

# III. BICYCLE AND PEDESTRIAN SAFETY

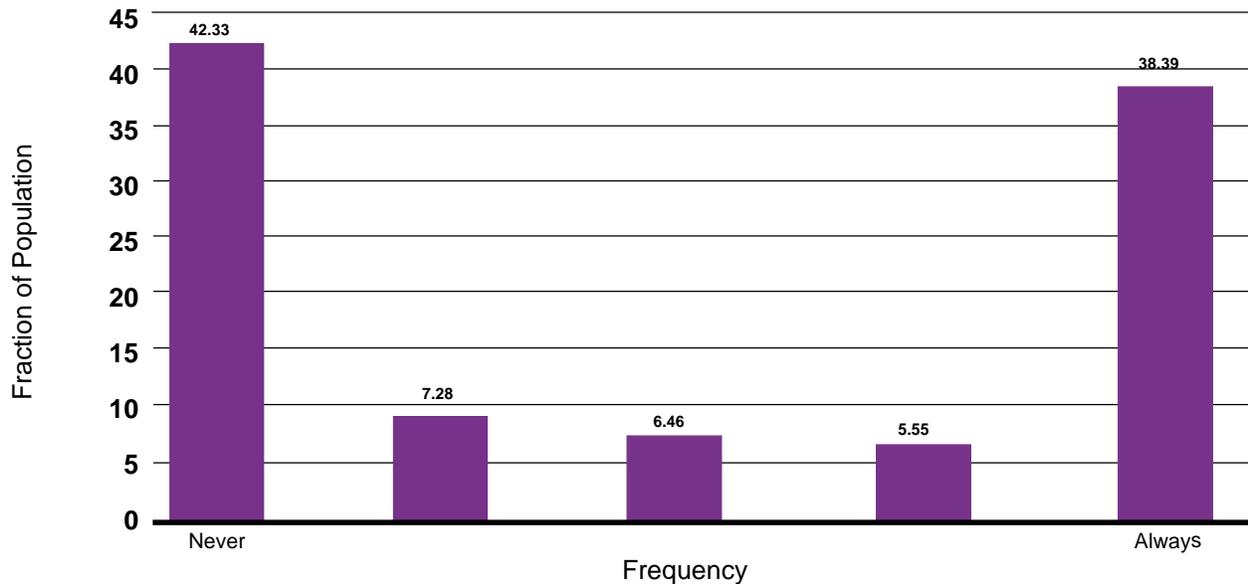
## A. Bicycle Safety

### Helmet Use

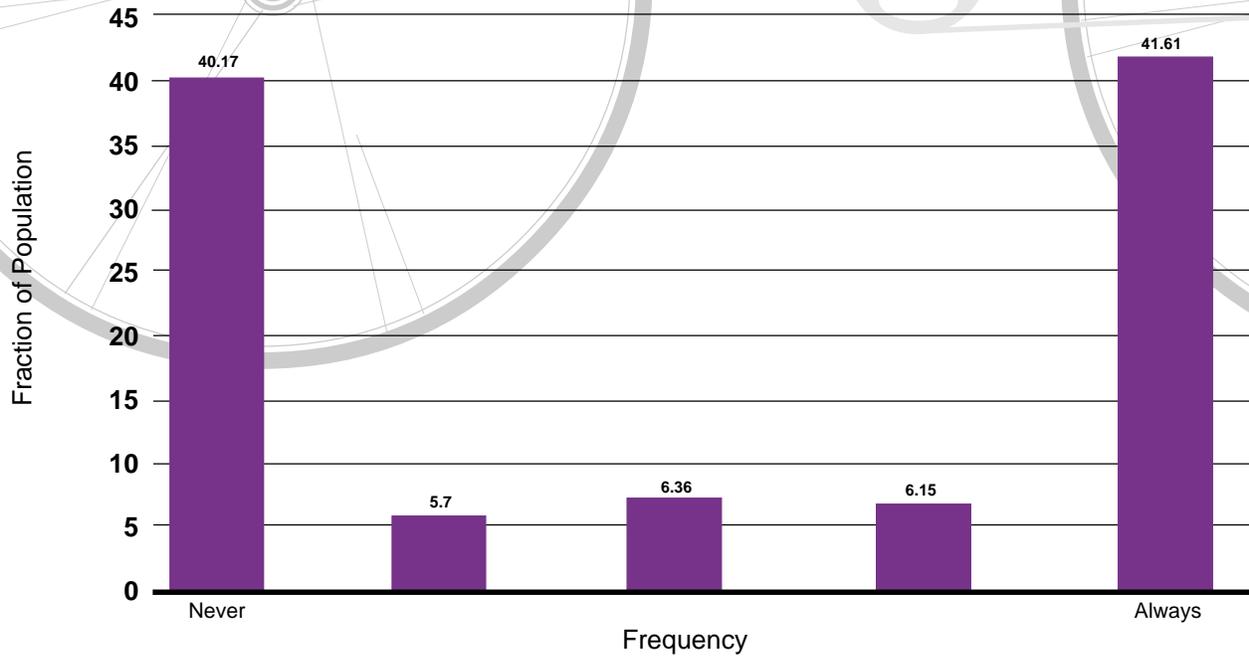
Fifty-nine percent of Colorado households with bicycles report owning bicycle helmets. The use of these helmets varies depending on the age of the cyclist and the type of surface. Survey respondents were asked to indicate the frequency of helmet use when riding on various surfaces. The frequency is indicated by selecting from a five point scale with one indicating that the rider “never wears a helmet” and five indicating that the rider “always wears a helmet.”

Adult riders (over the age of 16) are most likely to either always wear a helmet or never wear a helmet as shown in Figures IIIA.1 – IIIA.4. Helmet use by this group is most common on mountain terrain (Figure IIIA.4). Just over half (51%) report that they always wear a helmet when riding in the mountains, but 37 percent report that they never do. Similar patterns of helmet use by adults (although at slightly lower levels) are reported for those riding on unpaved trails, streets and paved bike paths. Adult riders are least likely to wear helmets on paved paths where 38 percent report that they always wear a helmet and 42 percent never wear one (Figure IIIA.1).

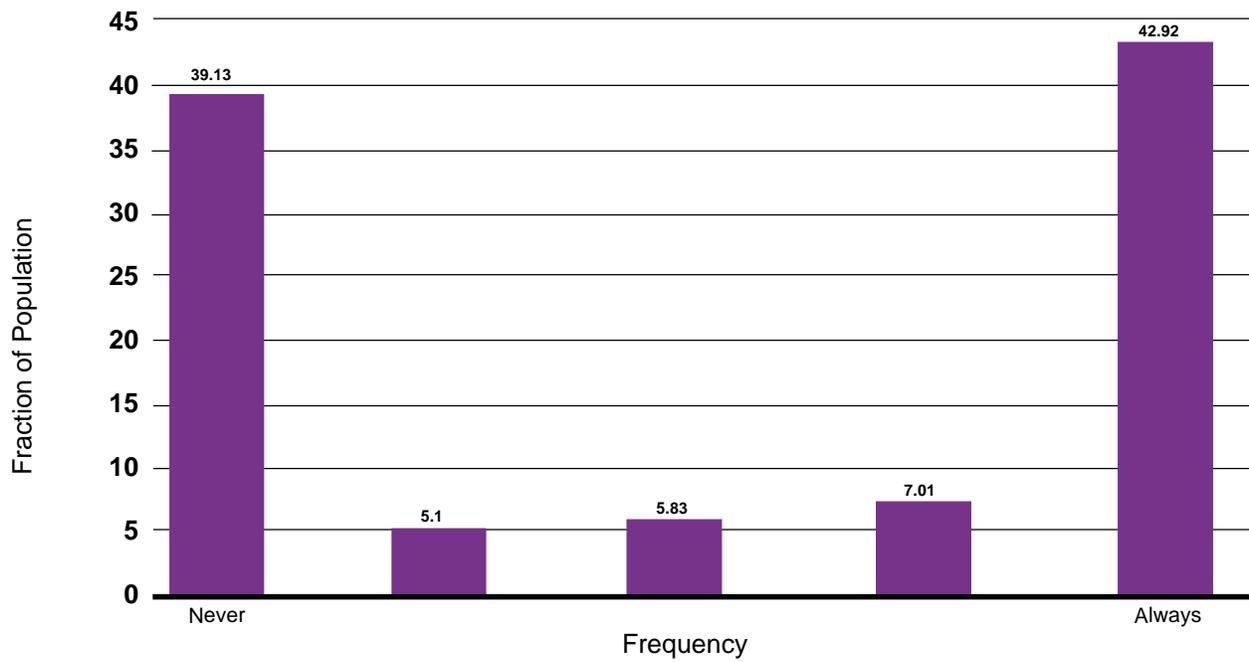
**Figure IIIA.1 Frequency of Helmet Use by Adults when Riding on a Paved Bicycle Path**



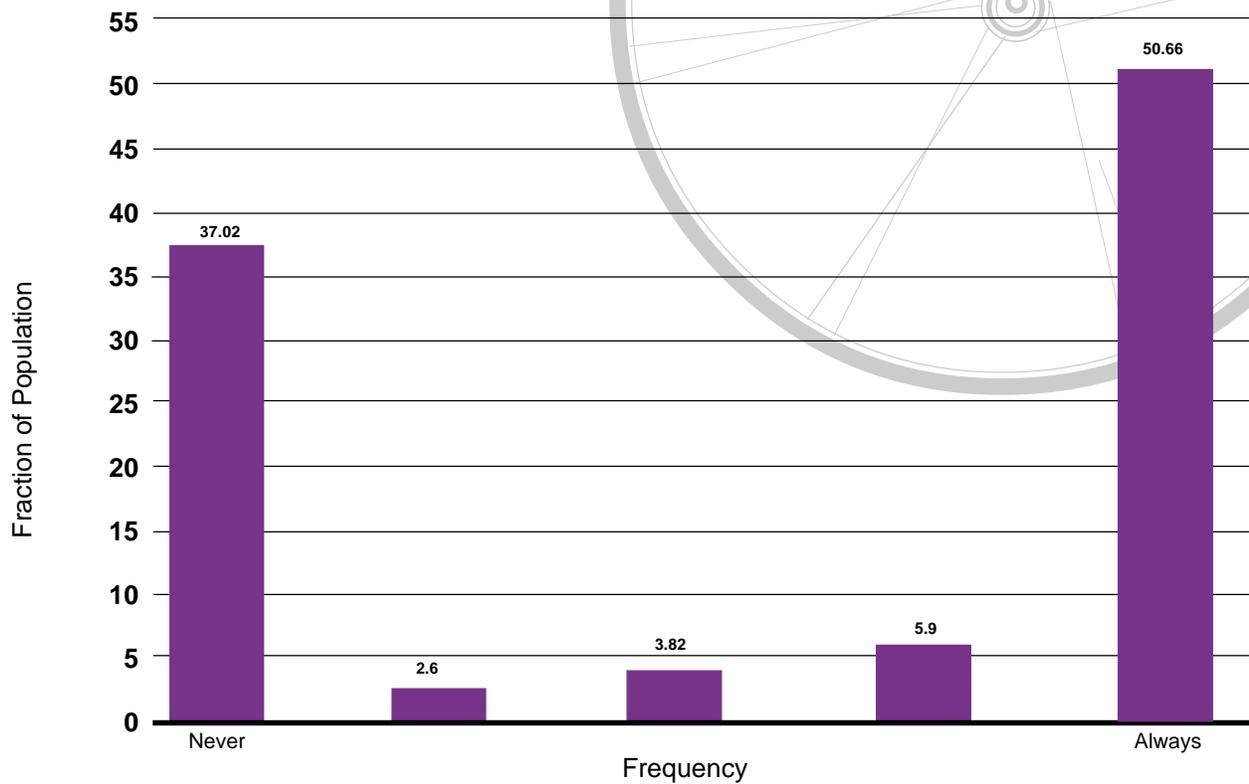
**Figure IIIA.2 Frequency of Helmet Use by Adults when Riding on a Street**



**Figure IIIA.3 Frequency of Helmet Use by Adults when Riding on an Unpaved Trail**



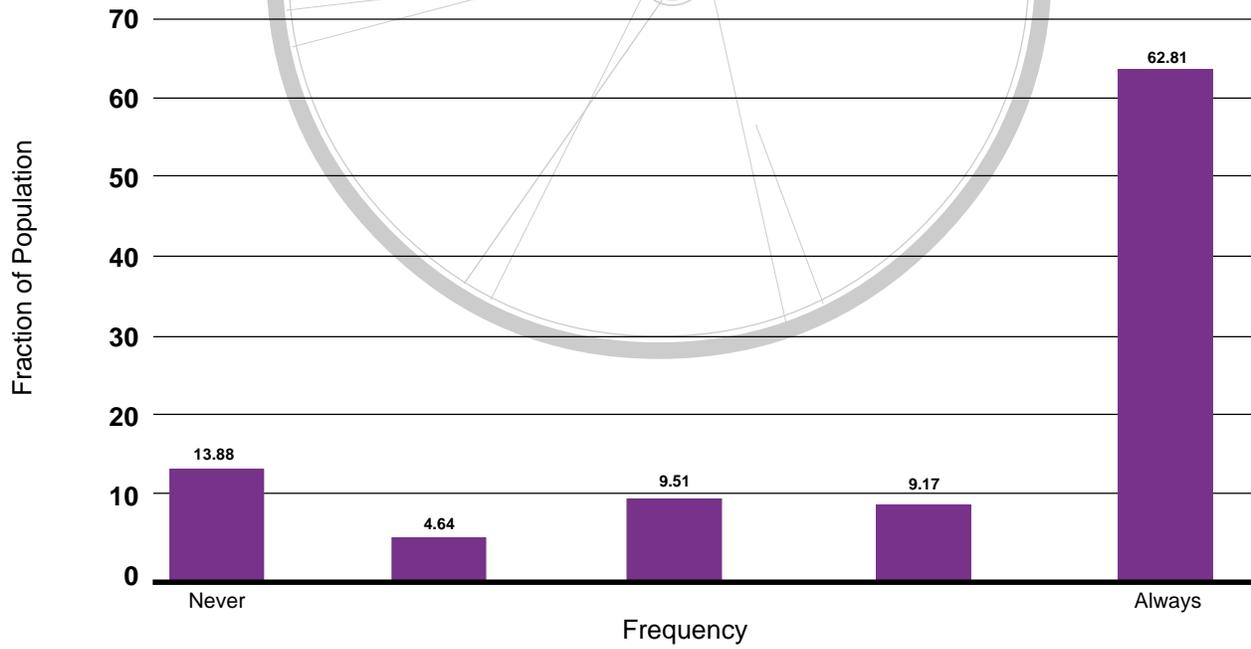
**Figure IIIA.4 Frequency of Helmet Use by Adults when Riding on Mountain Terrain**



