



# TRAFFIC SAFETY FACTS

## MOTORCYCLES, 2012

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In 2012, there were 4,104 collisions involving motorcycles or mopeds in Indiana, a 15.6 percent increase from 2011. Fatal motorcycle collisions increased even more steeply (24.8 percent). Indiana fatal collisions involving motorcycles (146) resulted in 151 fatalities (all motorcycle or moped riders), representing a 28 percent increase in motorcycle fatalities from 2011 to 2012. Based on data from the Indiana Automated Reporting and Information Exchange System (ARIES) as of April 9, 2013, this factsheet summarizes general aspects of motorcycle collisions, selected demographic characteristics of persons involved, license types and status, helmet use, the incidence of alcohol impairment, and geographical locations of collisions.

### PERSONS INVOLVED IN MOTORCYCLE AND MOPED COLLISIONS<sup>1</sup>

The population of persons involved in motorcycle collisions comprises the operators (drivers) and passengers of motorcycles, mopeds, and other vehicles, and non-motorists (other vehicles and non-motorists are combined in this factsheet, unless noted otherwise). There was a 15.8 percent increase in the number of persons involved in motorcycle collisions from 2011 to 2012 (Table 1). More specifically in 2012, there were 151 fatalities from collisions involving motorcycles and mopeds (+28 percent): 112 motorcycle operators (+22 percent), 23 moped operators (+9.5 percent), 15 motorcycle passengers (+275 percent), and 1 moped passenger. There were 3,490 (+20 percent) persons with non-fatal injuries. Moped operators and passengers were the fastest growing individual components of overall motorcycle collisions over both the 2008 to 2012 period and 2011 to 2012.

Although fatality and injury rates do not vary much year-to-year, there are differences among groups involved in motorcycle and moped collisions (Table 2). For the entire 2008 to 2012 period, motorcycles had roughly twice the fatality rates of mopeds: the relative risk (see definitions) of a fatal outcome on a motorcycle is between 1.6 and 2.5 times that of mopeds ( $p < 0.05$ ) (calculated from Table 2). Fatality rates for motorcycle operators have remained stable, averaging 3.6 percent from 2008 to 2012. However, with the large increase in motorcycle passengers killed in 2012, the passenger fatality rate increased from 1.4 percent in 2011 to 4.8 percent in 2012. Other vehicles involved in motorcycle collisions have very low injury rates and rarely experience a fatality.

**Table 1. Persons involved in motorcycle or moped collisions, by person type and injury, 2008-2012**

Injury status and person type	Count of Individuals					Annual rate of change	
	2008	2009	2010	2011	2012	2008-12	2011-12
<b>All persons involved</b>	<b>6,016</b>	<b>5,134</b>	<b>5,524</b>	<b>5,708</b>	<b>6,611</b>	<b>2.4%</b>	<b>15.8%</b>
<b>Motorcycle</b>	<b>3,312</b>	<b>2,758</b>	<b>2,858</b>	<b>2,850</b>	<b>3,187</b>	<b>-1.0%</b>	<b>11.8%</b>
<b>Driver</b>	<b>3,003</b>	<b>2,513</b>	<b>2,553</b>	<b>2,574</b>	<b>2,877</b>	<b>-1.1%</b>	<b>11.8%</b>
Fatal	102	88	93	92	112	2.4%	21.7%
Injured	2,097	1,683	1,736	1,718	1,983	-1.4%	15.4%
Not injured	804	742	724	764	782	-0.7%	2.4%
<b>Passenger</b>	<b>309</b>	<b>245</b>	<b>305</b>	<b>276</b>	<b>310</b>	<b>0.1%</b>	<b>12.3%</b>
Fatal	12	4	10	4	15	5.7%	275.0%
Injured	297	241	295	272	295	-0.2%	8.5%
<b>Moped</b>	<b>792</b>	<b>728</b>	<b>864</b>	<b>959</b>	<b>1,271</b>	<b>12.6%</b>	<b>32.5%</b>
<b>Driver</b>	<b>723</b>	<b>667</b>	<b>785</b>	<b>882</b>	<b>1,144</b>	<b>12.2%</b>	<b>29.7%</b>
Fatal	16	19	7	21	23	9.5%	9.5%
Injured	547	513	611	661	888	12.9%	34.3%
Not injured	160	135	167	200	233	9.9%	16.5%
<b>Passenger</b>	<b>69</b>	<b>61</b>	<b>79</b>	<b>77</b>	<b>127</b>	<b>16.5%</b>	<b>64.9%</b>
Fatal	0	0	0	1	1	--	--
Injured	69	61	79	76	126	16.2%	65.8%
<b>Other vehicles</b>	<b>1,912</b>	<b>1,648</b>	<b>1,802</b>	<b>1,899</b>	<b>2,153</b>	<b>3.0%</b>	<b>13.4%</b>
Fatal	3	2	4	0	0	100%	--
Injured	248	204	204	185	198	-5.5%	7.0%
Not injured	1,661	1,442	1,594	1,714	1,955	4.2%	14.1%

