

# Bicycle Helmet Use Among Winnipeg Cyclists

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# Overview

This report is presented in two sections. The first section examines helmet use trends in Winnipeg from 1996 to 2011. The second section provides additional analyses of helmet use for 2011.

## *Introduction*

Bicycle helmet use has been observed and reported for the following years: 1996 through 1998, 2003, 2004, 2006, 2008, 2010 and 2011. The replication of methods in each study year allows for analysis of helmet use trends over time. Observation sites included parks, schools, residential streets, major intersections and cycling paths. One-sixth of the observations were conducted on weekends. A further one-sixth of the observations were conducted on weekday evenings. The remaining observations were completed on weekdays during the day. Helmet use is reported for important predictors including age group (<8, 8-11, 12-15, 16-19, adult), sex, correct versus incorrect use, riding alone versus riding with companions, and with headphones versus not using headphones.

## *Helmet Use by Socioeconomic Status*

In 2008, the technique for coding socio-economic status of observation sites was restructured using more current data for neighborhood

income. The 12 Winnipeg Community Areas and 25 neighborhood clusters of the Winnipeg Health Region were selected as the unit of analysis due to the availability of neighborhood profiles with socio-demographic indicators, and the availability of bicycle injury data for these geographic areas. Community area maps were used to assign each of the observation sites to 25 neighborhood clusters (which by definition assigned them to 12 community areas); this facilitated coding of Median Total Family Income and the percentage of the population living below the Low Income Cut-Off (LICO) for each site. The entire dataset was recoded (1996- 2011), allowing for the comparison of helmet use by socioeconomic indicators over time. Median family income and LICO are both reported, as they measure separate aspects of neighborhood socioeconomic status. Neighborhoods can be heterogeneous, having a mix of high and low income households (for example, downtown Winnipeg). In such cases, one may identify an average median family income, even though a relatively high proportion of families are living below the poverty line. For neighborhoods that are more homogenous, the median family income and LICO may be more closely correlated measures of neighborhood socioeconomic status.

# Helmet Use Trends: 1996-2011

## Sample Size

17,851 Winnipeg cyclists were observed between 1996 and 2011 (Table 1).

Table 1. Cyclist Observations by Year

Year	Number of cyclists
1996	2314
1997	1886
1998	1593
2003	1648
2004	1936
2006	2976
2008	1393
2010	2870
2011	1235

## Bicycle Helmet Use by Year

Figure 1 illustrates helmet use by year for all ages combined, from 1996 to 2011. Helmet use rates have increased from 23% to 41.9% over the study years. Figure 2 shows the change in helmet use over time by age group.