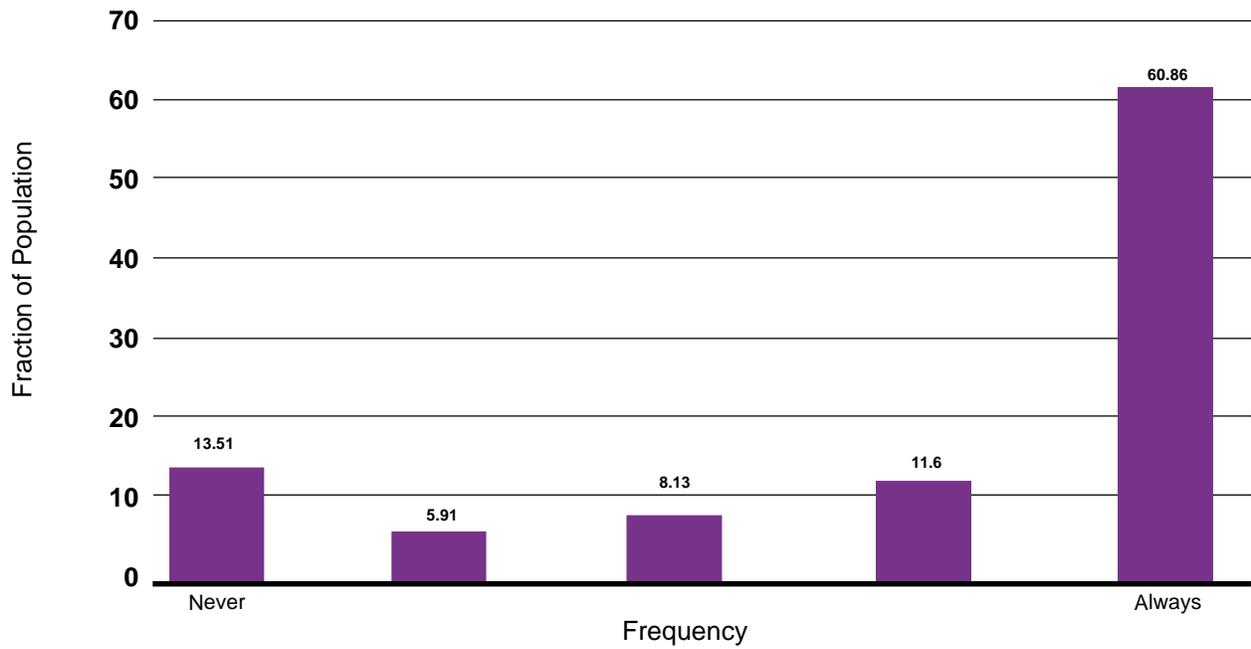
### **Helmet Use by Children**

As reported in Figures IIIA.5-III A.8, young children who ride bikes are much more likely than adults to wear helmets. Just under 70 percent of young children always wear helmets when riding on mountain terrain, although 16 percent never do. Fewer, 61 percent, of young children always wear a helmet when riding on the street. Just over 13 percent of children never wear a helmet when bicycling on streets.

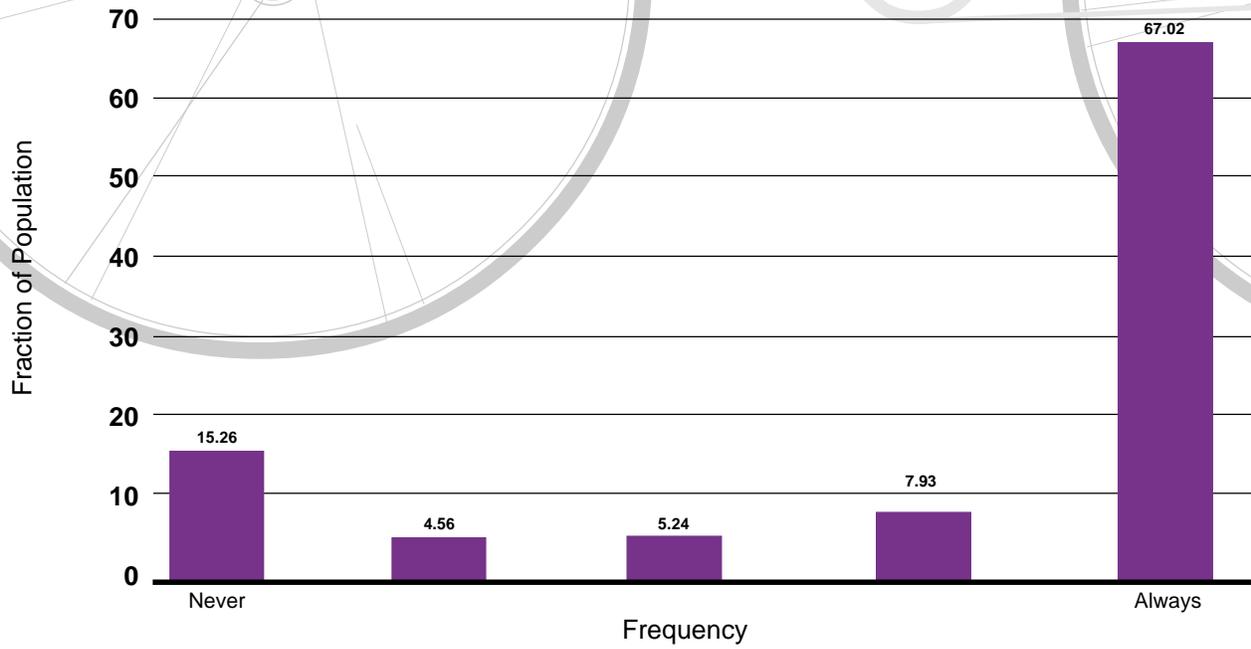
**Figure IIIA.5 Frequency of Helmet Use by Children when Riding on a Paved Bike Path**



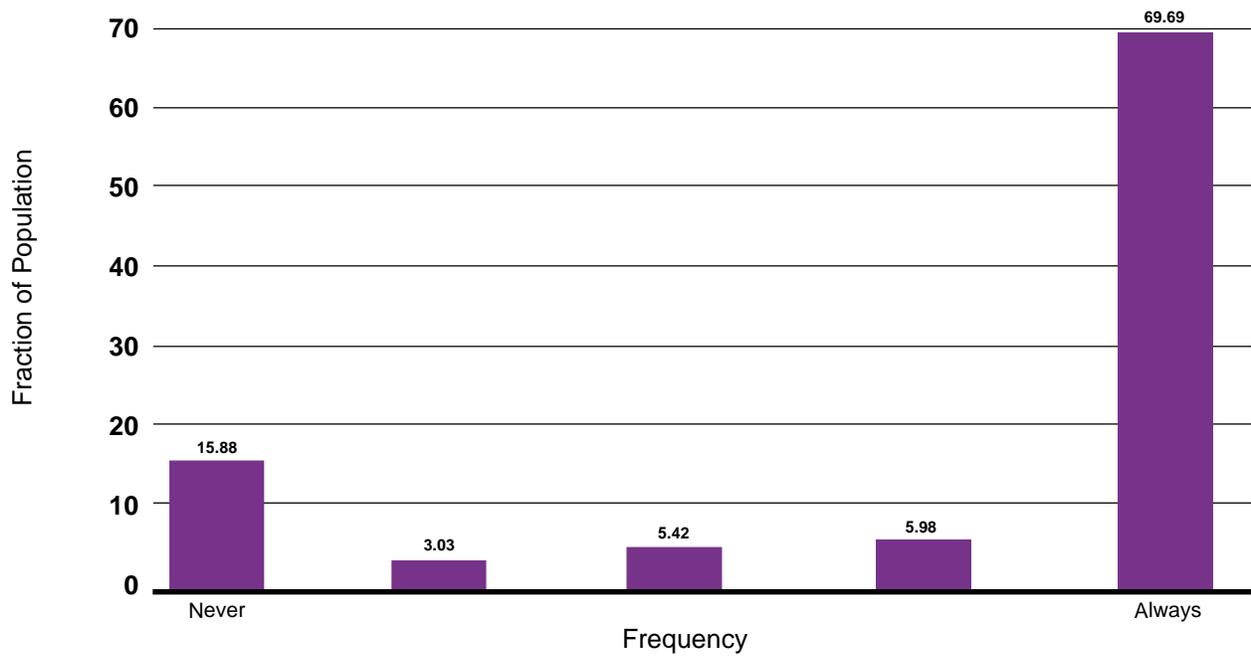
**Figure IIIA.6 Frequency of Helmet Use by Children when Riding on Street**



**Figure IIIA.7 Frequency of Helmet Use by Children when Riding on Unpaved Trails**



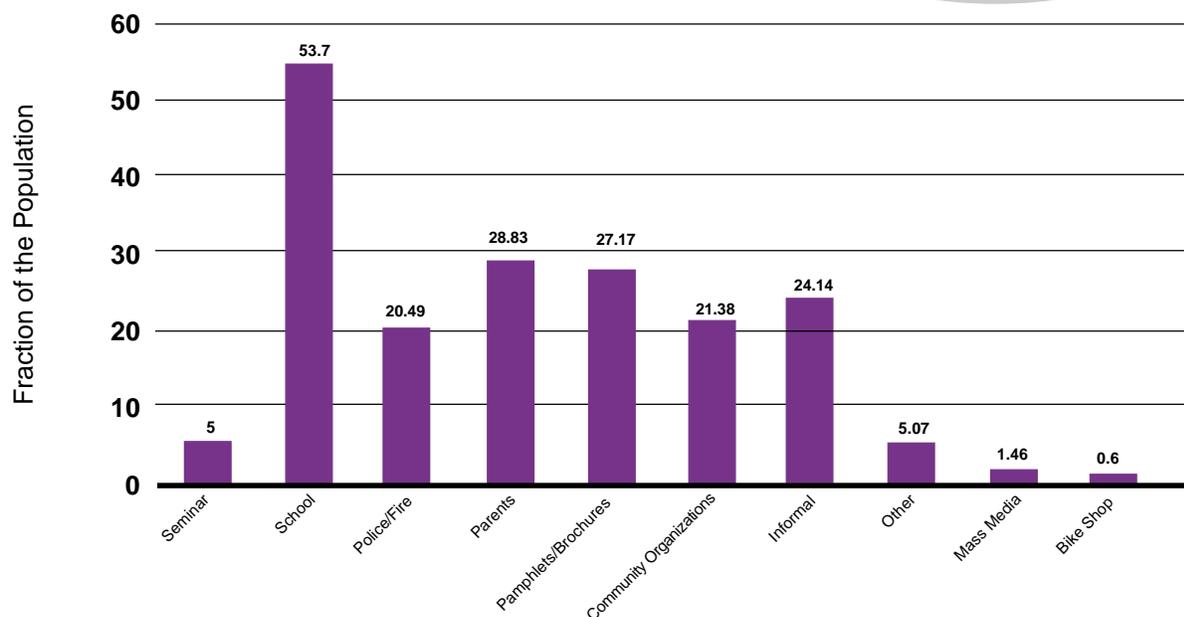
**Figure IIIA.8 Frequency of Helmet Use by Children when Riding on Mountain Terrain**



### Bicycle Safety Instruction.

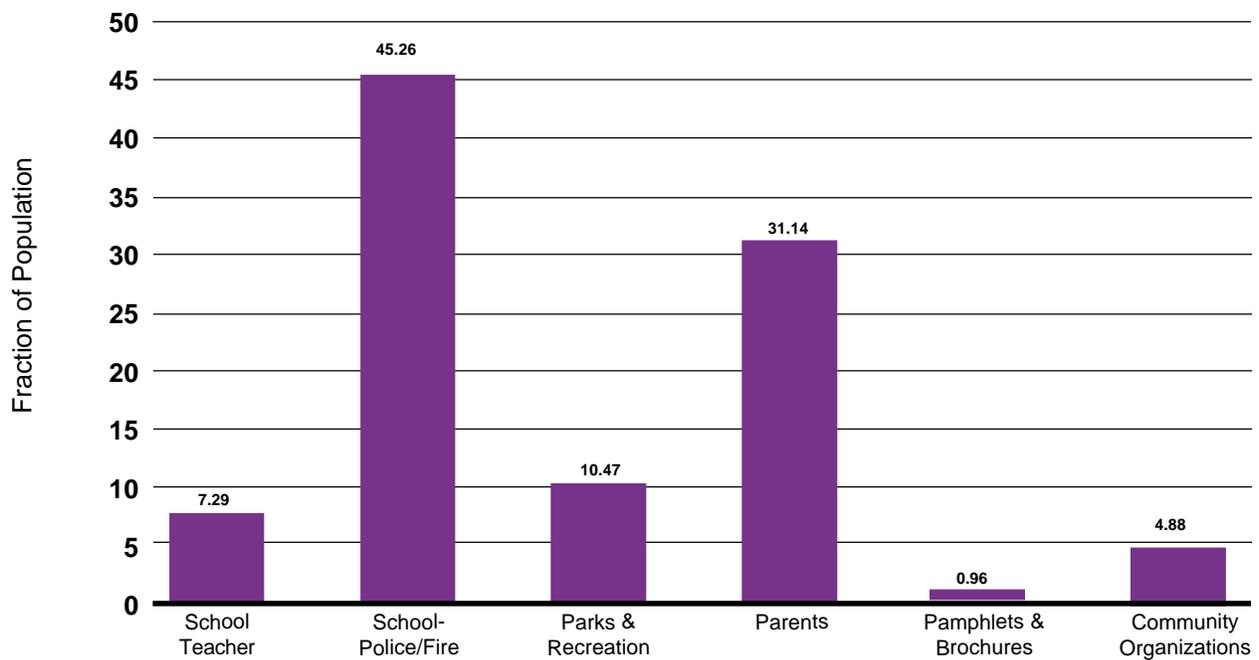
Just over 40 percent of Coloradans report having received some type of bicycle safety instruction. Respondents were asked to indicate all of the types of bicycle safety instruction they have received (many mentioned more than one type). Of those who received instruction, Figure IIIA.9 shows that more than half (54%) received some training at school. Other frequent sources of bicycle training instruction included parents, police and fire departments, community organizations, pamphlets and brochures and other informal sources.

