



Use of Helmets While Bicycling or Participating in Other Wheeled Sports Colorado Children ages 5-14 1999 and 2005

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Sallie Thoreson, MS, Injury Section
Jason Gannon, Health Statistics

Background

Bicycling and participating in wheeled sports, such as skateboarding, riding scooters and in-line skating, are excellent ways to increase physical activity and combat obesity and other chronic health conditions. Almost three-quarters (71 percent) of Colorado children ages 5-14 ride a bicycle or spend time on skateboards, in-line skates or scooters (72 percent).¹ Although these activities provide healthy exercise, they are not without risk of injury, with head injuries being the most serious and debilitating. Extensive research has shown that use of helmets can prevent many head injuries.² In 1999 and 2005, the Colorado Department of Public Health and Environment conducted two telephone surveys to ask parents about helmet use by their children while bicycling or participating in wheeled sports. This brief compares helmet use in 1999 and 2005 for children ages 5 to 14 and provides strategies to increase the use of helmets while bicycling or participating in wheeled sports.

Helmet use when bicycling

Survey results indicate that the percent of Colorado children ages 5-14 who were reported as always wearing a helmet when bicycling increased slightly, from 40.3 percent in 1999 to 49.3 percent in 2005 (Table 1). These results are comparable to those from a national survey conducted by Safe Kids Worldwide, which indicated that 40 percent of children ages 8-14 reported they always use a bicycle helmet.³

In 1999, children in the youngest age group (5-8 years) had a significantly higher prevalence of helmet use (56.2 percent) compared to children in the older age groups. This difference was not seen in 2005. Although not statistically significant, helmet use increased in all age groups from 1999 to 2005.

	1999	2005
	Percent	Percent
Total	40.3 (36.4-44.2)	49.3 (44.1-54.6)
By age group (years)		
5-8	56.2 (48.8-63.6)	57.8 (49.9-65.7)
9-12	36.8 (31.0-42.5)	42.1 (34.2-50.1)
13-14	28.4 (21.5-35.4)	42.9 (29.6-56.2)

Children who did not ride bicycles were excluded from the analysis. Results shown are from the 1999 Behavioral Risk Factor Surveillance System survey and the 2005 Child Health Survey. Both surveys were conducted by the Colorado Department of Public Health and Environment. See Page 4 for details about the survey methodology. Note: Values in parentheses are 95% confidence intervals. When comparing results, if confidence intervals do not overlap, the difference between the percents is statistically significant.

¹ From parental responses on the 2005 Child Health Survey conducted by the Colorado Department of Public Health and Environment.

² Lee, B.H., Schofer, J.L., & Koppelman, F.S. (2005). Bicycle safety helmet legislation and bicycle-related non-fatal injuries in California. *Accident Analysis and Prevention*, 37, 93-102.

³ Quraishi, A.Y., Mickalide, A.D., & Cody, B.E. (2005). *Follow the leader: A national study of safety role modeling among parents and children*. Washington, DC: National SAFE KIDS Campaign. Retrieved June 12, 2006, from http://www.usa.safekids.org/content_documents/ACF160.pdf.

From 1999 to 2005, helmet use did not change significantly in any region of the state (Denver metro, other metro or rural). In both time periods, children in rural counties were less likely to always use bicycle helmets than children in metro counties (Table 2). Studies have shown a higher rate of bicycle-related injuries in rural areas, attributed to bicycling exposure, helmet use, road environments and hospital admission criteria.⁴

In 1999, there was no statistical difference in bicycle helmet use for different income groups; however, in 2005 children in the lowest income group were less likely to wear a bicycle helmet (36.8 percent) than children in households with an annual income greater than \$50,000 (57.5 percent). Other studies also have shown a higher rate of helmet use in higher socioeconomic areas.⁵ This disparity in use based on socioeconomic level should be considered in addressing strategies to increase bicycle helmet use.

Table 2. Percent of children ages 5-14 who always wear a bicycle helmet, by region of residence and annual household income		
1999 Behavioral Risk Factor Surveillance System survey and 2005 Child Health Survey		
	1999	2005
	Percent	Percent
Total	40.3 (36.4-44.2)	49.3 (44.1-54.6)
By region of residence*		
Denver metro	46.0 (38.6-53.4)	57.9 (50.7-65.2)
Other metro	46.6 (38.7-54.5)	48.7 (39.5-57.9)
Rural	33.1 (27.6-38.6)	27.5 (17.1-38.0)
By annual household income		
< \$25,000	33.4 (25.4-41.3)	36.8 (23.4-50.2)
\$25,000 – \$50,000	40.4 (33.9-47.0)	41.3 (31.0-51.6)
>\$50,000	42.1 (35.6-48.6)	57.5 (50.5-64.5)
Children who did not ride bicycles were excluded from the analysis. *Denver metro includes Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson counties. Other metro includes El Paso, Larimer, Mesa, Pueblo and Weld counties. Rural includes all remaining Colorado counties. Note: Values in parentheses are 95% confidence intervals. When comparing results, if confidence intervals do not overlap, the difference between the percents is statistically significant.		