Figure 1. Bicycle Helmet Use by Year

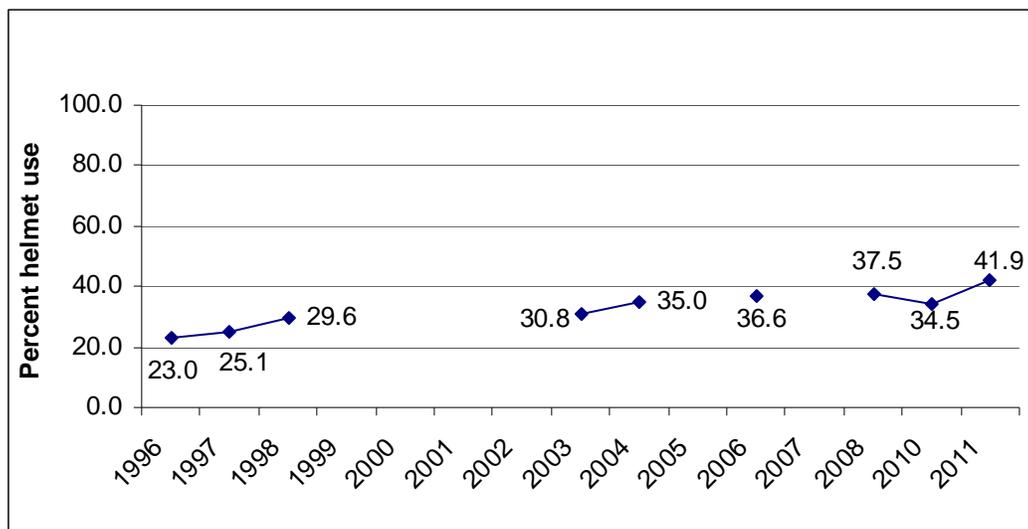
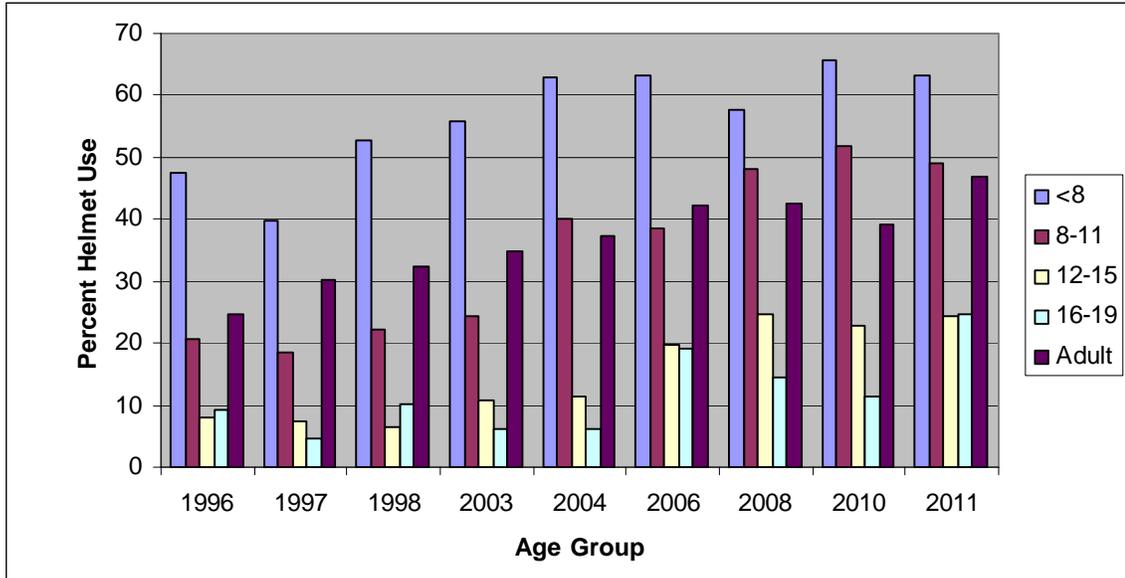