**Figure IIIA.9 Where Colorado Residents Received Bicycle Safety Instruction**



The majority of Coloradans believe that the best place for children to receive bicycle safety training is in school (Figure IIIA.10). Forty-five percent think that the instruction should be provided by police or fire department personnel, and 7 percent believe that teachers should be providing safety information at schools. Almost a third (31%) think that parents should provide safety information. Smaller percentages feel that bicycle safety instruction should be provided by other organizations in the community--10 percent think that parks and recreation district personnel are best equipped to provide training to children and 5 percent think that it should be provided by community organizations. Although 27 percent of adults indicated that they had received some of their training from pamphlets and brochures, less than 1 percent of residents believe that this is the best way for children to learn about bicycle safety.

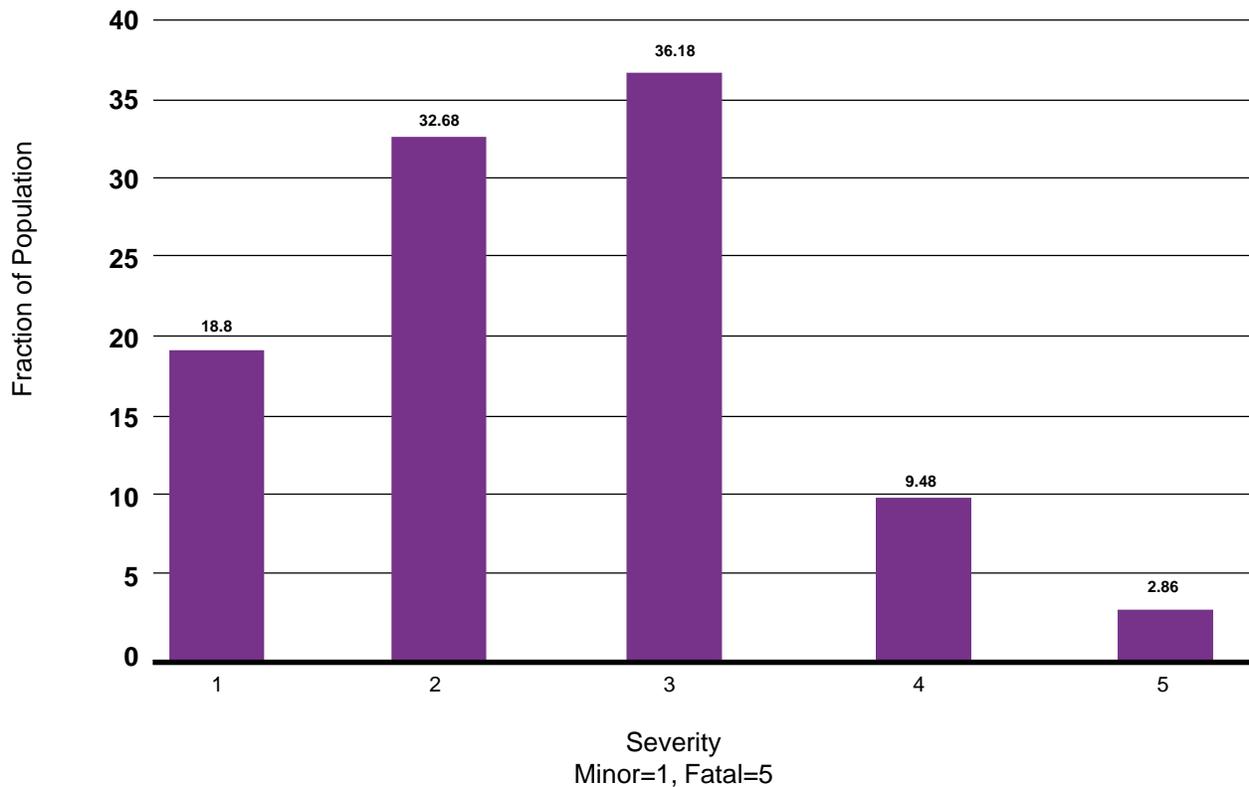
**Figure IIIA.10 Where Colorado Residents Prefer Children Receive Bicycle Safety Instruction**



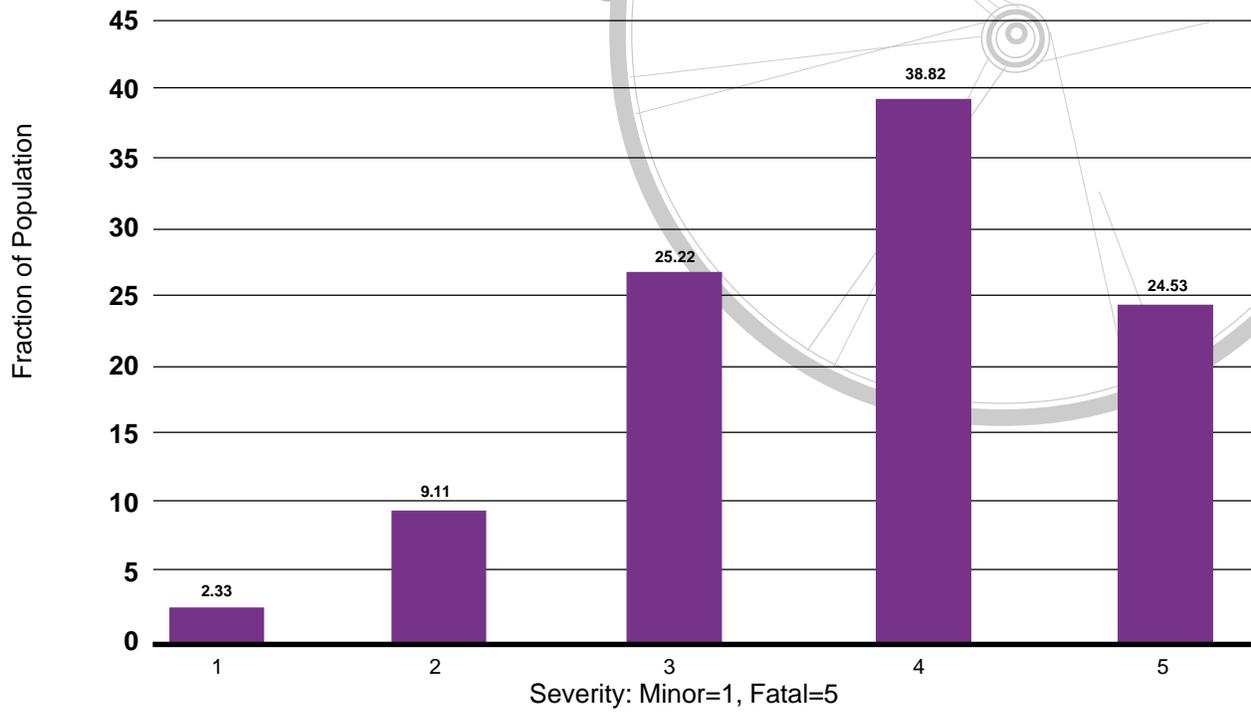
### Expectations Regarding Bicycle Crashes

Figures IIIA.11 – IIIA.14 present data regarding the expected severity of various types of bicycle crashes. Expected severity is ranked on a scale of one to five, where one represents a crash resulting in only minor injuries and five is a fatal crash. Bicycle crashes on streets (Figure IIIA.12) and mountain terrain (Figure IIIA.14) are expected to be the most severe. Sixty-three percent of all respondents rated the probable severity of a crash on the street in the two highest categories on our five point scale. In contrast, crashing on paved and unpaved bicycle paths (Figures IIIA.11 and IIIA.13) are expected to have less severe consequences. For example, only 12 percent thought that a crash on a paved bike trail would result in injuries in the two most severe categories.

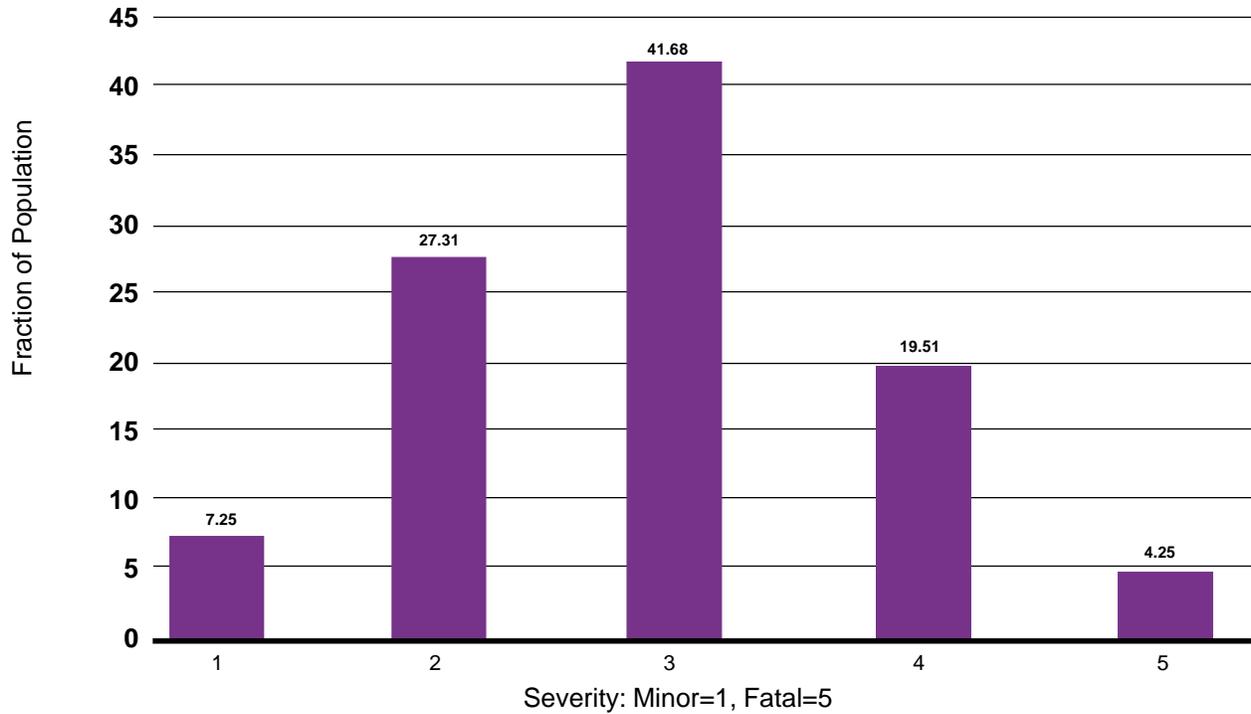
**Figure IIIA.11 Expected Severity of a Bicycle Crash on a Paved Bicycle Path**



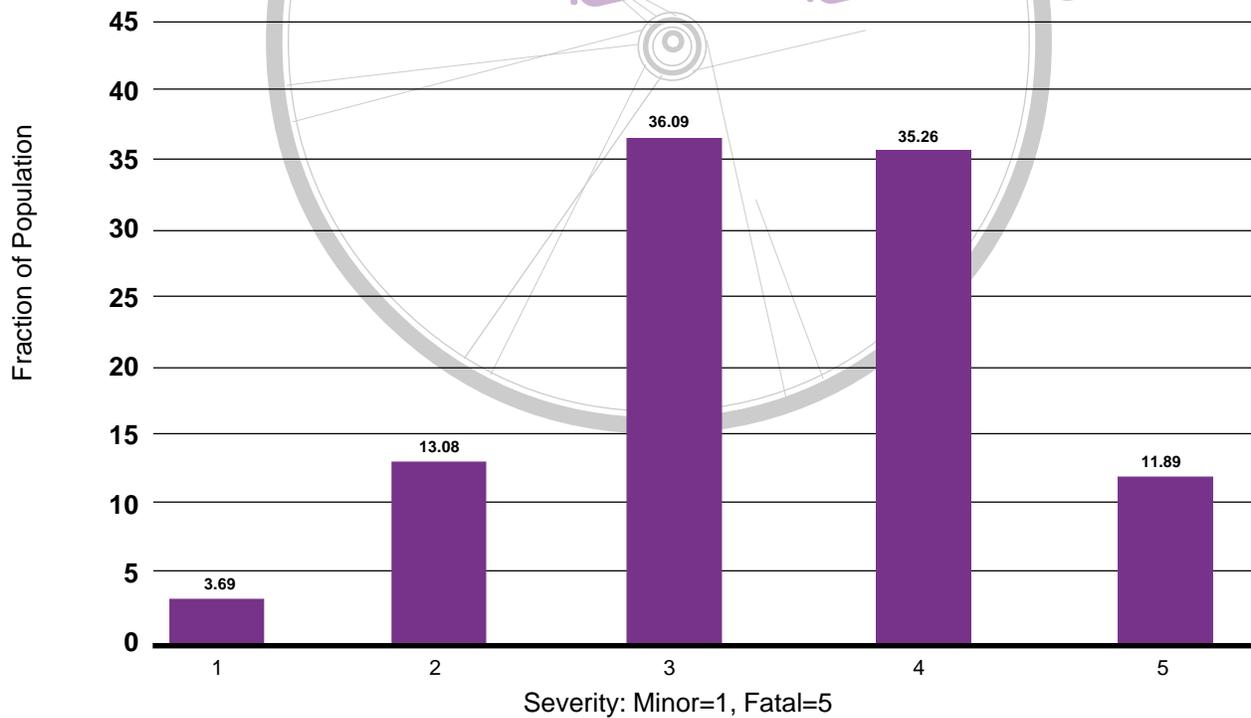
**Figure IIIA.12 Expected Severity of a Bicycle Crash on Street**