Source: Indiana State Police

**Table 2. Fatality and injury rates for individuals involved in motorcycle or moped collisions, 2008-2012**

Injury status and person type	Percent by injury status					Average, 2008-12
	2008	2008	2010	2011	2012	
<b>Motorcycle</b>						
<b>Driver</b>						
Fatal	3.4%	3.5%	3.6%	3.6%	3.9%	3.6%
Injured	69.8%	67.0%	68.0%	66.7%	68.9%	68.1%
Not injured	26.8%	29.5%	28.4%	29.7%	27.2%	28.3%
<b>Injured passenger</b>						
Fatal	3.9%	1.6%	3.3%	1.4%	4.8%	3.0%
Injured	96.1%	98.4%	96.7%	98.6%	95.2%	97.0%
<b>Moped</b>						
<b>Driver</b>						
Fatal	2.2%	2.8%	0.9%	2.4%	2.0%	2.1%
Injured	75.7%	76.9%	77.8%	74.9%	77.6%	76.6%
Not injured	22.1%	20.2%	21.3%	22.7%	20.4%	21.3%
<b>Injured passenger</b>						
Fatal	0.0%	0.0%	0.0%	1.3%	0.8%	0.4%
<b>Other vehicles</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Fatal	0.2%	0.1%	0.2%	0.0%	0.0%	0.1%
Injured	13.0%	12.4%	11.3%	9.7%	9.2%	11.1%
Not injured	86.9%	87.5%	88.5%	90.3%	90.8%	88.8%

Source: Indiana State Police

Note: Calculated from Table 1.



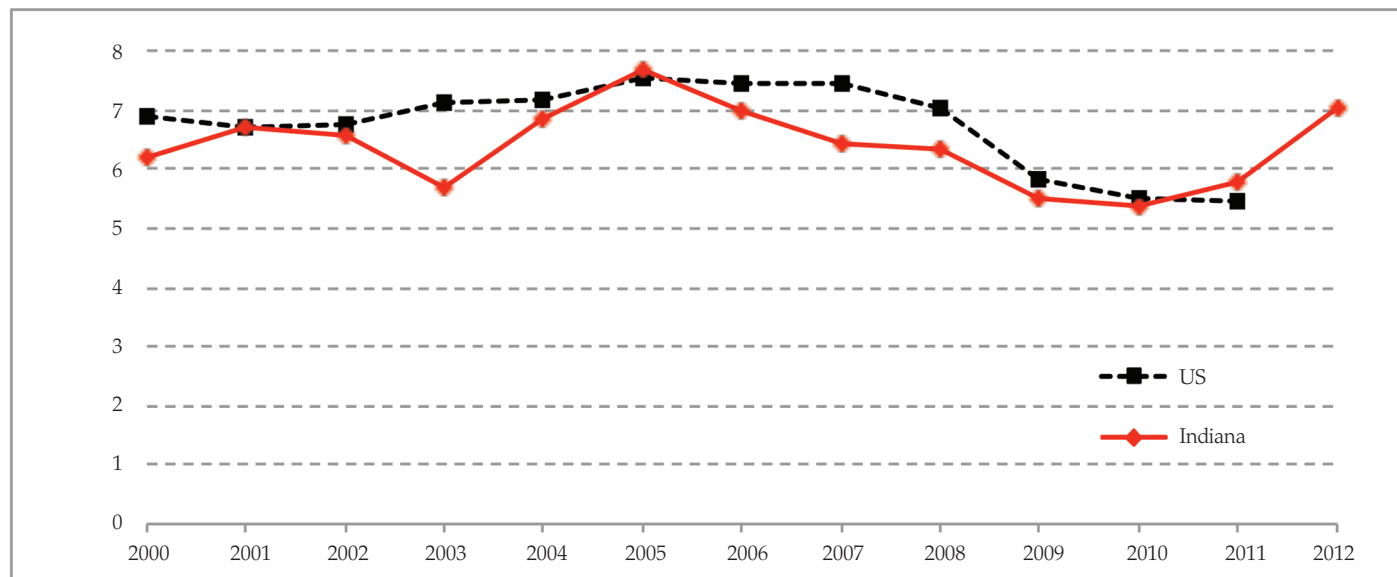


## MOTORCYCLE COLLISIONS

Total collisions involving motorcycles and mopeds remained relatively constant from 2008 to 2012 (Table 3), but there were notable changes by collision severity. From 2011 to 2012, the number of fatal motorcycle collisions increased 25 percent. The largest increase in fatal collisions from 2011 to 2012 was in the multi-vehicle category (+32 percent, from 63 to 83). In 2012, multi-vehicle collision injury rates (81 percent) were lower than single-vehicle rates (63 percent), mostly because lesser or no injuries occur among occupants of other vehicles in multi-vehicle motorcycle collisions.