Figure 2. Bicycle Helmet Use by Age and Year

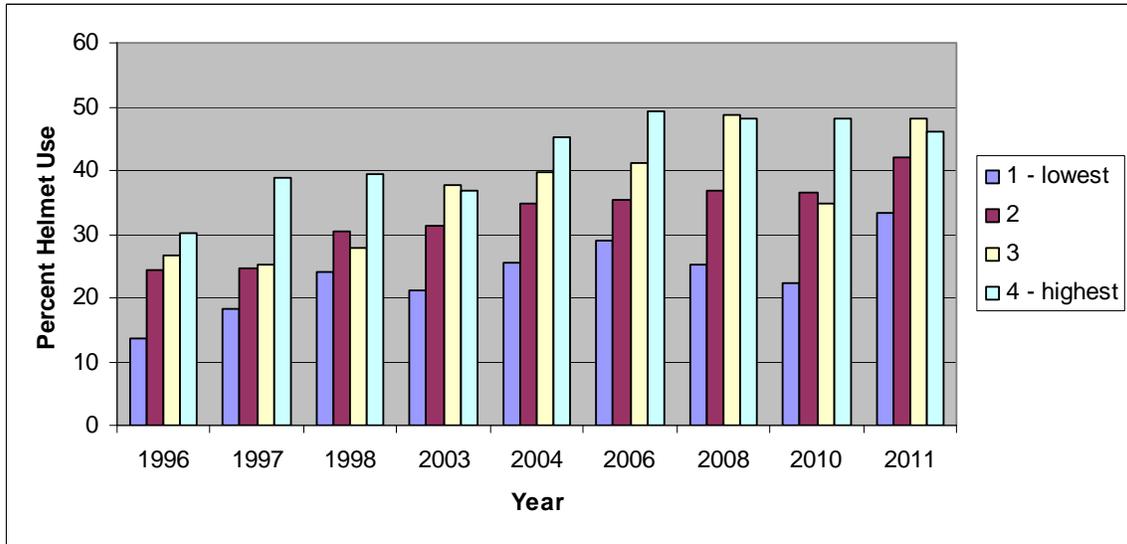


*Bicycle Helmet Use and Socioeconomic Status*

Helmet use was analyzed by two community-level SES indicators: Median Total Family Income (Figure 3) and the percentage of the population living below the Low Income Cut-Off (Figure 4). There is a consistent correlation between these socioeconomic indicators and helmet

use, with lower rates associated with lower income and higher levels of poverty. Helmet use increased 19.7% in the lowest income areas and 15.9% in the highest income areas, with a gap of 16.7% in 1996 and 12.9% in 2011 between the lowest and highest income areas. Of note, there was a significant increase in helmet use from 2010 to 2011 in the lowest income category (p = 0.0001).

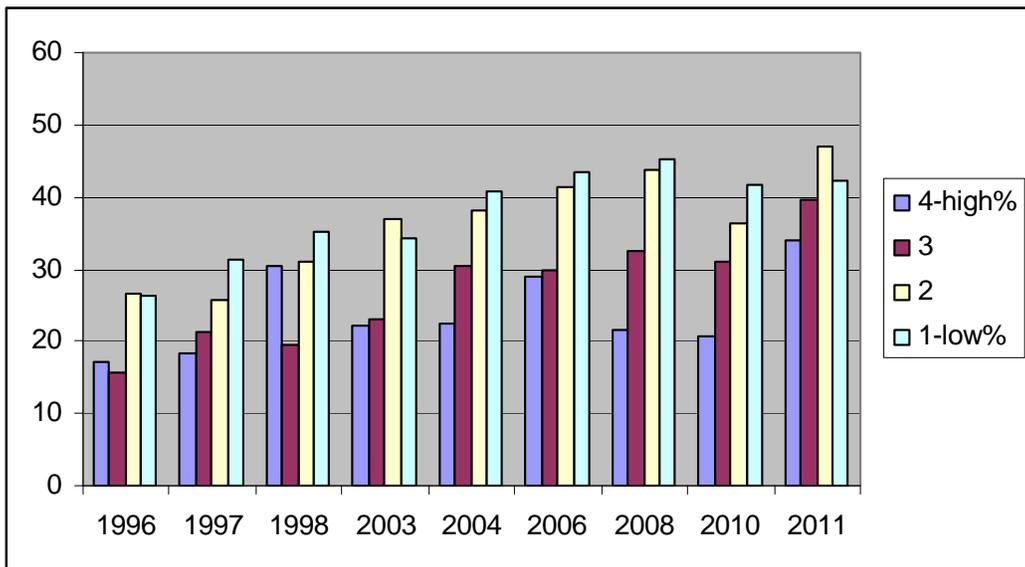
Figure 3. Bicycle Helmet Use by Median Total Family Income and Year



The gap in helmet use between the lowest and highest poverty areas has increased over time; helmet use improved by 16.8% in the highest

poverty areas and 15.9% in the lowest poverty areas, with a gap of 9.2% in 1996 and 8.3% in 2011 between the lowest and highest poverty areas.