**Figure IIIA.13 Expected Severity of a Bicycle Crash on an Unpaved Trail**

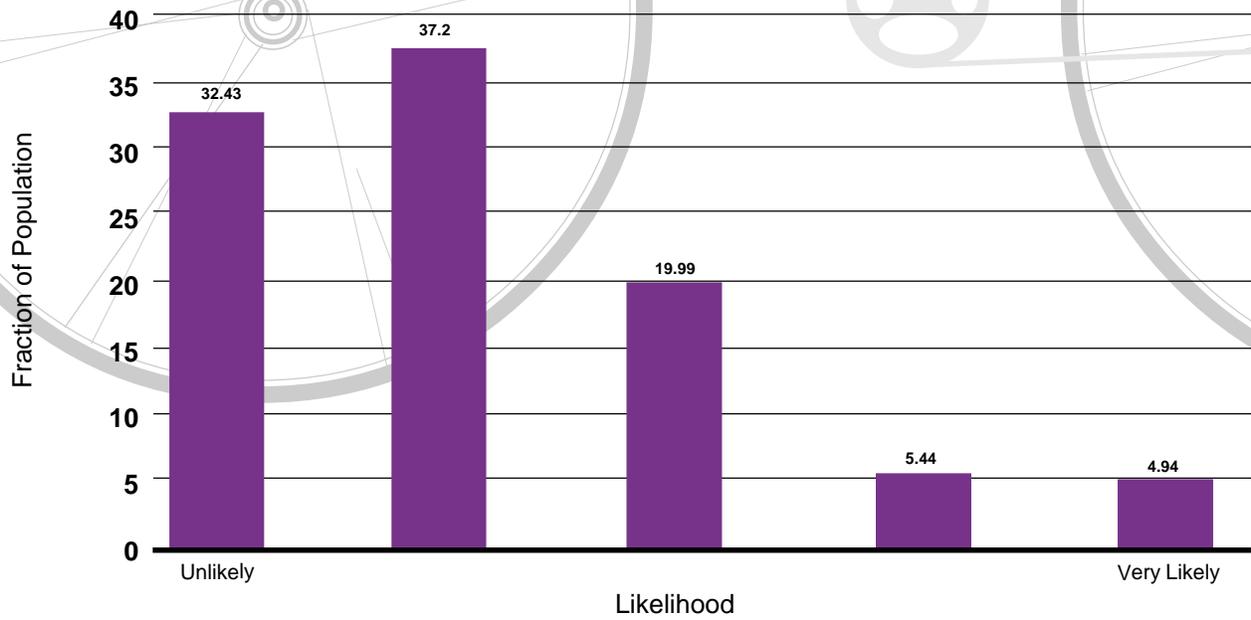


**Figure IIIA.14 Expected Severity of a Bicycle Crash on Mountain Terrain**

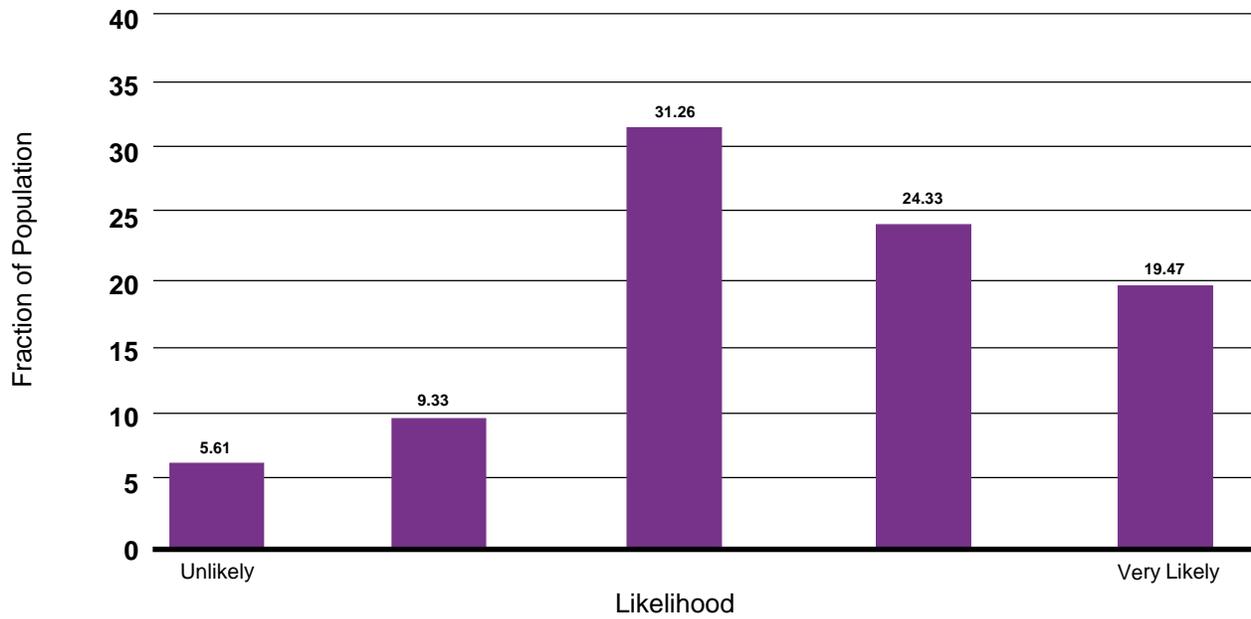


Figures IIIA.15 – IIIA.18 illustrate how respondents rated the likelihood that someone riding a bicycle would experience a crash. This is measured on a five-point scale that ranges from unlikely (1) to very likely (5). Coloradoans feel that crashes are least likely to happen on paved bike trails (Figure IIIA.15)--only 10 percent place the likelihood of a crash in the highest two categories. Street crashes are seen as more likely, probably due to the presence of automobiles and the increased activity (Figure IIIA.16). About one-third of all respondents place the likelihood of a street crash in the two highest categories. The most likely crashes are expected to occur on mountain terrain; half of all respondents chose the two highest categories (Figure IIIA.17).

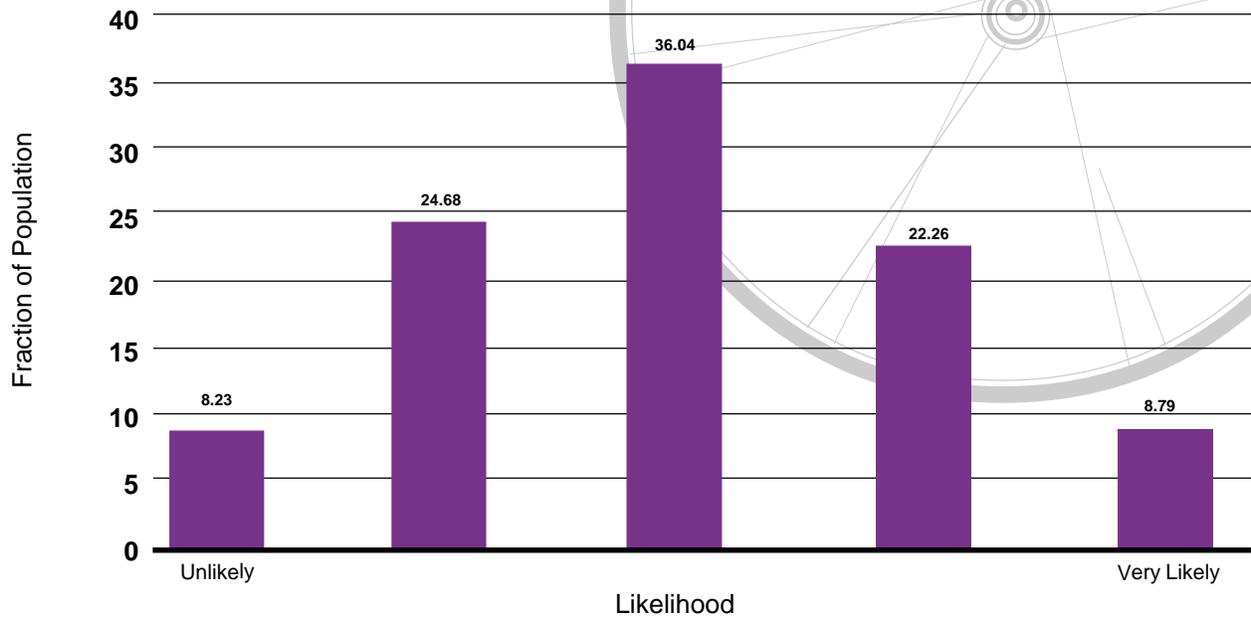
**Figure IIIA.15 Expected Likelihood of a Bicycle Crash on a Paved Bicycle Path**



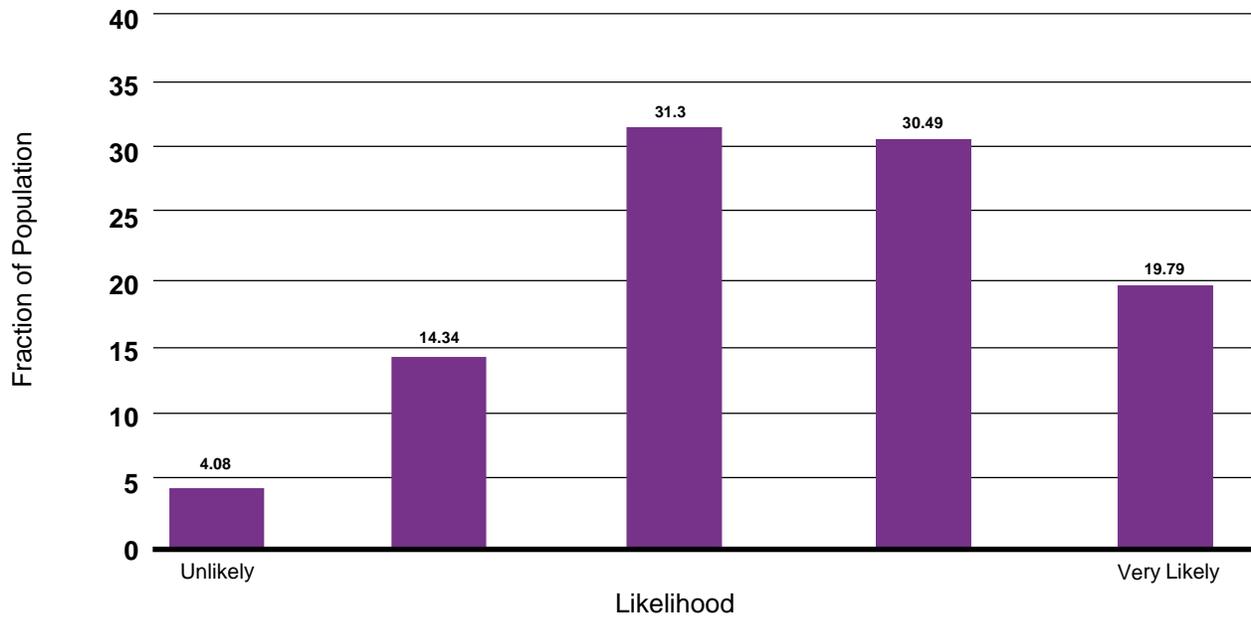
**Figure IIIA.16 Expected Likelihood of a Bicycle Crash on a Street**



**Figure IIIA.17 Expected Likelihood of a Bicycle Crash on an Unpaved Trail**



**Figure IIIA.18 Expected Likelihood of a Bicycle Crash on Mountain Terrain**

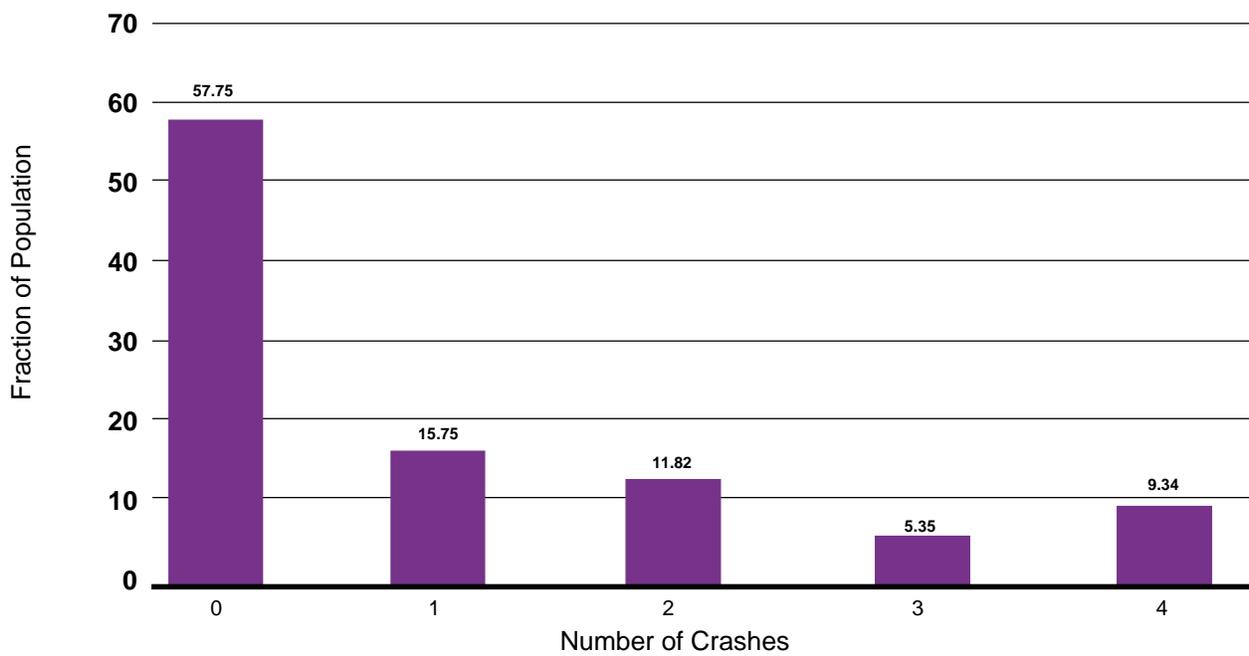


### Bicycle Crashes on Unpaved Trails

In addition to their attitudes and expectations about bicycle crashes, survey respondents were asked about crashes that they have been involved in while riding a bicycle. Nearly half (46%) of all Colorado bicycle riders report having ever had a crash on an unpaved trail, and many riders (27%) have experienced more than one in the last twelve months (Figure IIIA.19).