Measured in terms of fatal collision-involved motorcycles per 10,000 registered motorcycles, Indiana generally paralleled US rates from 2000 to 2010 (Figure 1—note U.S. FARS data for 2012 are unavailable). The state motorcycle fatality rate dropped from 2005 to 2010, and differences between Indiana and U.S. rates narrowed. By 2010, Indiana and U.S. fatality rates were almost the same. However, since 2010, the rate of fatal collision-involved motorcycles among registered motorcycles reported for Indiana climbed steeply, from 5.4 in 2010 to 7.1 in 2012.<sup>2</sup>

**Figure 1. Motorcycles involved in fatal collisions per 10,000 motorcycle registrations, 2000-2012**



Sources: Fatality Analysis Reporting System (2000-2011); Indiana State Police (2012); Indiana Bureau of Motor Vehicles

Notes:  
 FARS data not available for 2012.  
 Indiana BMV 2012 data not available. The 2012 estimate for Indiana motorcycle registrations is based on 2007-2011 linear trend.

**Table 3. Collisions involving motorcycles, by collision severity and vehicles involved, 2008-2012**

Collision type and severity	2008	2009	2010	2011	2012	Annual rate of change	
						2008-12	2011-12
<b>All collisions</b>	<b>3,822</b>	<b>3,276</b>	<b>3,429</b>	<b>3,551</b>	<b>4,104</b>	<b>1.8%</b>	<b>15.6%</b>
Fatal	125	111	110	117	146	4.0%	24.8%
Injury	2,646	2,224	2,410	2,421	2,892	2.2%	19.5%
Property damage	1,051	941	909	1,013	1,066	0.4%	5.2%
<b>Single vehicle</b>	<b>1,794</b>	<b>1,493</b>	<b>1,557</b>	<b>1,566</b>	<b>1,768</b>	<b>-0.4%</b>	<b>12.9%</b>
Fatal	53	48	49	54	63	4.4%	16.7%
Injury	1,423	1,162	1,236	1,231	1,427	0.1%	15.9%
Property damage	318	283	272	281	278	-3.3%	-1.1%
<b>Multi-vehicle</b>	<b>2,028</b>	<b>1,783</b>	<b>1,872</b>	<b>1,985</b>	<b>2,336</b>	<b>3.6%</b>	<b>17.7%</b>
Fatal	72	63	61	63	83	3.6%	31.7%
Injury	1,223	1,062	1,174	1,190	1,465	4.6%	23.1%
Property damage	733	658	637	732	788	1.8%	7.7%
<b>Fatal collision as % total</b>							
Single vehicle	3.0%	3.2%	3.1%	3.4%	3.6%		
Multi-vehicle	3.6%	3.5%	3.3%	3.2%	3.6%		
<b>Injury collision as % total</b>							
Single vehicle	79.3%	77.8%	79.4%	78.6%	80.7%		
Multi-vehicle	60.3%	59.6%	62.7%	59.9%	62.7%		

Source: Indiana State Police

Notes:  
 Motorcycles includes mopeds.  
 Multi-vehicle collision includes other vehicles and non-motorists.

## GENDER AND AGE<sup>3</sup>

Far more males than females are involved in Indiana motorcycle collisions—in 2012, 85 percent of 4,451 collision-involved motorcycle riders were males (calculated from Table 4). Overall, the number of male motorcycle *riders* in crashes increased 18 percent in 2012. Although the number of male motorcycle *operators* in all collisions increased about 2.3 percent annually from 2008 to 2012, it jumped nearly 18 percent from 2011 to 2012. The number of male operators *killed* increased 23.9 per-

cent. The number of collision-involved female operators was generally stable during this period, and remained about the same from 2011 to 2012. However, the number of male and female *passengers* involved in collisions increased by 33 percent and 21 percent, respectively, from 2011 to 2012. During 2008 to 2012, fatality rates for female operators and male operators did not differ statistically. Conversely, relative to male operators, female motorcycle operators are about 20 percent more likely to suffer an injury ( $p < 0.05$ ) (calculated from Table 5).

**Table 4. Injury status of motorcycle and moped riders, by gender and person type, 2008-2012**

Person type and injury status	2008	2009	2010	2011	2012	Annual rate of change	
						2008-12	2011-12
<b>All riders</b>							
<b>Male</b>	<b>3,463</b>	<b>2,967</b>	<b>3,122</b>	<b>3,221</b>	<b>3,802</b>	<b>2.4%</b>	<b>18.0%</b>
Fatal	113	100	99	109	135	4.5%	23.9%
Injured	2,453	2,042	2,177	2,196	2,714	2.6%	23.6%
Not injured	897	825	846	916	953	1.5%	4.0%
<b>Female</b>	<b>637</b>	<b>515</b>	<b>599</b>	<b>587</b>	<b>649</b>	<b>0.5%</b>	<b>10.6%</b>
Fatal	16	11	11	9	16	0.0%	77.8%
Injured	541	444	535	522	562	1.0%	7.7%
Not injured	80	60	53	56	71	-2.9%	26.8%
<b>Operators only</b>							
<b>Male</b>	<b>3,385</b>	<b>2,910</b>	<b>3,044</b>	<b>3,146</b>	<b>3,702</b>	<b>2.3%</b>	<b>17.7%</b>
Fatal	113	100	96	109	135	4.5%	23.9%
Injured	2,387	1,992	2,110	2,124	2,620	2.4%	23.4%
Not injured	885	818	838	913	947	1.7%	3.7%
<b>Female</b>	<b>337</b>	<b>266</b>	<b>293</b>	<b>310</b>	<b>314</b>	<b>-1.8%</b>	<b>1.3%</b>
Fatal	4	7	4	4	0	-100.0%	-100.0%
Injured	256	204	237	255	250	-0.6%	-2.0%
Not injured	77	55	52	51	64	-4.5%	25.5%
<b>Injured passengers</b>							
<b>Male</b>	<b>78</b>	<b>57</b>	<b>78</b>	<b>75</b>	<b>100</b>	<b>6.4%</b>	<b>33.3%</b>
Fatal	0	0	3	0	0	--	--
Injured	78	57	75	75	100	6.4%	33.3%
<b>Female</b>	<b>300</b>	<b>249</b>	<b>306</b>	<b>277</b>	<b>335</b>	<b>2.8%</b>	<b>20.9%</b>
Fatal	12	4	7	5	16	7.5%	220.0%
Injured	288	245	299	272	319	2.6%	17.3%