Figure 4. Bicycle Helmet Use by Percentage LICO and Year

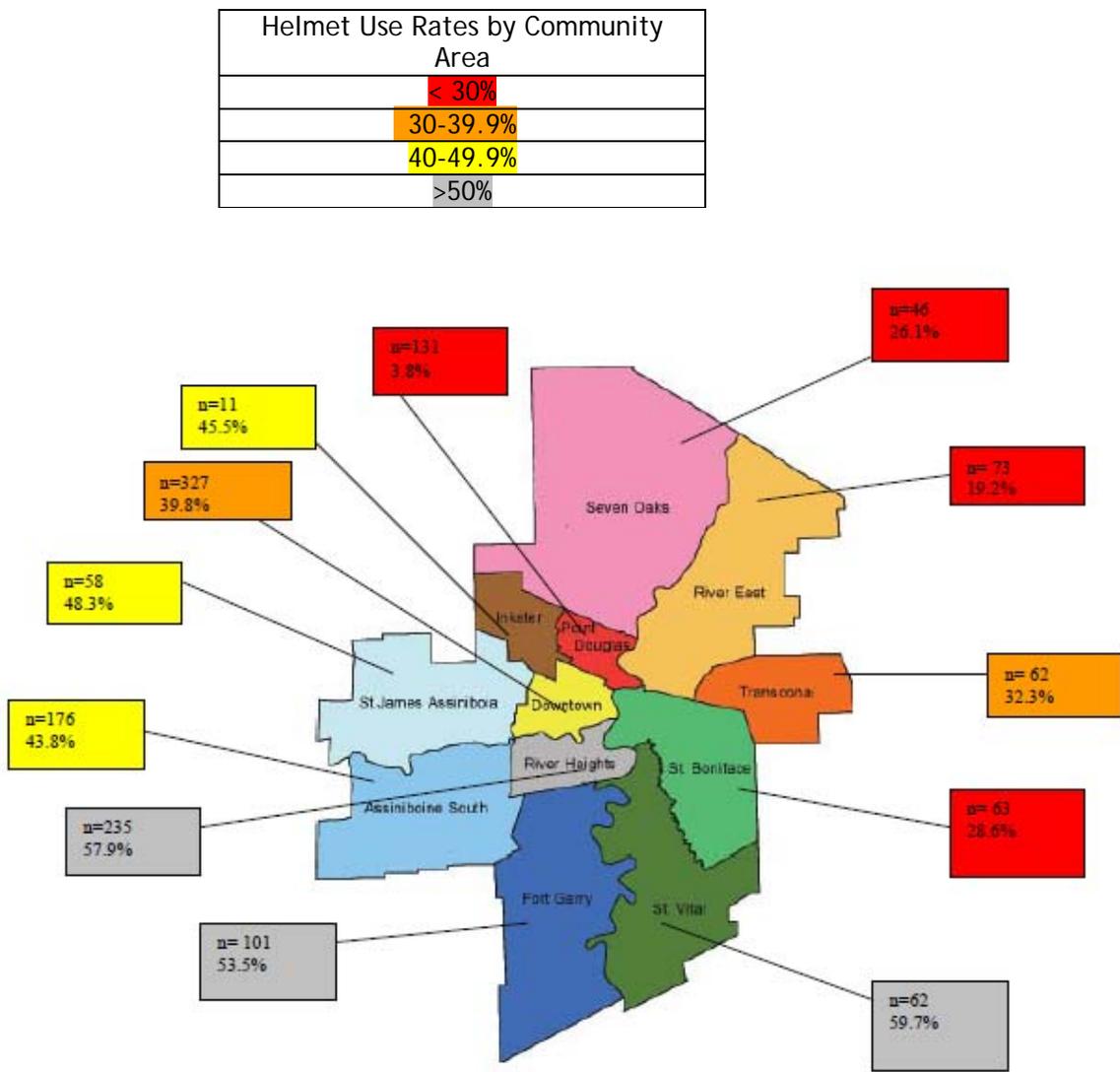


**Bicycle Helmet Use by Community Area**

Helmet use is illustrated here by community area to depict the

variation in helmet use across regions of the city (Figure 5). Lowest helmet use was observed in Point Douglas. Highest helmet use was observed in River Heights and St. Vital.

Figure 5. Bicycle Helmet Use by Winnipeg Community Area



# 2011 Helmet Use Observations

## *Bicycle Helmet Use*

The overall rate of helmet use for the full 2011 sample was 39.9%.

### *Bicycle Helmet Use by Gender*

Male cyclists had significantly lower rates of helmet use ( $\chi^2 = 17.103$ ,  $p < .001$ ).