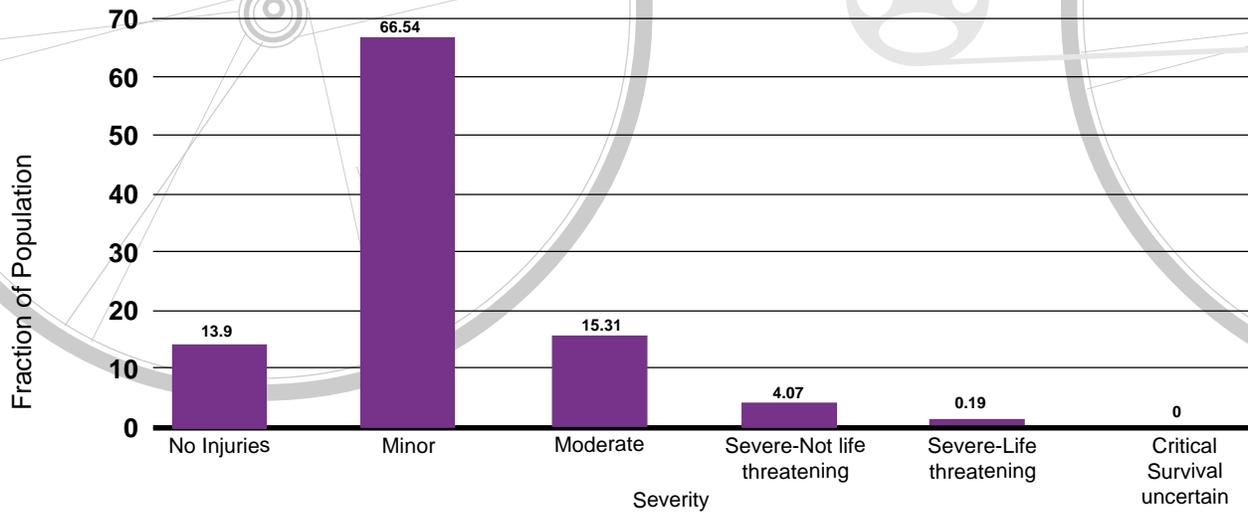
The riders with the most experience, who ride most frequently are least likely to experience a crash. For example, 38 percent of those who bicycle more than one per week reported a crash on an unpaved trail, while almost 60 percent of those who bicycle less than once per month were in a crash.

**Figure IIIA.19 Number of Bicycle Crashes in the last 12 Months on an Unpaved Trail Among Bicycle Riders**

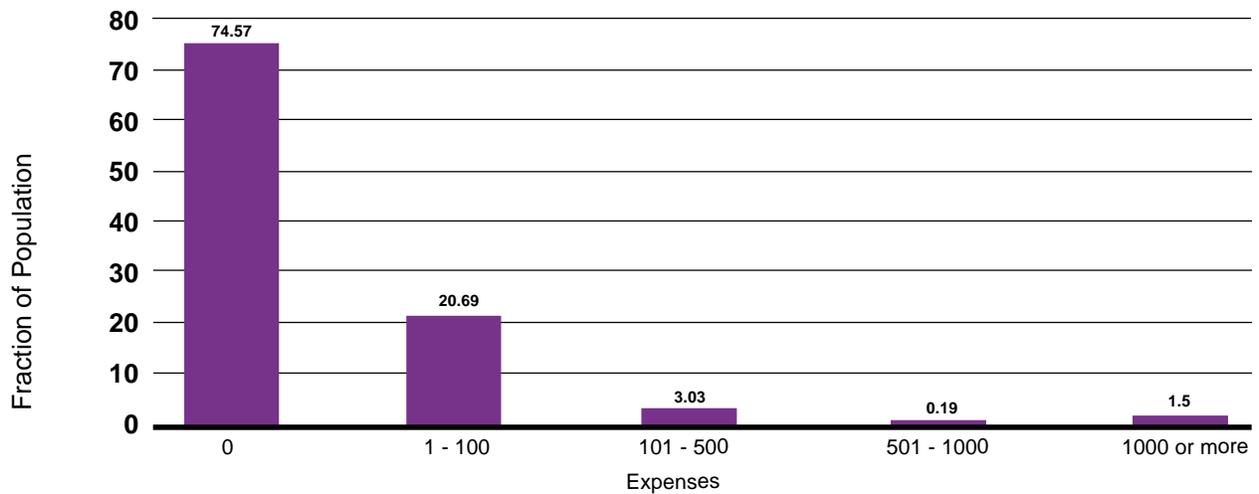


Though many Coloradoans have experienced a crash on an unpaved trail, the consequences typically are not severe. As shown in Figure IIIA.20, less than five percent indicated that their crash resulted in severe or worse injuries. Fourteen percent indicated that they received no injuries at all, and 67 percent reported only minor injuries. These reports are consistent with the expenses involved in a bicycle crash on an unpaved trail reported in Figure IIIA.21. Three-quarters of the riders who were involved in this type of crash incurred no expenses as a result. Only 5 percent incurred expenses greater than \$100. The average amount spent per crash was \$51.

**Figure IIIA.20 Severity of Injury in Last Bicycle Crash on an Unpaved Trail**



**Figure IIIA.21 Total Expenses Incurred in Most Recent Bicycle Crash on Unpaved Trail**

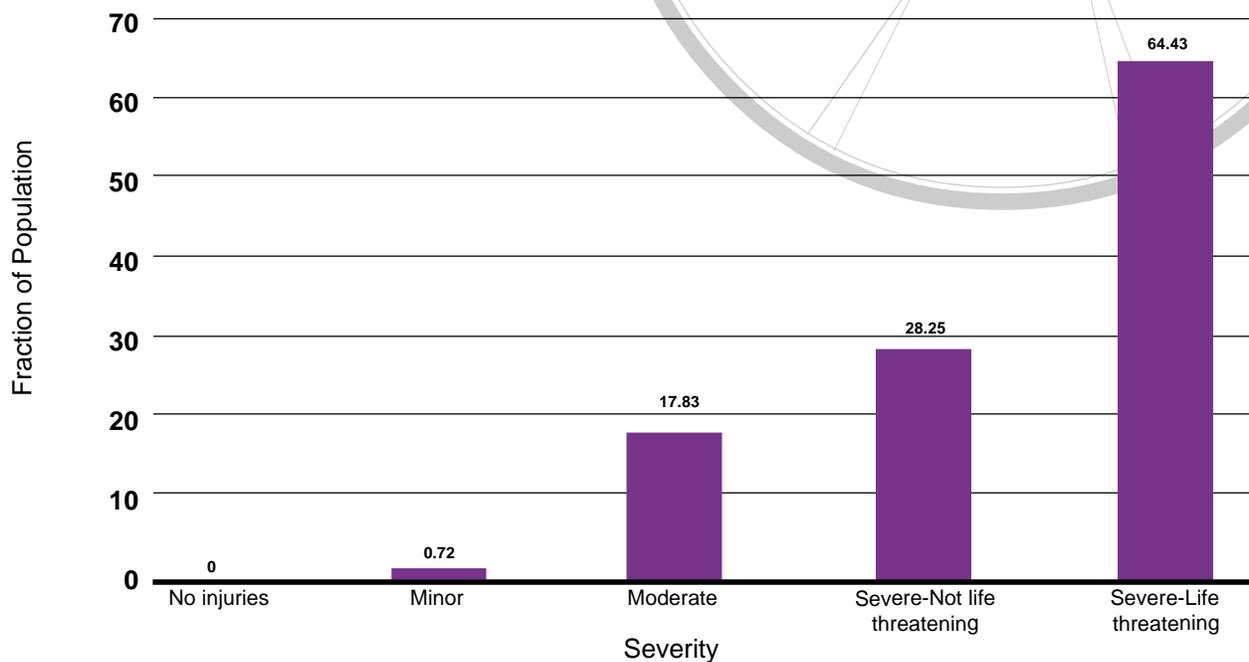


**Crash Reporting**

Bicyclists who experienced a crash on an unpaved trail were asked if they reported it to the authorities, including the police, park rangers and medical personnel. Predictably, the fraction of crash victims reporting their crash increased with the severity of the crash. As Figure IIIA.22 indicates, no one reported a crash on an unpaved trail that resulted in no injuries. One percent of those who had minor injuries reported their crash. Among those with moderate and severe, non-life-threatening-injuries, the reporting rates were 18% and 28% respectively. The highest reporting

rates were for those who had severe life-threatening injuries. Responses to this question are not available for those with critical injuries because the sample size is too small to report reliable estimates.

**Figure IIIA.22 Fraction Reporting the Most Recent Bicycle Crash on an Unpaved Trail by Severity of Injuries**

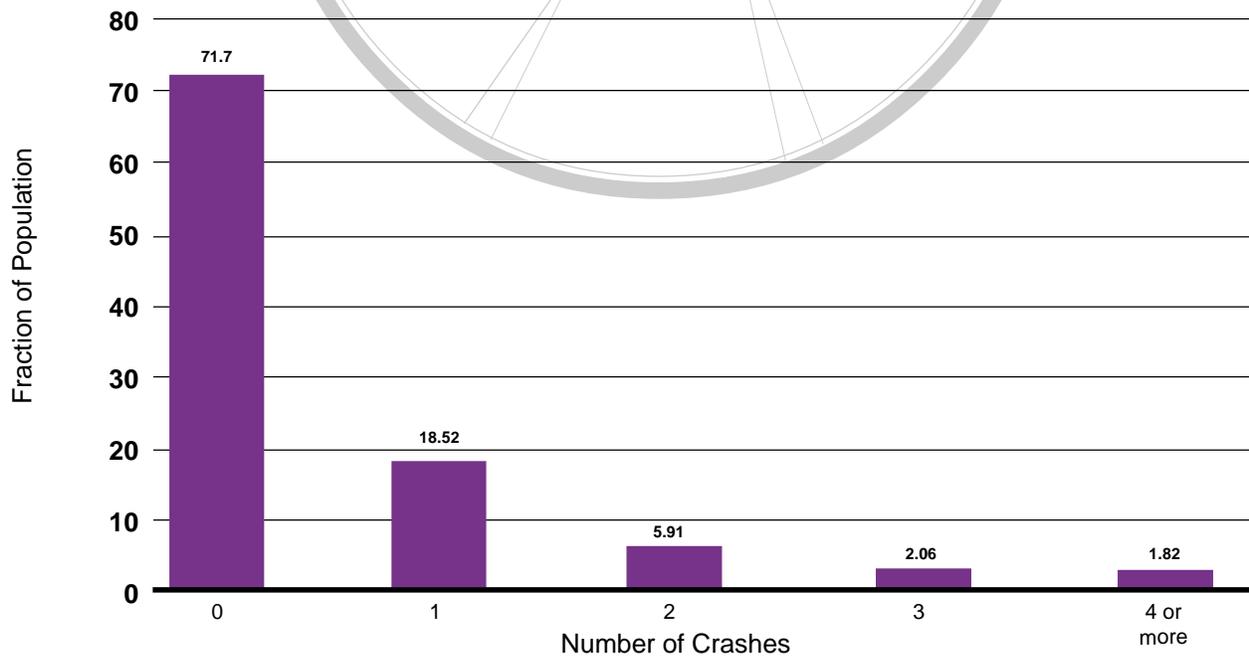


### **Bicycle Crashes on Paved Roads and Trails**

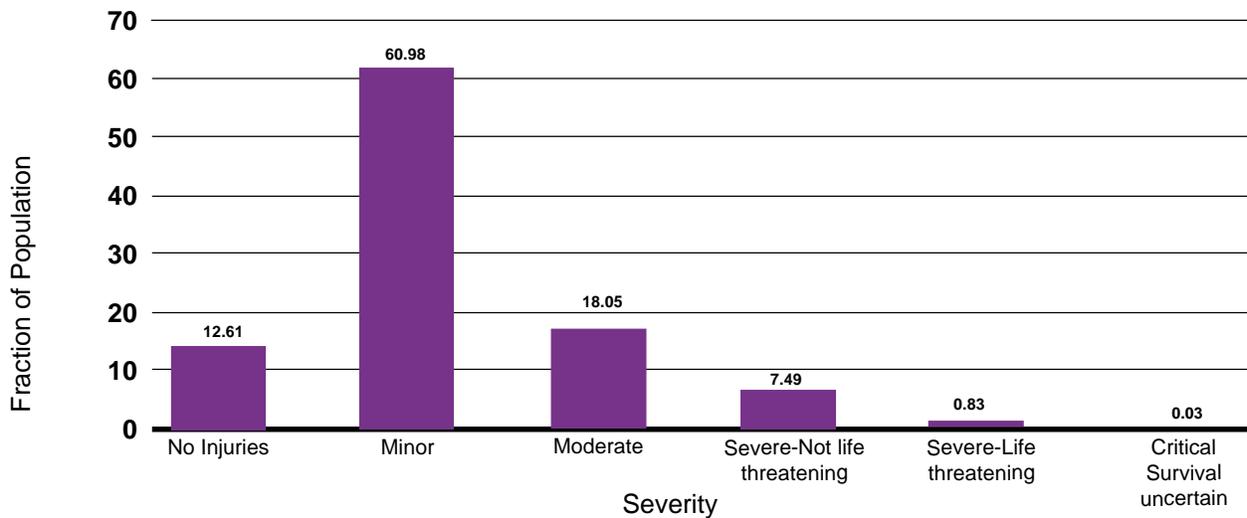
Respondents were asked similar questions to those just above regarding crashes that occurred on a paved road or trail. Half of respondents reported that they had ever crashed on a paved road or trail. Within the last 12 months, 28 percent have experienced such a crash, with 10 percent involved in more than one crash (Figure IIIA.23). As detailed in Figure IIIA.24, most of these crashes were not serious, 74 percent resulted in either no injuries or only minor injuries. Less than one percent resulted in life-threatening or worse injuries. The average expense of the crash, among those involved in a crash on a paved surface was \$123. However, as Figure IIIA.25 illustrates, 68 percent incurred no expenses, while 3 percent incurred expenses that exceeded \$1000. As with crashes on unpaved surfaces, the fraction reporting their injuries is low. Nine percent of respondents experiencing a bicycle crash indicated that it was reported to authorities. Figure IIIA.26 demonstrates the same pattern that we found earlier, the more severe the injuries, the more likely that a report is made. Three percent of those with no injuries or only minor injuries are reported, but

nearly all, 91 percent, of crashes with severe-life threatening injuries are reported. (Again, there were too few individuals with critical injuries to calculate a reporting percentage for this group.)