Source: Indiana State Police

Note: Excludes cases where *gender* or *injury status* was unknown.

**Table 5. Fatal and non-fatal injury proportions, by person type and gender, 2008-2012**

Person type and injury status	2008	2009	2010	2011	2012
<b>Fatality rates</b>					
Male operators	3.3%	3.4%	3.2%	3.5%	3.6%
Female operators	1.2%	2.6%	1.4%	1.3%	0.0%
Male passengers	--	--	3.8%	--	--
Female passengers	4.0%	1.6%	2.3%	1.8%	4.8%
<b>Injury rates</b>					
Male operators	70.5%	68.5%	69.3%	67.5%	70.8%
Female operators	76.0%	76.7%	80.9%	82.3%	79.6%

Source: Indiana State Police

Notes:

Columns (by person type) will not add to 100% because *not injured* is excluded. Calculated from Table 4.

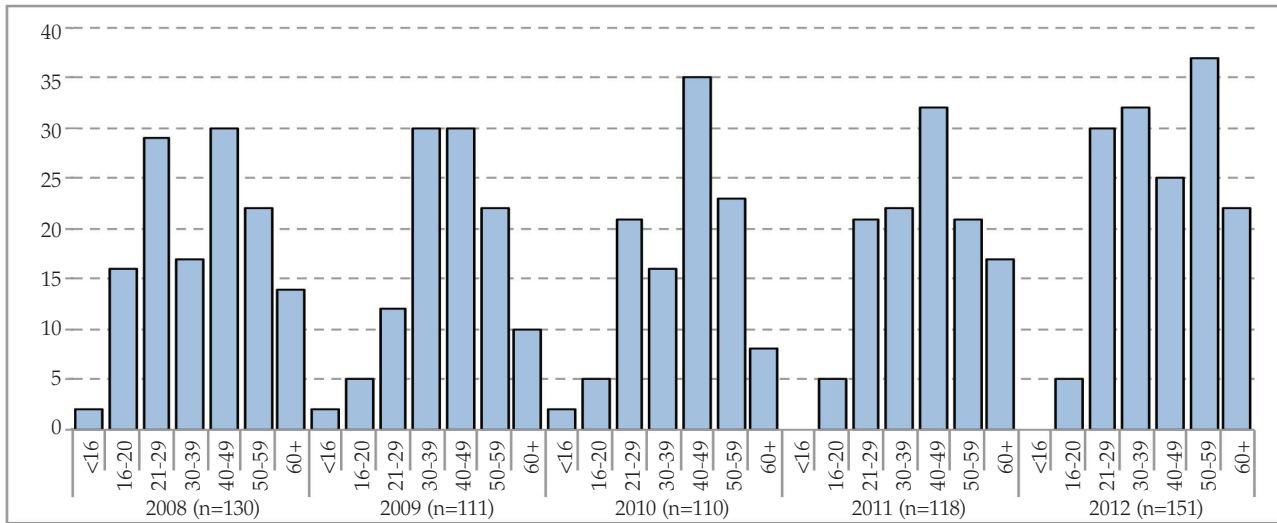


# INDIANA TRAFFIC SAFETY FACTS

Thirty-three more motorcycle and moped riders died in 2012 than in 2011. Of the 33 fatalities added in 2012, 21 were 50 years or older (calculated from Figure 2). This is part of a broader trend from 2008 to 2012, in which the share of fatalities represented by the 50 years and older age cohorts increased from 27.7 percent to 39.1 percent. Individuals in the oldest age groups are responsible for an increasing proportion of fatal motorcycle collisions. Nonetheless, younger age cohorts have also experienced steep increases—for instance, from 2010 to 2012, fatalities for the 30-39 age group doubled (from 16 to 32).

Further, the pattern of fatality rates per 100 motorcyclists involved reflects an underlying positive relationship between age and fatality rates (Figure 3). Fatality rates generally increased with the age categories, with the highest fatality rates in the 60 years and above age cohorts in 2008, 2011, and 2012. Overall, the general growth in fatalities since 2010 seems linked to an increase in motorcycle fatalities among the 50 years and older age cohorts.