**Table 2. Bicycle Helmet Use by Gender**

Gender	Helmet Use % (n)	Cyclists (%)
Female	48.8% (181)	372 (27.62)
Male	36.5% (352)	966 (71.71)
Unknown	33.3% (3)	9 (0.67 %)
Total		1347 (100%)

### *Bicycle Helmet Use by Age*

Helmet use was highest in children less than eight years of age and lowest in teens 16-19 years of age (Table 3). Statistical testing of helmet use by age group yielded a statistically significant difference ( $\chi^2 = 61.144$ ,  $p < .0001$ ).

**Table 3. Bicycle Helmet Use by Age**

Age Group	Helmet Use % (n)	Cyclists (%)
Less than 8	63.2% (36)	57 (4.23)
8-11	46.9% (53)	113 (8.39)
12-15	24.4% (48)	197 (14.63)
16-19	22.4% (35)	157 (11.66)
Adult	44.3% (364)	823 (61.10)
Total		1347 (100%)

### *Bicycle Helmet Use and Riding Companions*

Cyclists riding with both adults and children had the highest helmet use rates (62%), followed by cyclists riding with adults and cyclists riding alone (Table 4). Cyclists riding with children but no adults had the lowest helmet use rate. These differences were statistically significant ( $\chi^2 = 26.413$   $p < .000026$ ). Two 'Unknowns' were excluded.

**Table 4. Helmet Use and Riding Companions**

Riding Companion	Cyclists (%)	% Helmet Use (n)
Alone	964 (71.6)	40.6% (391)
With children	199 (14.8)	27.1% (54)
With adults	124 (9.2)	43.5% (54)
With both adults and children	58 (4.3)	62.1% (36)
Total	1345 (99.9)	

***Bicycle Helmet Use and SES Indicators***

Helmet use increased with increasing neighborhood median total family income (Table 5). This difference was statistically significant ( $\chi^2 = 35.296$ ,  $p < .0001$ ).

<b>Income Range</b>	<b>Helmet Use % (n)</b>	<b>Cyclists (%)</b>
\$26,583-42,556	29.6% (141)	478 (35.49)
\$42,557-54,726	41.9% (121)	289 (21.46)
\$54,727-64,944	48.1% (168)	349 (25.91)
\$64,945-83,654	46.1% (106)	231 (17.15)
Total	39.9% (536)	1347 (100%)

Helmet use was also assessed by comparing the percentage of the population falling below the low income cutoff (LICO). As neighbourhood poverty level increased, helmet use decreased

(Table 6). This difference was statistically significant ( $\chi^2 = 25.087$ ,  $p < .0001$ ). In the highest poverty areas, helmet use was 29.4%, which is considerably lower than the average rate of helmet usage of 39.9%.

<b>LICO Category</b>	<b>Helmet Use % (n)</b>	<b>Cyclists (%)</b>
4-11% (low poverty)	42.2% (139)	330 (24.50)
11.1-22%	46.9% (206)	439 (32.59)
22.1-34%	37.8% (96)	254 (18.86)
34.1-58% (high poverty)	29.4% (95)	324 (24.05)
Total	39.9% (536)	1347 (100%)

*Helmet Use by Site Type*

Cyclists observed at intersections had the highest rates of helmet use (50.8%), whereas helmet use was lowest at parks (33.7%) and schools (33.5%). These differences were statistically significant ( $\chi^2 = 34.765$ ,  $p < .0001$ ).

**Table 7. Helmet Use by Site Type**

Site Type	Helmet Use % (n)	Cyclists (%)
Cycle Path	48.7% (38)	78 (5.79)
Major Intersection	50.8% (202)	398 (29.55)
Park	33.7% (70)	208 (15.44)
Residential Street	35.8% (67)	188 (13.96)
School	33.5% (159)	475 (35.26)
Total	39.9% (536)	1347 (100%)

*Incorrect Bicycle Helmet Use*

In 2011, overall bicycle helmet use was 39.9%. Correct use was observed among 72.2% of bicycle helmet users (387 of the 536 observed). The most frequent type of incorrect use was wearing the helmet too far back .

