84.0%	30	11.7%
Patient was part of a recognized common source outbreak	4	1.6%	230	89.8%	22	7.6%

\* Reported contacts include: household contact (15); sexual contact (7); playmate (5); child care contact (4); other contact (5); categories not mutually exclusive.

Table 5. International travel among reported hepatitis A cases, 2004-2009, in Colorado, among those for whom that information was known (n=248)

Year of report	International travel during incubation period?	
	Yes	No
<b>2004</b>	22 (45%)	27 (55%)
<b>2005</b>	27 (59%)	19 (41%)
<b>2006</b>	22 (52%)	20 (48%)
<b>2007</b>	11 (46%)	13 (54%)
<b>2008</b>	15 (43%)	20 (57%)
<b>2009</b>	22 (42%)	30 (58%)
<b>Total</b>	119 (48%)	129 (52%)

Table 6. Average hepatitis A incidence rates in Colorado by county, 2005-2009

<b>County</b>	<b>Number of Cases 05-09</b>	<b>Population*</b>	<b>Average Rate per 100,000</b>
Adams	15	424379	0.71
Alamosa	2	15757	2.54
Arapahoe	26	551730	0.95
Archuleta		12628	
Baca		4192	
Bent		5924	
Boulder	17	294654	1.15
Broomfield	1	53691	0.37
Chaffee		16937	
Cheyenne		2003	
Clear Creek		9417	
Conejos		8393	
Costilla		3552	
Crowley		6494	
Custer		4097	
Delta	1	30963	0.65
Denver	28	596584	0.95
Dolores		1932	
Douglas	13	275122	0.94
Eagle	7	52530	2.71
Elbert		23086	
El Paso	23	587596	0.78
Fremont		48002	
Garfield	5	55060	1.84
Gilpin		5138	
Grand	1	14390	1.40
Gunnison	1	15046	1.33
Hinsdale		878	
Huerfano		7968	
Jackson		1471	
Jefferson	21	538323	0.78
Kiowa		1462	
Kit Carson		8146	
Lake	1	8183	2.46
La Plata	2	49751	0.80
Larimer	7	288239	0.49
Las Animas		16568	
Lincoln		5730	
Logan	1	21874	0.93

Mesa	1	140417	0.14
Mineral		983	
Moffat	2	13927	2.89
Montezuma	2	25559	1.57
Montrose	4	40260	1.99
Morgan	1	28568	0.71
Otero		19123	
Ouray		4506	
Park	1	17006	1.18
Phillips		4596	
Pitkin	2	16603	2.42
Prowers		13406	
Pueblo	3	155722	0.39
Rio Blanco		6435	
Rio Grande	1	12598	1.58
Routt	2	23062	1.74
Saguache	1	6918	2.90
San Juan		562	
San Miguel		7686	
Sedgwick		2512	
Summit	1	28618	0.71
Teller		22883	
Washington		4826	
Weld	13	244515	1.07
Yuma		9974	

\* 2007 population estimates used for mid-point calculation

**Note: Five year average rates were calculated to minimize the potential impact of single cases being reported in small counties, however, caution should be used when interpreting rates based on small numbers of cases.**

Figure 5

### Average Annual Incidence Rate of Hepatitis A Cases During 2005-2009 in Colorado