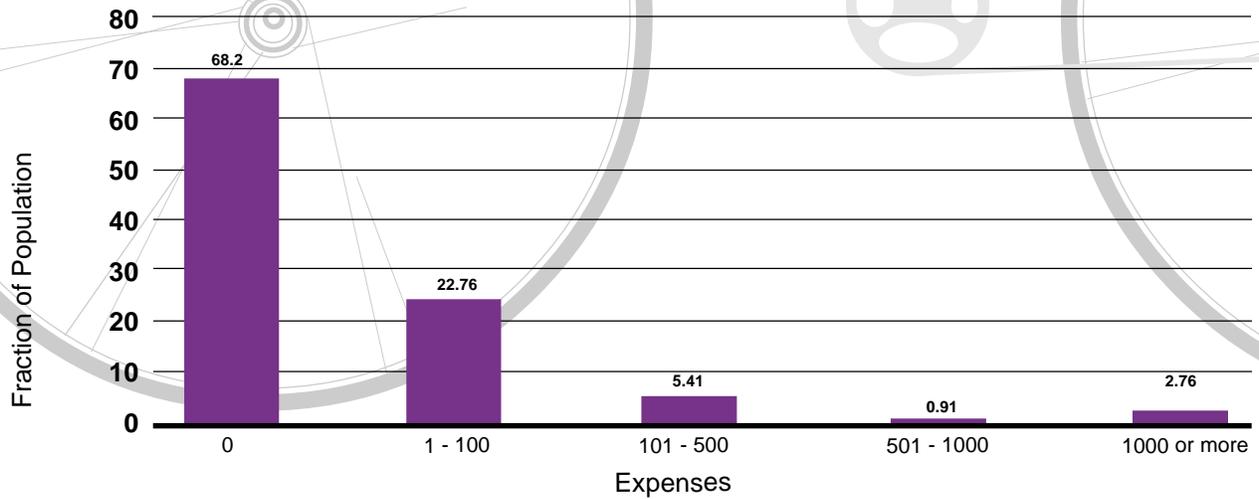
**Figure IIIA.23 Number of Bicycle Crashes on a Paved Road Among Bicycle Riders Within the Last 12 Months**



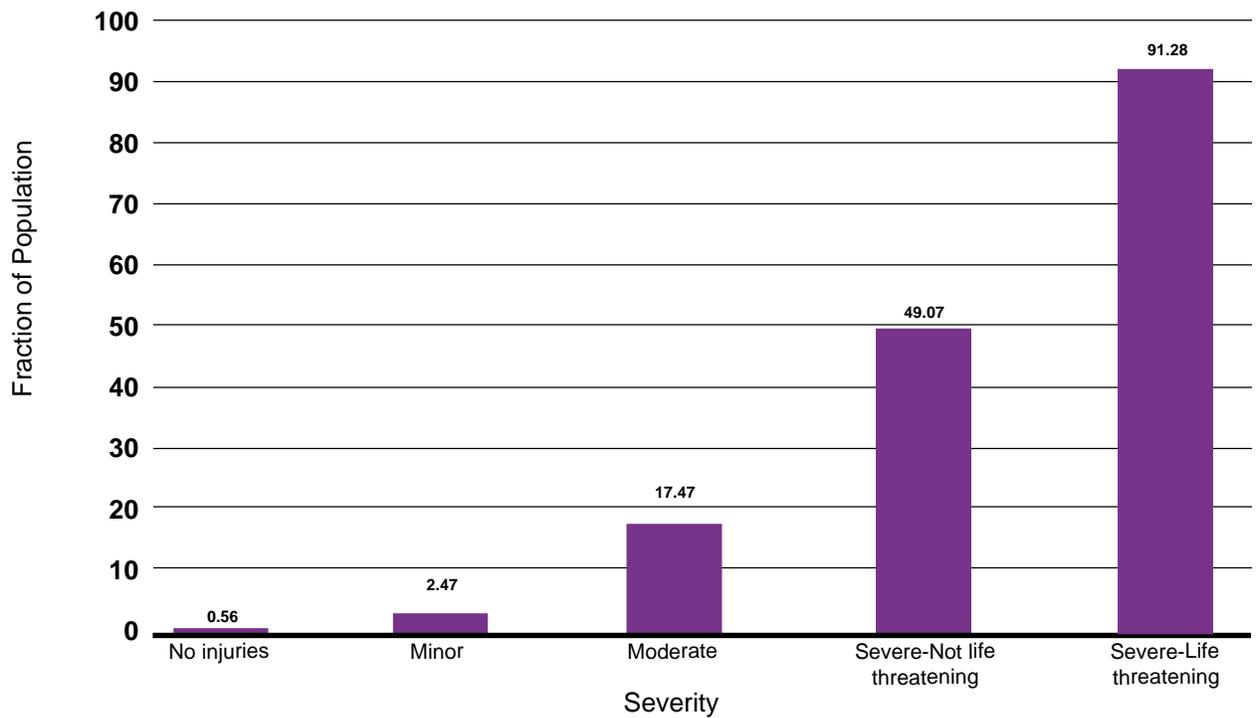
**Figure IIIA.24 Severity of Injury in Last Bicycle Crash on a Paved Road**

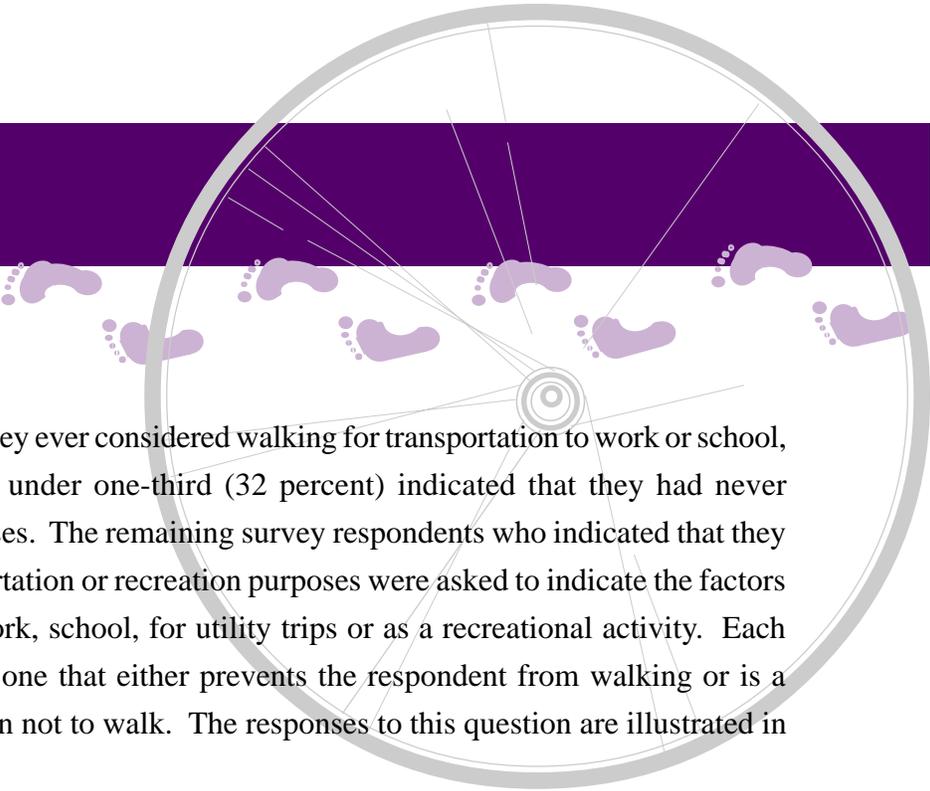


**Figure IIIA.25 Total Expenses Incurred in Most Recent Bicycle Crash on Paved Road**



**Figure IIIA.26 Fraction Reporting the Most Recent Bicycle Crash on a Paved Road by Severity of Injuries**





## **B. Pedestrian Safety**

### **Obstacles to Walking**

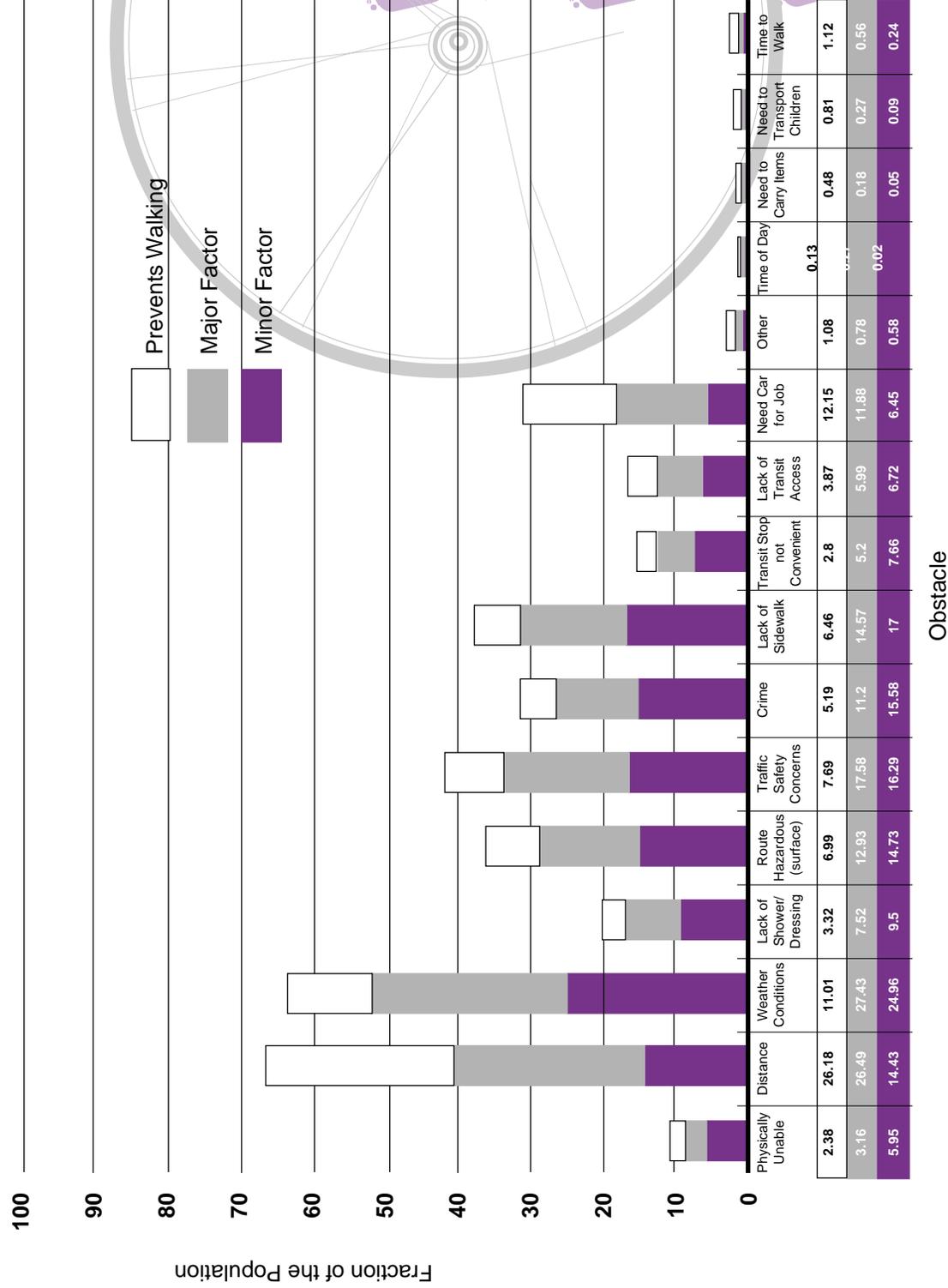
Respondents were asked if they ever considered walking for transportation to work or school, or for recreational purposes. Just under one-third (32 percent) indicated that they had never considered walking for these purposes. The remaining survey respondents who indicated that they would consider walking for transportation or recreation purposes were asked to indicate the factors that deter them from walking to work, school, for utility trips or as a recreational activity. Each factor could be identified as being one that either prevents the respondent from walking or is a major or minor factor in the decision not to walk. The responses to this question are illustrated in Figure IIIB.1.

Of those who would consider walking, just about two-thirds noted that the distance of the trip was a factor in their choosing not to walk. Twenty-six percent indicated that it prevented them from walking, another 26 percent said that it was a major factor and 14 percent indicated that it was a minor factor in their transportation choice. Sixty-three percent of respondents indicated that the weather conditions were an important factor in their decision not to walk. Although only 11 percent indicated that it prevented them from walking, over 50 percent said that it was either a major or minor factor in their decision not to walk.

Safety concerns were the next most important factors preventing pedestrian transportation. In order of the frequency that they were mentioned, traffic safety concerns (42 percent), lack of sidewalk (38 percent), hazardous route (35 percent) and fear of crime (32 percent) prevent Coloradoans from walking as often as they might like.

For some respondents (30 percent) walking to work is difficult since they need a car to perform some of the duties required at their job. An additional 11 percent are physically unable to walk (or to walk the necessary distances). About five percent cited other factors as preventing them from walking. These other factors include such considerations as: the time of day, the need to carry items or transport children or the length of time necessary to walk as affecting this transportation choice.