**Table 8. Incorrect Helmet Use**

Type of incorrect use	Cyclists (%)
Too far back	93 (65.03)
Too far forward	26 (18.18)
Straps too loose or not fastened	17 (11.89)
Size incorrect	7 (4.90)
Total	143 (100)

Younger riders were more likely to be observed with incorrect helmet use. Correct use was highest for adults (80%) and teens 16-19 (71%) followed by children less than eight years of age (56%). Children 8-11 (51%) and 12-15 (50%) years of age had the lowest frequency of correct helmet use.

### *Use of Headphones*

Helmet use differences between riders with and without headphones were statistically significant ( $\chi^2=9.255$ ,  $p<.01$ ). It should be noted that

the sample size of head phone wearers was small (5.35%).

**Table 9. Helmet Use and Headphone Use**

Headphones	Helmet Use % (n)	Cyclists (%)
Yes	25.4% (18)	72 (5.35)
No	41.3% (488)	1182 (87.75)
Unknown	32.6% (30)	93 (6.90)
Total		1347 (100%)

## 2010 – 2011 Data Comparisons

### *Bicycle Helmet Use*

The overall rate of helmet use for the full 2010 sample was 33.8% while in 2011 it was 39.9%. This increase in helmet use was significant ( $\chi^2=15.03$ ,  $p<.0001$ ).

### *Bicycle Helmet Use by Median Income Category*

The four median income categories were assessed for changes in helmet use from 2010 to 2011. Significant increases in helmet use were found for the lowest level and the mid-high level.

**Table 10. Helmet Use by Median Total Family Income 2010-2011**

Income Range	2010 Helmet Use % (n)	2011 Helmet Use % (n)	Chi-square/p value
\$26,583-42,556	24.1% (293)	29.6% (141)	$\chi^2=5.21$ , $p<.05$
\$42,557-54,726	36.4% (245)	41.9% (121)	ns
\$54,727-64,944	34.9% (240)	48.1% (168)	$\chi^2=16.90$ , $p<.0001$
\$64,945-83,654	48.0% (316)	46.1% (106)	ns
Total	33.8% (1,094)	39.9% (536)	

*Bicycle Helmet Use by Community Area*

The 12 Community Areas were assessed for changes in helmet use from 2010 to 2011. Significant increases in helmet use were found

for St. Vital and Downtown while Point Douglas experienced a significant reduction in bike helmet use.

**Table 11. Bike Helmet Use Rates by Community Area, Year and Time Period**

Community Area	Bike Helmet Use Pre-Event 2010	Bike Helmet Use Post-Event 2010	Bike Helmet Use 2011	Chi-squared Test Post10-2011
1 –St James Assiniboia	30.0%	33.9%	48.3%	NS*
2 – Assiniboine South	44.6%	50.2%	43.8%	NS
3 – Fort Garry	43.8%	54.5%	53.5%	NS
4 – St. Vital	40.0%	42.6%	59.7%	X <sup>2</sup> =4.87 P<.027
5 – St. Boniface	55.2%	35.1%	28.6%	NS
6 – Transcona	10.2%	25.0%	32.3%	NS
7 – River East	30.9%	31.2%	19.2%	NS
8 – Seven Oaks	22.2%	24.8%	26.1%	NS
9 - Inkster	10.4%	19.4%	45.5%	NS
10 – Point Douglas	5.6%	15.0%	3.8%	X <sup>2</sup> =9.82 P<.002
11 – Downtown	28.8%	29.2%	39.8%	X <sup>2</sup> =9.36 P<.003
12 – River Heights	34.5%	52.4%	57.9%	NS

NS=non-significant

The Community Areas were grouped into categories resulting in low, mid and high. These were compared for

changes in helmet use across 2010-2011. There was a significant increase in helmet use for the mid group.