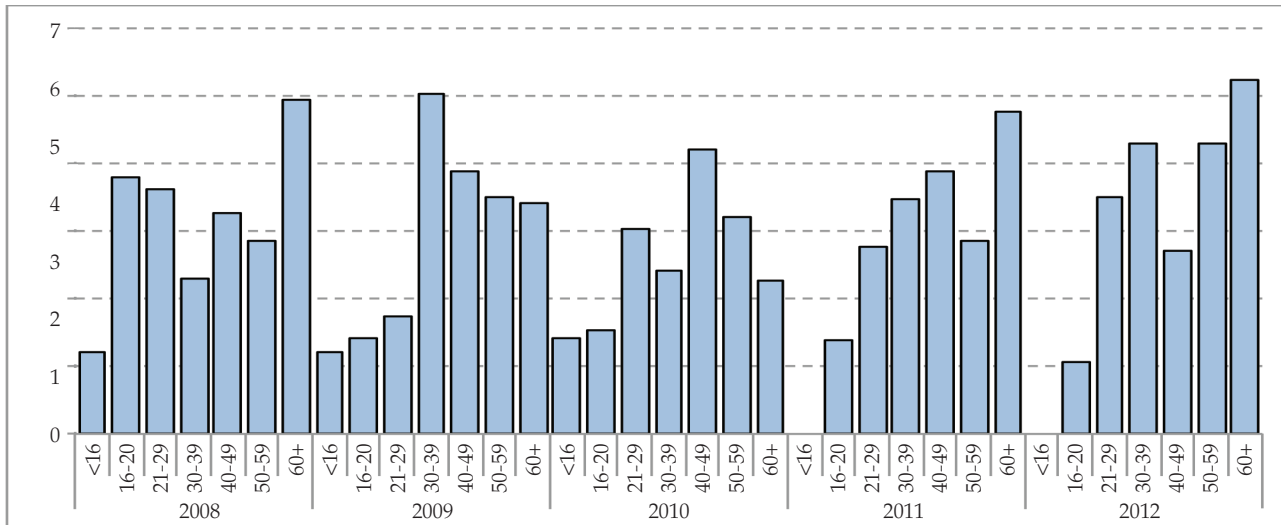
**Figure 2. Count of motorcyclists killed, by age, 2008-2012**



Source: Indiana State Police

Note: Motorcycles includes moped riders.

**Figure 3. Fatality rate per 100 motorcyclists involved, by age, 2008-2012**



Source: Indiana State Police

Note: Motorcycles includes moped riders.

# LICENSING IN MOTORCYCLE COLLISIONS

ARIES data collected at collision sites include the operator license type reported for the drivers involved. Generally, the types of driver's licenses reported for motorcycle operators differed from moped operators in several ways (Table 6). From 2008 to 2012, collision-involved motorcycle operators with proper motorcycle endorsements comprised slightly less than two-thirds of all motorcycle operators involved, and about 95 percent of collision-involved motorcycle operators had a valid license of

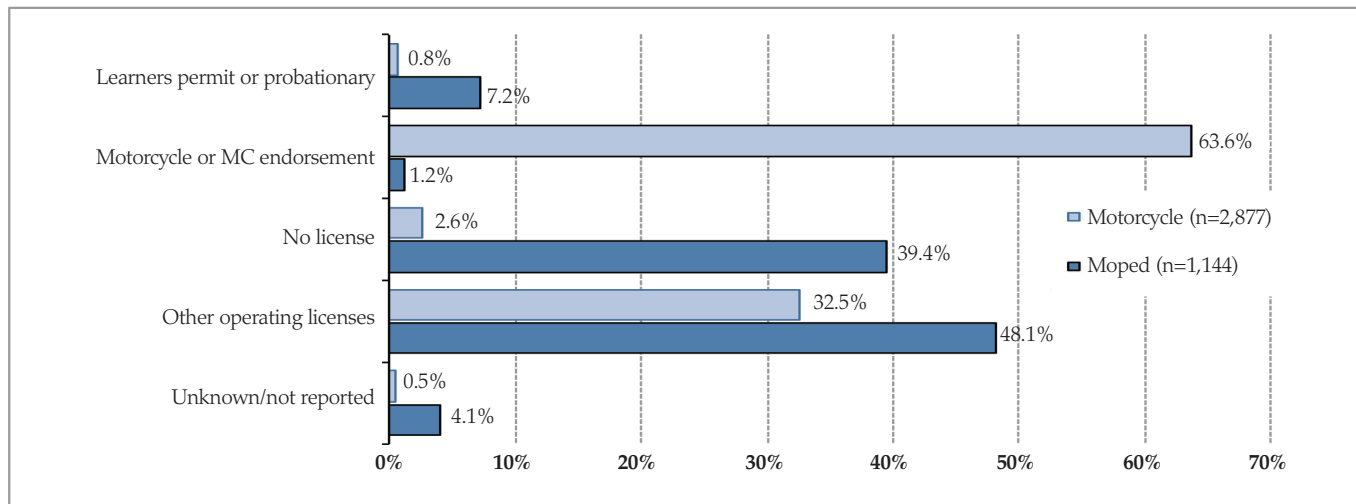
some type. This was not so with Indiana moped operators—from 2008 to 2012, about 40 percent of collision-involved moped operators reported no licensing at all. The number of unlicensed moped operators involved in collisions increased about 12 percent annually from 2008 to 2012. In 2012, 39 percent of collision-involved moped operators reported no license, consistent with the five-year average (Figure 4). Fewer than 2 percent of moped operators typically had a *motorcycle* license. The number of moped operators involved in collisions increased 30 percent from 2011 to 2012. Moped operators are an increasing percentage of all collision-involved operators.