Figure IIB.1 Obstacles to Walking as Transportation

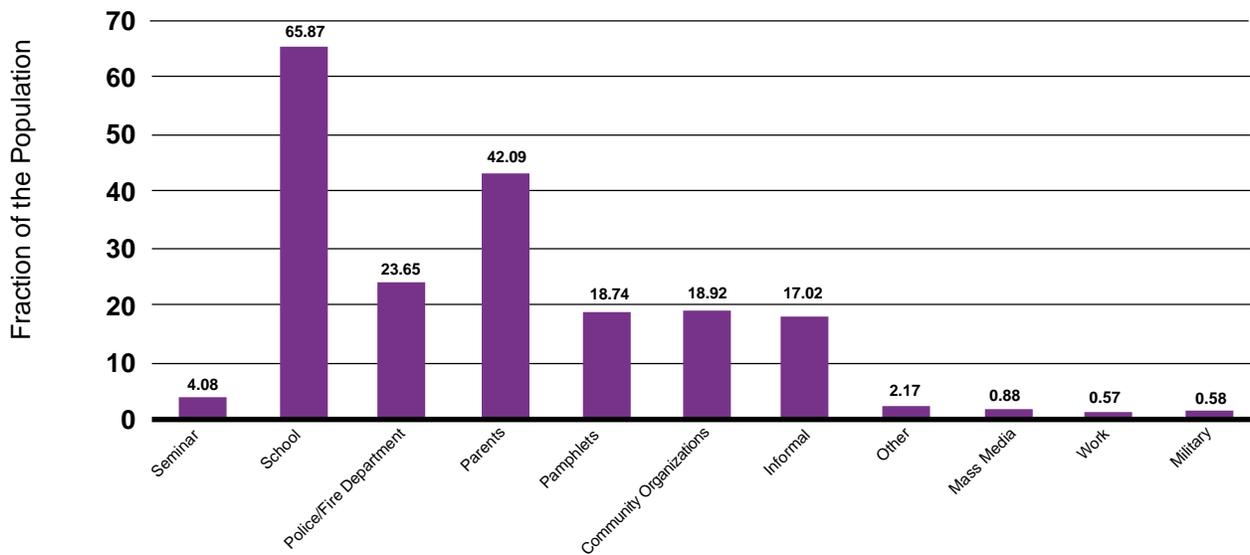


### Pedestrian Safety Instruction

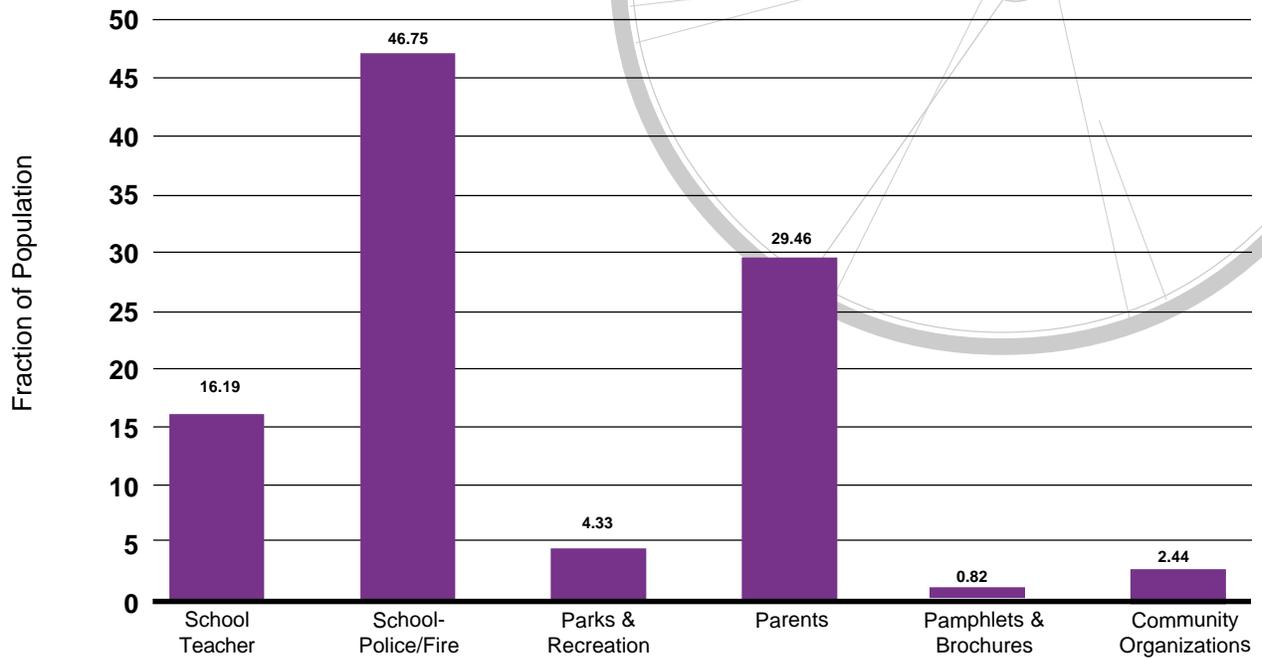
Only one third of Coloradans over the age of 16 reports having received any instruction regarding pedestrian safety. Of those who did, Figure IIIB.2 indicates all of the sources of pedestrian safety information. Most respondents received instruction at school (66%) and from their parents (42%). Other sources of information regarding pedestrian safety included police and fire departments, community organizations, pamphlets and brochures, and other informal sources.

Figure IIIB.3 illustrates where survey respondents think that children *should* receive such safety information. The majority of Coloradans preferred that this instruction take place at school. They also strongly believe that the information should be taught by police and fire department personnel (47 percent) rather than by teachers (16 percent). Nearly 30 percent indicated that parents should be the primary source of pedestrian safety information.

**Figure IIIB.2 Where Coloradans Receive Pedestrian Safety Instruction**



**Figure IIIB.3 Where Colorado Residents Prefer Children Receive Pedestrian Safety Instruction**

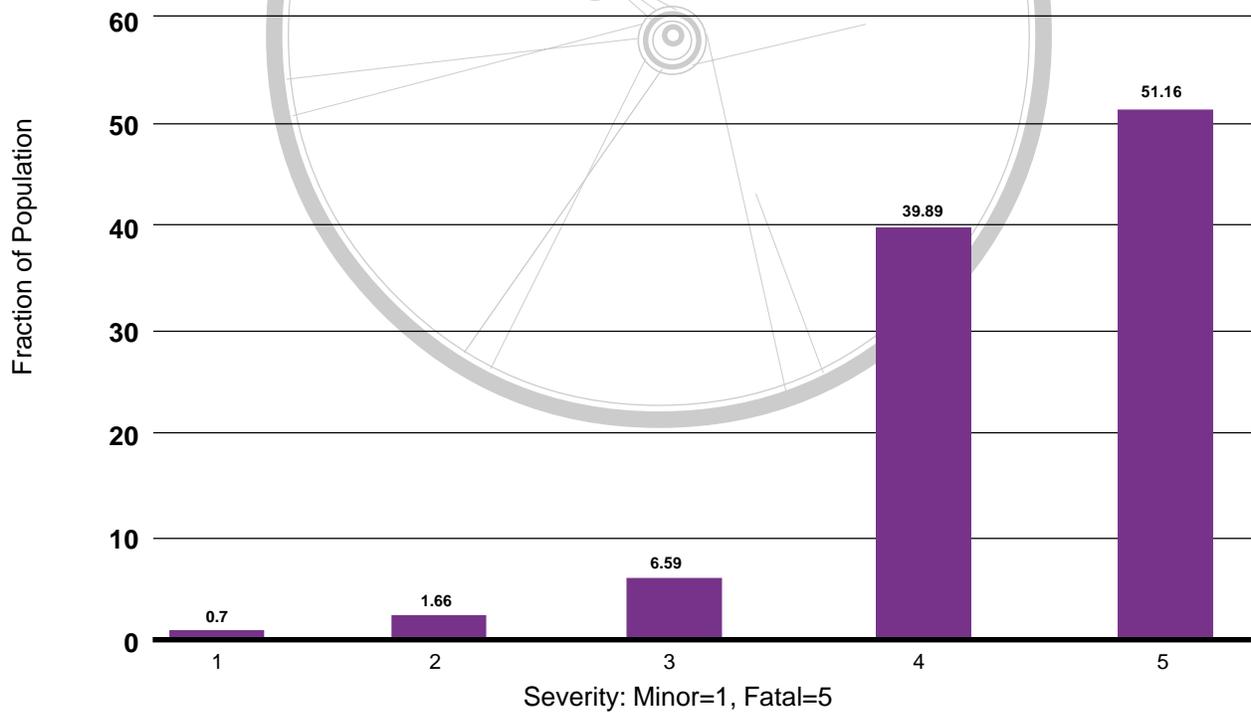


### **Expectations Regarding Pedestrian Crashes**

Survey respondents were asked about the expected severity of various types of pedestrian crashes. They responded by selecting a number on a five-point scale where 1 is a minor crash and 5 is one that results in a fatality. Figures IIIB.4 – IIIB.6 detail their responses to these questions.

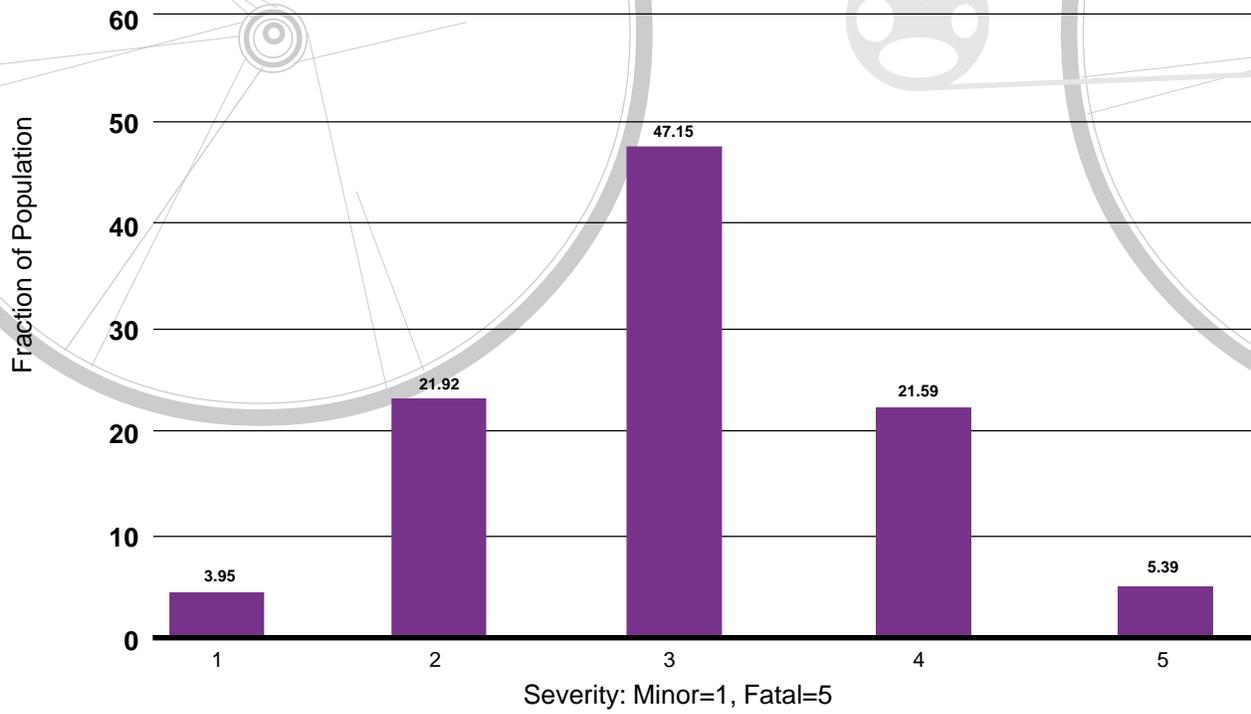
The vast majority expects a pedestrian/automobile incident to be fatal or very severe. Figure IIIB.4 illustrates that 91 percent of respondents ranked the expected injuries caused to a pedestrian by an automobile 4 or 5 on the five-point scale.

**Figure IIIB.4 Expected Severity of a Pedestrian/Automobile Crash**

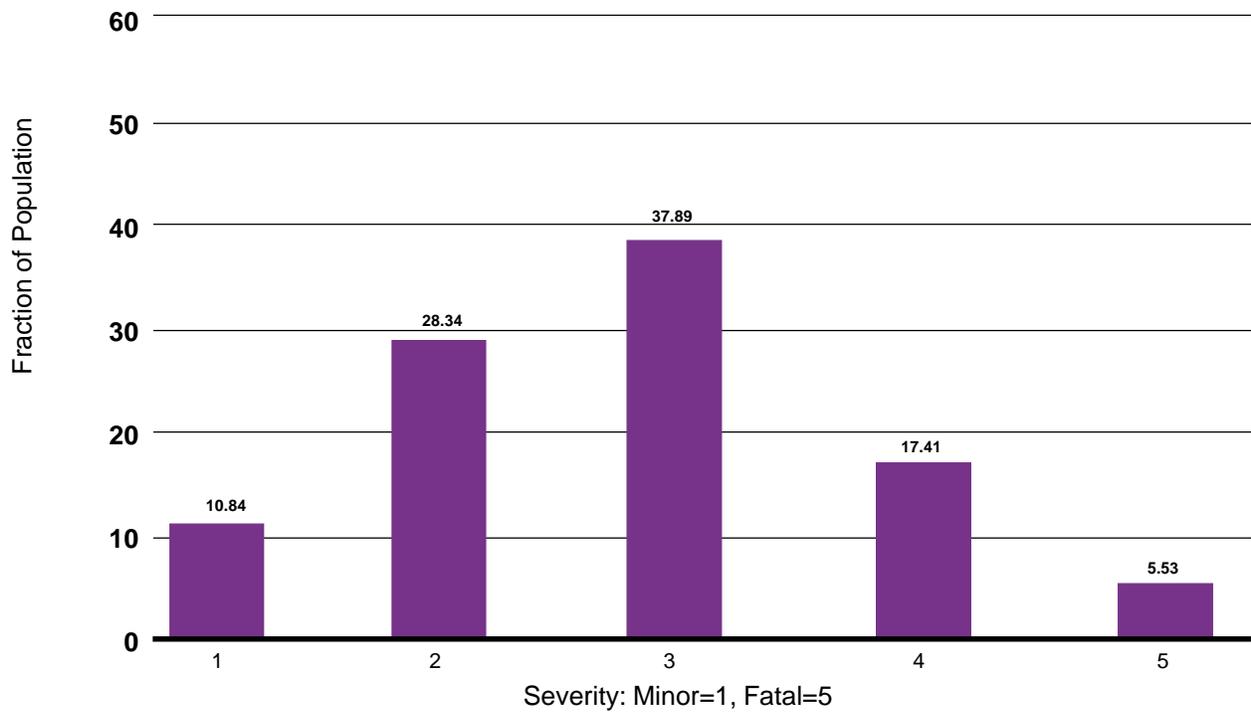


Pedestrian crashes involving bicycles are most commonly rated a 3 on the same scale (Figure IIIB.5). Less than six percent indicated that they thought the consequences of a pedestrian/bicycle crash would be fatal. However, only than four percent thought that this type of crash was likely to result in only minor injuries. Hazardous surfaces are also thought to lead to injuries that are expected to be neither minor nor fatal (Figure IIIB.6).