CA category	2010	2011	Chi-sq
<b>LOW (CA 6,8,9,10)</b>	16.5% (123)	16.8% (42)	ns
MID (CA 1,5,7,11)	30.9% (408)	36.5% (190)	$\chi^2=5.26, p<.05$
HIGH (CA 2,3,4,12)	48.1% (563)	53.0% (304)	Close $p=.0574$ ns

Finally, the at-risk Community Areas of Point Douglas, Downtown and Transcona were grouped together to

assess changes in helmet use from 2010-2011. Here, a significant increase in helmet use was observed.

	2010	2011	Chi-sq
<b>CA - PD, D, T</b>	23.45% (283)	29.81 (155)	$\chi^2=7.77, p<.001$

# Summary and Conclusions

## Helmet Use Trends

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Helmet use has increased by about 1% per year over the past 15 years.

Helmet use is lowest among youth (ages 12-19), although the number of teen helmet wearers has increased significantly since 1996.

Cyclists observed in high poverty/low income areas have significantly lower helmet use.

The disparity between high and low income neighbourhoods persists.

## 2011 Helmet Use

The highest helmet use rates (62%) were observed when adults rode together with children. Children riding with other children had the lowest frequency of helmet use (27%).

Children less than 8 years of age are most likely to wear helmets (63%) while teens are least likely to wear them (22%).

Helmet use is highest at major intersections (51%) and lowest at schools and parks (34%).

There is an inverse relationship between helmet use and socioeconomic with helmet use decreasing as poverty level increases.

Incorrect use of helmets (28%) is still an issue in 2011 although there has been a substantial decrease in incorrect use since 1996 (79%).

The 2011 sample size is smaller than in other years. The impact of this on trends and conclusions is not clear.

# Recommendations

Helmet trend data in this report demonstrate a need to continue to promote helmet use for Winnipeg cyclists of all ages. Helmet use has increased very slightly over time, and remains below 40%. Socioeconomic gaps remain, and are *increasing over time*, indicating a need to expand and build upon strategies directed at these disparities. Helmet use among the youngest cyclists, who have had the highest use consistently over time, appear to have leveled off. Helmet use in adults has also leveled off, indicating a need to consider additional strategies to increase and remain above 40%. Numerous other jurisdictions have experienced a similar trend, with helmet use approaching 40% with a variety of non-legislative strategies. Research has shown that legislation is required to increase rates significantly above this level.<sup>1,2,3</sup> Research has also shown that legislation reduces bicycle-related injuries requiring hospitalization. A Canadian study demonstrated that bicycle-related head injury admissions reduced 45% between 1994 and 1998 in provinces with legislation compared to 27% in provinces and territories without legislation.<sup>4</sup>

Of particular importance is the observation that children riding with adults have the highest helmet use. Promotion of helmet use for the entire family should be a priority objective of any future initiative. This is also supported by research literature that demonstrates the highest helmet use in children accompanied by helmeted adults.<sup>5</sup> Children riding with helmeted adults are nine times more likely to wear a helmet than children riding with non-

helmeted riders; in this study helmet use was 95% for children riding with helmeted adults and 41% for children riding with non-helmeted adults.<sup>5</sup> While all ages legislation has been shown to increase helmet use in adult cyclists,<sup>2</sup> helmet legislation for cyclists less than 18 years of age has increased helmet use only among cyclists in that age group, and not among older cyclists.<sup>6</sup> Self-reported helmet use increases significantly as the comprehensiveness of helmet legislation increases; helmet use was over 70% for respondents with all-ages legislation compared to 40% for those with legislation for children <18 years of age and 27% with no legislation. The impact of legislation was strongest for rural cyclists, who were 22 times more likely to wear a helmet where there was all-ages legislation vs. no legislation.<sup>7</sup> In other words, all ages legislation is required to increase helmet use in adults, which is strongly correlated to helmet use in children.

A successful helmet promotion strategy will also require ongoing and enhanced promotion of helmet use through public education and targeted programs such as low cost helmet distribution and other strategies to address disparities observed in lower income areas. Correct helmet use continues to be an issue and should be an ongoing focus of public education campaigns. Helmet use is one important aspect of a broader safe cycling strategy which should also include evidence-based measures which address road, cyclist, and driver factors. Collaboration with other community and provincial partners will be critical to the success of these strategies.

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