**Table 6. License type of motorcycle and moped operators involved in collisions, 2008-2012**

	2008	2009	2010	2011	2012	Annual rate of change	
						2008-12	2011-12
<b>All operators</b>	<b>3,726</b>	<b>3,180</b>	<b>3,338</b>	<b>3,456</b>	<b>4,021</b>	<b>1.9%</b>	<b>16.3%</b>
<b>Motorcycle</b>	<b>3,003</b>	<b>2,513</b>	<b>2,553</b>	<b>2,574</b>	<b>2,877</b>	<b>-1.1%</b>	<b>11.8%</b>
Motorcycle or MC endorsement	1,858	1,593	1,636	1,590	1,831	-0.4%	15.2%
Other operating license	1,048	832	851	893	935	-2.8%	4.7%
No license	63	57	46	73	75	4.5%	2.7%
Learners permit/probationary	21	19	13	12	22	1.2%	83.3%
Unknown/not reported	13	12	7	6	14	1.9%	133.3%
<b>Moped</b>	<b>723</b>	<b>667</b>	<b>785</b>	<b>882</b>	<b>1,144</b>	<b>12.2%</b>	<b>29.7%</b>
Motorcycle or MC endorsement	8	14	13	8	14	15.0%	75.0%
Other operating license	348	287	348	423	550	12.1%	30.0%
No license	283	284	331	366	451	12.4%	23.2%
Learners permit/probationary	37	42	49	49	82	22.0%	67.3%
Unknown/not reported	47	40	44	36	47	0.0%	30.6%
<b>Moped as percent all operators</b>	<b>19.4%</b>	<b>21.0%</b>	<b>23.5%</b>	<b>25.5%</b>	<b>28.5%</b>		
<b>Percent by license type</b>							
<b>Motorcycle</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>		
Motorcycle or MC endorsement	61.9%	63.4%	64.1%	61.8%	63.6%		
Other operating license	34.9%	33.1%	33.3%	34.7%	32.5%		
No license	2.1%	2.3%	1.8%	2.8%	2.6%		
Learners permit/probationary	0.7%	0.8%	0.5%	0.5%	0.8%		
Unknown/not reported	0.4%	0.5%	0.3%	0.2%	0.5%		
<b>Moped</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>		
Motorcycle or MC endorsement	1.1%	2.1%	1.7%	0.9%	1.2%		
Other operating license	48.1%	43.0%	44.3%	48.0%	48.1%		
No license	39.1%	42.6%	42.2%	41.5%	39.4%		
Learners permit/probationary							
Unknown/not reported	6.5%	6.0%	5.6%	4.1%	4.1%		

Source: Indiana State Police

**Figure 4. Percentage of motorcycle and moped operators involved in collisions, by license type, 2012**



Source: Indiana State Police



## HELMET USE

From 2008 to 2012, the rate of helmet use among *motorcycle* riders involved in collisions was roughly one in three (Table 7). Among *moped* riders, helmet use was consistently less than 2 percent, although the rate jumped to 9 percent in 2012. Helmet use among motorcycle operators fatally injured was 22 percent in 2012, and less than 5 percent among

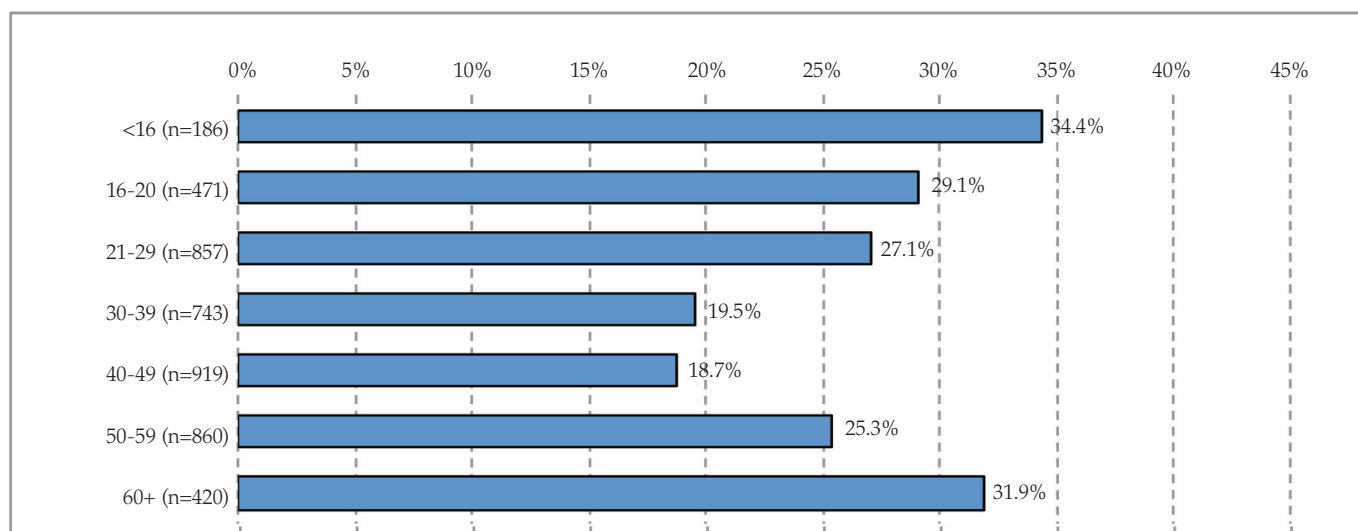
moped operators. The highest rate of helmet use in 2012 (34 percent) was among riders under 16 years of age; conversely, this means two-thirds of those under 16 years did not report a helmet in 2012 collisions, despite Indiana law (IC 9-19-7-1) that requires motorcycle riders 17 years and under to wear helmets (Figure 5). The lowest rates of helmet use in motorcycle collisions in 2012 were in the 30-39 and 40-49 age cohorts.