Helmet use reduces the risk of head injury

Head injury is the leading cause of death and serious disability resulting from wheeled sports. Nationally, head injuries account for more than 60 percent of bicycle-related deaths and more than two-thirds of bicycle-related hospital admissions. Approximately one-third of hospital emergency room visits for bicycle-related crashes are for head injuries.⁶

Each year in Colorado, an average of 11 bicyclists (all ages) are killed and 540 are hospitalized for injuries sustained in a bicycle crash.⁷ Of all age groups, children ages 5-14 have the highest rate of bicycle-related hospitalization (17.7 per 100,000.); 32.4 percent of these hospitalized children sustain a brain injury.⁸

Bicycle helmet reduce the risk of head and brain injury by 70 to 88 percent.⁹ In California, bicycle helmet legislation, which led to an increase in helmet use, resulted in an 18.2 percent reduction in the proportion of traumatic brain injuries among young bicyclists.¹⁰

⁴ Macpherson, A.K., To, T.M., Parkin, P.C., Moldofsky, B., Wright, J.G., Chipman, M.L., et al. (2004). Urban/rural variation in children's bicycle-related injuries. *Accident Analysis & Prevention*, 36(4), 649-654.

⁵ Karkhaneh, M., Kalenga, J.C., Hagel, B.E., & Rowe, B.H. (2006). Effectiveness of bicycle helmet legislation to increase helmet use: a systematic review. *Injury Prevention*, 12, 76-82.

⁶ Cody, B.E., Quraishi, A.Y., Mickalide, A.D. (2004). *Headed for injury; An observational survey of helmet use among children ages 5 to 14 participating in wheeled sports*. Washington, DC: National SAFE KIDS Campaign. Retrieved June 12, 2006, from http://www.usa.safekids.org/content_documents/ACFC7.pdf

⁷ *Injury in Colorado*. (2005). Denver, CO: Colorado Department of Public Health and Environment.

⁸ Based on 2002-2004 injury hospitalization data from the Colorado Health Information Dataset (CoHID), retrieved June 12, 2006, from <http://www.cdphe.state.co.us/cohid>.

⁹ Harborview Injury Prevention and Research Center. (2001). *Bicycle injury interventions: Bicycle Helmet Effectiveness*. Retrieved August 30, 2006, from <http://depts.washington.edu/hiprc/practices/topic/bicycles/helmeteffect.html>

¹⁰ Lee, B.H.-Y., Schofer, J.L., & Koppelman, F.S. (2005). Bicycle safety helmet legislation and bicycle-related non-fatal injuries in California. *Accident Analysis and Prevention*, 37, 93-102.

Helmet use when participating in other wheeled sports

In the 2005 Colorado Child Health Survey, parents also were asked whether their child wore a helmet while using a scooter, in-line skates or skateboard. Helmet use for other wheeled sports (Table 3) was similar to helmet use for bicycling. Other studies have reported similar helmet use rates for wheeled sports, with helmet use while riding a scooter being the lowest.¹¹

Helmet use by the 13- to 14-year-old age group (34.6 percent) was significantly lower than that of the 5- to 8-year-old age group (58.1 percent). Helmet use did not vary with region of residence. Children in households with an annual income of \$25,000 to \$50,000 had a significantly lower helmet use rate (34.3 percent) than children living in households with an income greater than \$50,000 (52.9 percent).

Table 3. Percent of children ages 5-14 who always wear a helmet while using a scooter, in-line skates or skateboard, by age group, region of residence and household income	
2005 Colorado Child Health Survey	
	Percent (95% CI)
Total	45.8 (40.6-51.0)
By age group (years)	
5-8	58.1 (49.6-66.5)
9-12	40.0 (32.0-47.3)
13-14	34.6 (23.7-45.5)
By region of residence*	
Denver metro	45.4 (38.0-52.7)
Other metro	46.2 (37.2-55.1)
Rural	46.5(33.6-59.4)
By annual household income	
< \$25,000	39.8 (25.3-54.3)
\$25,000 –50,000	34.3 (24.4-44.3)
>\$50,000	52.9 (46.1-59.7)
<small>Children who did not participate in this form of recreation were excluded from the analysis. *Denver metro includes Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson counties. Other metro includes El Paso, Larimer, Mesa, Pueblo and Weld counties. Rural includes all remaining Colorado counties. Note: Values in parentheses are 95% confidence intervals. When comparing results, if confidence intervals do not overlap, the difference between the percents is statistically significant.</small>	

Preventing injuries while bicycling or participating in other wheeled sports

Effective injury prevention strategies generally involve programs that are multifaceted and impact many different audiences. Effective bicycle and wheeled-sports helmet programs should include the following:

- **Formation of a community coalition to develop and administer a multi-faceted program.** The program should include child, parent and community education; legislation and policies; traffic engineering; and evaluation. Community partners might include law enforcement, health care, local health departments, service organizations, recreation facilities, schools, parents and children. Safe Routes to School programs and physical activity and obesity-prevention programs are important program partners.
- **Education of children, often through school-based programs.** These programs need to be thorough, involve more than a single event, and include education as well as helmet distribution. In addition to a focus on injury prevention, programs should address the identified barriers to helmet use: Children don't feel they are at risk for a crash, helmets are uncomfortable and friends and family don't wear helmets.^{12,13}