**Figure IIIB.5 Expected Severity of a Pedestrian/Bicycle Crash**



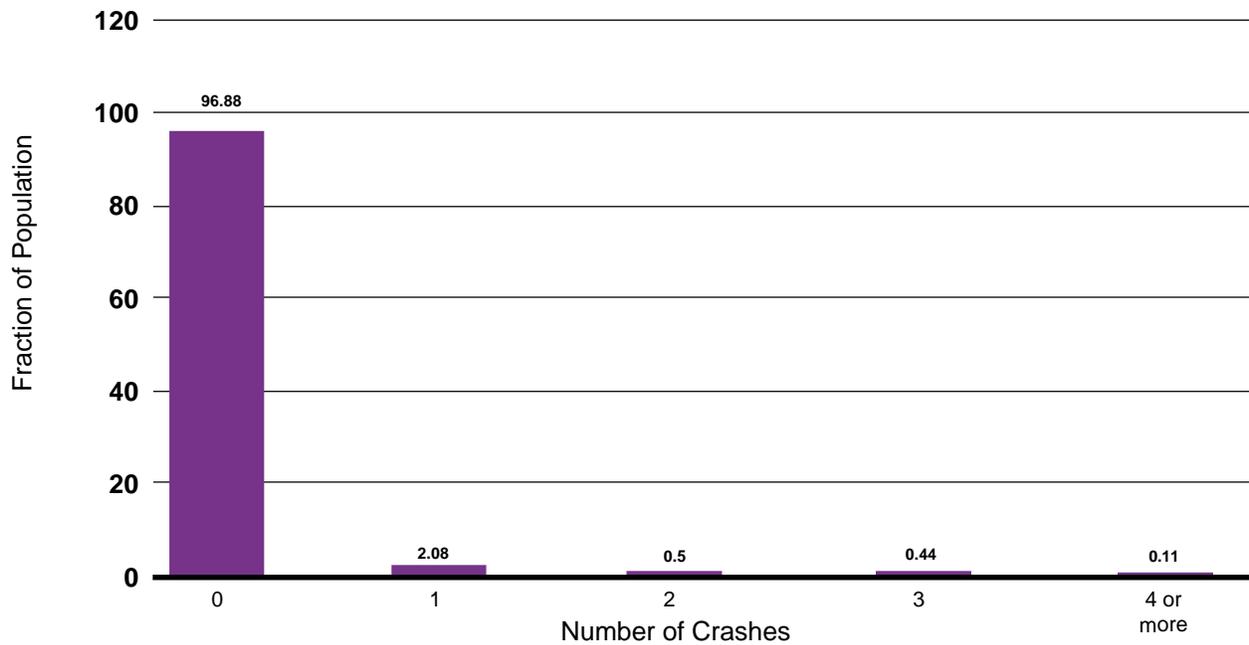
**Figure IIIB.6 Expected Severity of a Pedestrian Crash Caused by Hazardous Surfaces**



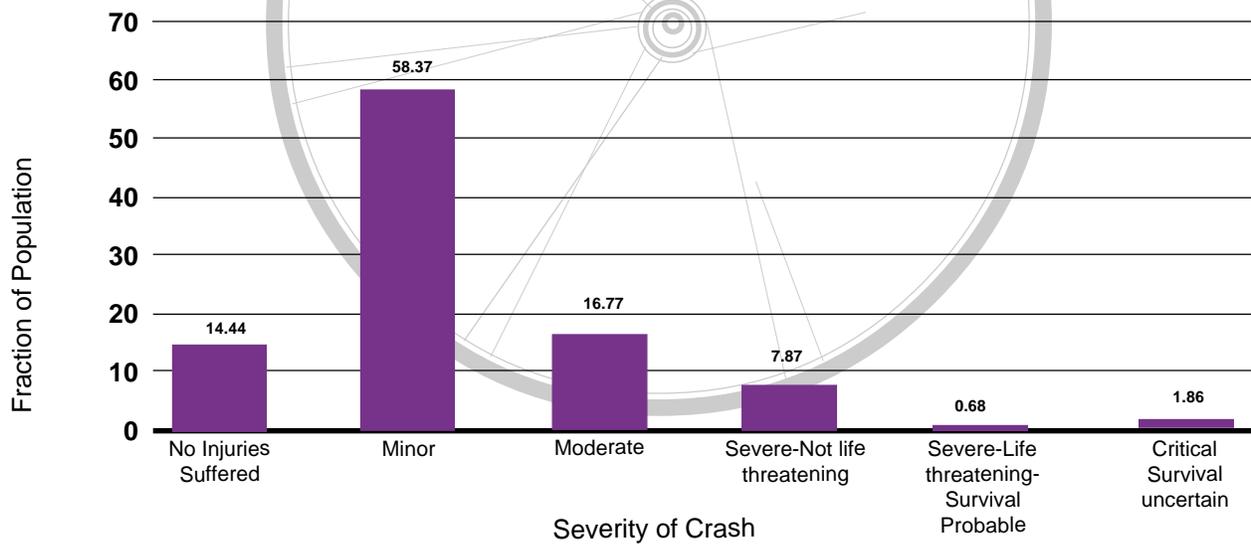
## Pedestrian Crashes

Three percent of Coloradoans reported having been involved in a crash as a pedestrian in the last 12 months (about 1% more than once). Very few have had more than one pedestrian crash in the last year (Figure IIIB.7). Nearly 12 percent of Coloradoans indicated that they had *ever* been involved in a crash as a pedestrian. Among those who had ever been in a pedestrian crash, over 14 percent sustained no injuries in their last crash and 58 percent incurred only minor injuries as shown in Figure IIIB.8. The remainder sustained injuries that ranged from moderate to critical (obviously we were unable to capture fatalities in these data).

**Figure IIIB.7 Frequency of Pedestrian Crashes in the Previous 12 Months**



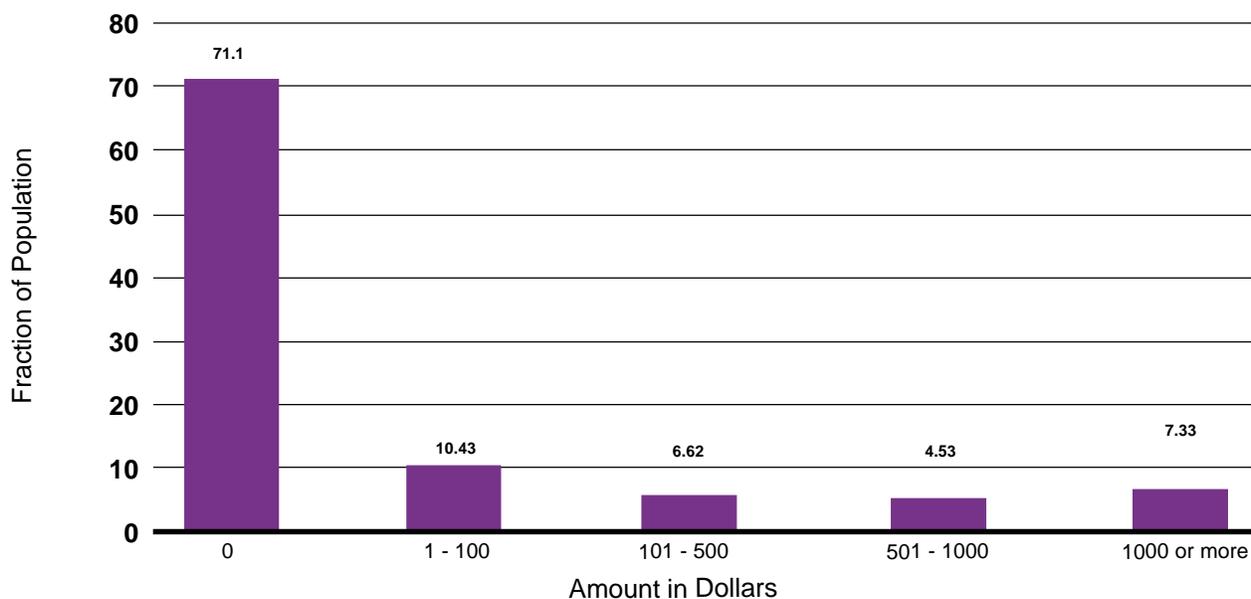
**Figure IIIB.8 Severity of Most Recent Pedestrian Crash**



### Cost of Pedestrian Crashes

The average expense as a result of the most recent pedestrian crash within the last year was reported to be \$149. As shown in Figure IIIB.9, 71 percent of all pedestrian crashes resulted in no expense. Just over 10 percent incurred costs of less than \$100. Seven percent of those involved in a pedestrian crash incurred costs of over \$1,000.

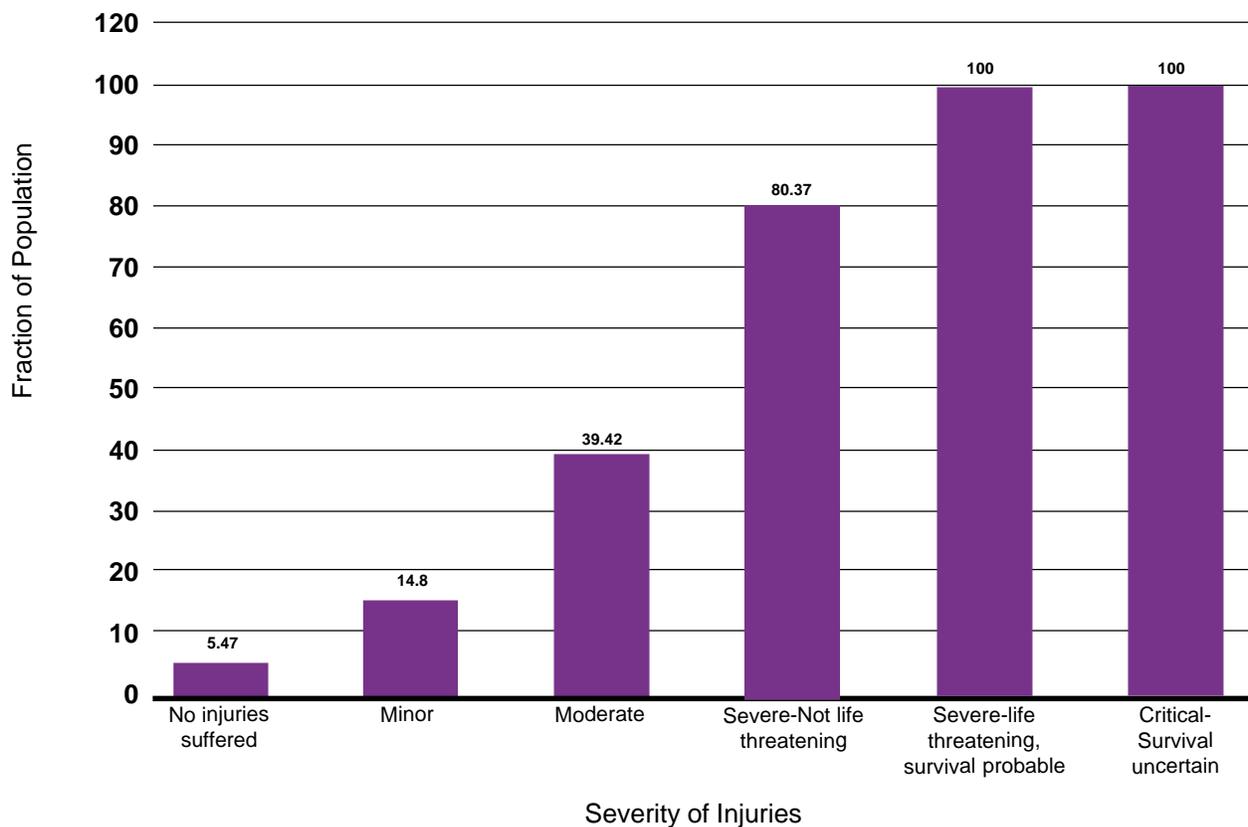
**Figure IIIB.9 Total Expenses Incurred in Most Recent Pedestrian Crash**



### Reporting Pedestrian Crashes

Most (81%) non-fatal pedestrian crashes were not reported to authorities (e.g. police, park rangers, medical personnel). The likelihood that a crash is reported varies substantially by the severity of the crash as shown in Figure IIIB.10. Pedestrian crashes with no injuries and those with only minor injuries are most likely to go unreported. Only 5.5 percent and 14.8 percent, respectively, were reported. Pedestrian crashes with moderate injuries were reported nearly forty percent of the time. The more severe the injuries, the more likely it is that the crash is reported. All crashes in which the victim suffered severe life threatening or critical injuries are reported to authorities.

**Figure IIIB.10 Fraction Reporting the Most Recent Pedestrian Crash by Severity of Injuries**



In order to attempt to identify the frequency of severe pedestrian crashes we asked respondents if anyone in their household had ever suffered a severe or worse crash as a pedestrian. Severe crashes were reported by 4.4 percent of households.