**Table 7. Helmet use for motorcycle and moped riders in Indiana collisions, by vehicle type, 2008-2012**

Helmet use	2008	2009	2010	2011	2012	Annual rate of change	
						2008-12	2011-12
<b>All injuries</b>							
<b>Motorcycles</b>	<b>3,312</b>	<b>2,758</b>	<b>2,858</b>	<b>2,850</b>	<b>3,187</b>	<b>-1.0%</b>	<b>11.8%</b>
Helmet reported	1,168	975	980	967	982	-4.2%	1.6%
% helmet	35.3%	35.4%	34.3%	33.9%	30.8%	-3.3%	-9.2%
<b>Mopeds</b>	<b>792</b>	<b>728</b>	<b>864</b>	<b>959</b>	<b>1,271</b>	<b>12.6%</b>	<b>32.5%</b>
Helmet reported	14	12	6	14	120	71.1%	757.1%
% helmet	1.8%	1.6%	0.7%	1.5%	9.4%	52.0%	546.7%
<b>Total</b>	<b>4,104</b>	<b>3,486</b>	<b>3,722</b>	<b>3,809</b>	<b>4,458</b>	<b>2.1%</b>	<b>17.0%</b>
% helmet	28.8%	28.3%	26.5%	25.8%	24.7%	-3.7%	-4.0%
<b>Fatal injuries</b>							
<b>Motorcycle</b>	<b>114</b>	<b>92</b>	<b>103</b>	<b>96</b>	<b>127</b>	<b>2.7%</b>	<b>32.3%</b>
Helmet reported	31	21	18	17	28	-2.5%	64.7%
% helmet	27.2%	22.8%	17.5%	17.7%	22.0%	-5.1%	24.5%
<b>Moped</b>	<b>16</b>	<b>19</b>	<b>7</b>	<b>22</b>	<b>24</b>	<b>10.7%</b>	<b>9.1%</b>
Helmet reported	0	0	0	1	1	--	--
% helmet	0%	0%	0%	0%	4.2%	--	--
<b>Total</b>	<b>130</b>	<b>111</b>	<b>110</b>	<b>118</b>	<b>151</b>	<b>3.8%</b>	<b>28.0%</b>
% helmet	23.8%	18.9%	16.4%	15.3%	19.2%	-5.3%	25.9%

Source: Indiana State Police

**Figure 5. Percent helmet use reported for motorcyclists involved in collisions, by age of rider, 2012**



Source: Indiana State Police

Notes:  
Cases with unknown helmet use are classified as no helmet use.  
Cases with unknown age are excluded.  
Motorcycle and moped riders are combined in this figure.



Male and female motorcycle riders involved in collisions had similar reported rates of helmet use during the 2008 to 2012 period (Table 8). Roughly 25 percent of female and male motorcycle and moped riders in collisions were classified as using helmets. Considering all motorcycle and moped riders involved in collisions from 2008 to 2012 in Indiana, rid-

ers were typically less likely to suffer fatal injuries when wearing helmets (Table 9). Unhelmeted *males* were 1.7 times more likely to be killed in collisions than helmeted males ( $p < 0.05$ ). However, there was no significant statistical difference between the fatality rates of unhelmeted and helmeted *female* riders.