¹¹ Cody, B.E., Quraishi, A.Y., & Mickalide, A.D. (2004). *Headed for injury: An observational survey of helmet use among children ages 5 to 14 participating in wheeled sports*. Washington, DC: National SAFE KIDS Campaign. Retrieved June 12, 2006, from http://www.usa.safekids.org/content_documents/ACFC7.pdf

¹² Cody, B.E., O'Toole, M.L., Mickalide, A.D., & Paul, H.P. (2002). *A national study of traumatic brain injury and wheel-related sports*. Washington, DC: National SAFE KIDS Campaign. Retrieved June 12, 2006, from http://www.usa.safekids.org/content_documents/ACF160.pdf

¹³ Ehrlich, P.F., Helmkamp, J.C., Williams, J.M, Haque, A., & Furbee, P.M. (2004). Matched analysis of parent's and children's attitudes and practices towards motor vehicle and bicycle safety: An important information gap. *Injury Control and Safety Promotion, 11(1)*, 23-28.

- **Education of parents and community.** Many studies have shown that helmet use increases when parents wear helmets, when parents realize the protective value of helmets and when parents have strong family expectations and rules for helmet use.^{14,15}
- **Helmet legislation and school/community facility policies.** Studies show that bicycle helmet legislation increases helmet use, particularly for younger age groups and in those areas with low pre-law helmet use.¹⁶
- **Engineering solutions.** The use of off-street bike paths and bike lanes help separate bicyclists from motor vehicles. In addition, signs, signals and well-engineered intersections help direct vehicles and bicyclists to follow the rules of the road.¹⁷ Additional effective engineering solutions that are beyond the control of the community are good helmet design, vehicle designs for visibility and optimal bumper height.
- **Evaluation of helmet use and monitoring of injuries and deaths.** In addition to monitoring helmet distribution, it is important to monitor helmet usage through observational surveys (preferred) or phone/in-person surveys.¹⁸

For more information on Best Practices

Colorado Injury Prevention Strategic Plan

http://www.cdphe.state.co.us/pp/injuryprevention/IP_03-08finalstrategicplan.pdf

Harborview Injury Prevention and Research Center: Best Practices

<http://depts.washington.edu/hiprc/practices/topic/bicycles/>

Bicycle Helmet Safety Institute

<http://www.helmets.org/>

Cochrane Database of Systematic Reviews

www.cochrane.org/reviews/en/topics/74.html

Note: The Behavioral Risk Factor Surveillance System survey was initiated in 1990 as a joint project of the Colorado Department of Public Health and Environment and the Centers for Disease Control and Prevention. For the 1999 project, approximately 3,053 Colorado residents ages 18 years and older were interviewed, using random digit dialing techniques, by telephone. The randomly selected adult respondent from the household was asked to report on the helmet use by children ages 5 to 15 living in the household. All percentages shown have been weighted to reflect the probability of selection and to develop statewide estimates of restraint use. In January 2004, the Health Statistics Section of the Colorado Health Department initiated the Child Health Survey in conjunction with the annual Behavioral Risk Factor Surveillance System survey. Once a respondent completed the Behavioral Risk Factor Surveillance System survey, the interviewer inquired if the respondent had a child in the target age range of 1-14. For 2005, a total of 915 interviews were completed, and the percentages also were weighted. The same questions on bicycle helmet use were asked in both surveys, with the addition of questions about helmet use in other wheeled sports added in 2005. In 1999 there were 686 respondents with children aged 5 to 14; in 2005 there were 635 such respondents. The helmet use by children may be over reported in the surveys if adults answering the survey do not have accurate knowledge of their child's behavior. Also the adult respondents for the two types of surveys are not entirely comparable; an adult household respondent completed the 1999 survey, while a child's primary caregiver completed the Child Health Survey.

¹⁴ Quraishi, A.Y., Mickalide, A.D., & Cody, B.E. (2005). *Follow the leader: A national study of safety role modeling among parents and children.* Washington, DC: National SAFE KIDS Campaign. Retrieved June 12, 2006, from http://www.usa.safekids.org/content_documents/ACF160.pdf.

¹⁵ Harborview Injury Prevention and Research Center. (2001). *Bicycle injury interventions: Programs to increase helmet use, education.* Retrieved December 20, 2004, from <http://depts.washington.edu/hiprc/practices/topic/bicycles/helmeteduc.html>

¹⁶ Karkhaneh, M., Kalenga, J.C., Hagel, B.E., & Rowe, B.H. (2006). Effectiveness of bicycle helmet legislation to increase helmet use: a systematic review. *Injury Prevention, 12*, 76-82.

¹⁷ Harborview Injury Prevention and Research Center. (2001). *Bicycle injury interventions: Bicycle lanes and paths.* Retrieved August 2, 2006, from <http://depts.washington.edu/hiprc/practices/topic/bicycles/bikelanes.html>

¹⁸ Schieber, R.A., & Sacks, J.J. (2001). Measuring community bicycle helmet use among children. *Public Health Reports, 116*, 113-121.