**Table 8. Helmet use for motorcycle and moped riders in crashes, by gender, 2008-2012**

All riders	2008	2009	2010	2011	2012	Annual rate of change	
						2008-12	2011-12
<b>Male</b>	<b>3,463</b>	<b>2,967</b>	<b>3,122</b>	<b>3,221</b>	<b>3,802</b>	<b>2.4%</b>	<b>18.0%</b>
Helmet reported	1,000	854	834	830	941	-1.5%	13.4%
% helmet	28.9%	28.8%	26.7%	25.8%	24.8%	-3.8%	-4.0%
<b>Female</b>	<b>637</b>	<b>515</b>	<b>599</b>	<b>587</b>	<b>649</b>	<b>0.5%</b>	<b>10.6%</b>
Helmet reported	181	132	152	150	160	-3.0%	6.7%
% helmet	28.4%	25.6%	25.4%	25.6%	24.7%	-3.5%	-3.5%
<b>Operators only</b>							
<b>Male</b>	<b>3,385</b>	<b>2,910</b>	<b>3,044</b>	<b>3,146</b>	<b>3,702</b>	<b>2.3%</b>	<b>17.7%</b>
Helmet reported	989	843	819	813	918	-1.8%	12.9%
% helmet	29.2%	29.0%	26.9%	25.8%	24.8%	-4.0%	-4.0%
<b>Female</b>	<b>337</b>	<b>266</b>	<b>293</b>	<b>310</b>	<b>314</b>	<b>-1.8%</b>	<b>1.3%</b>
Helmet reported	105	78	84	94	88	-4.3%	-6.4%
% helmet	31.2%	29.3%	28.7%	30.3%	28.0%	-2.6%	-7.6%

Source: Indiana State Police

**Table 9. Injury status of motorcycle and moped riders involved in Indiana collisions, by helmet use and gender, 2008-2012**

All riders	Fatal	Injured	Not injured	Total
<b>Overall (n=17,852)</b>	<b>3.3%</b>	<b>73.5%</b>	<b>23.2%</b>	<b>100%</b>
No helmet (n=12,614)	3.8%	74.7%	21.5%	100%
Helmet reported (n=5,238)	2.2%	70.6%	27.2%	100%
<b>Male (n=15,129)</b>	<b>3.4%</b>	<b>69.4%</b>	<b>27.2%</b>	<b>100%</b>
No helmet (n=10,670)	4.0%	72.1%	23.9%	100%
Helmet reported (n=4,459)	2.4%	67.8%	29.9%	100%
<b>Female (n=2,717)</b>	<b>1.3%</b>	<b>79.1%</b>	<b>19.7%</b>	<b>100%</b>
No helmet (n=1,942)	2.6%	88.9%	8.5%	100%
Helmet reported (n=775)	1.4%	86.8%	11.7%	100%
<b>Relative risk (RR) of fatality (no helmet/helmet)</b>				
Riders by gender	RR	Lower limit	Upper limit	
Overall	1.68	1.38	2.05*	
Male	1.69	1.37	2.08*	
Female	1.81	0.95	3.47 (ns)	

Source: Indiana State Police

**Notes:**

\* RR is statistically significant,  $p < 0.05$ .

ns = not significant

Male and female totals will not sum to overall totals due to the exclusion of unknown gender, unknown injury, or unknown helmet use from relevant categories.



## ALCOHOL INVOLVEMENT

From 2008 to 2012, the numbers of impaired motorcycle and moped operators (i.e., operators with a blood alcohol content [BAC] of 0.08 grams per deciliter [g/dL] or greater) involved in collisions generally increased at about 19 percent per year (Table 10). The percentage of all operators classified as impaired has also increased—the rate nearly doubled (2.8 to 5.2 percent) from 2008 to 2012. Considering all collisions, impaired operators comprised an average of about 4 percent for motorcycles and 6 percent of mopeds (calculated from Table 10). In 2012, 23 percent of motorcycle operator fatalities were classified impaired (down from 35 percent in 2011), compared to 26 percent of moped operator fatalities.

When examined in terms of BAC among motorcycle and moped operators killed in collisions, the number of operators classified with a BAC of 0.08 g/dL or greater grew about 4 percent annually from 2008 to 2012 (Table 11). Indiana law calls for drivers involved in serious bodily injury collisions to be tested for alcohol (see IC 9-30-7-3a). Notwithstanding this section of state law, however, the percentage of fatalities tested ranged from about 46 percent in 2009 to 66 percent in 2011, and the rate dropped to 61 percent in 2012. Considering only those tested, the percentage of (killed) operators with 0.08 g/dL or greater drifted upward from 2008 to 2011 to nearly 51 percent in 2011, then dropped to under 40 percent in 2012.<sup>4</sup>

**Table 10. Operators involved in collisions, by alcohol impairment and injury status, 2008-2012**

Operators by alcohol and injury status	2008	2009	2010	2011	2012	Annual rate of change	
						2008-12	2012-12
<b>Unimpaired</b>	<b>3,622</b>	<b>3,045</b>	<b>3,178</b>	<b>3,276</b>	<b>3,812</b>	<b>1.3%</b>	<b>16.4%</b>
<b>Motorcycle</b>	<b>2,934</b>	<b>2,415</b>	<b>2,451</b>	<b>2,450</b>	<b>2,736</b>	<b>-1.7%</b>	<b>11.7%</b>
Fatal	81	69	71	60	86	1.5%	43.3%
Injured	2,059	1,627	1,665	1,641	1,892	-2.1%	15.3%
Not injured	794	719	715	749	758	-1.2%	1.2%
<b>Moped</b>	<b>688</b>	<b>630</b>	<b>727</b>	<b>826</b>	<b>1,076</b>	<b>11.8%</b>	<b>30.3%</b>
Fatal	10	18	5	15	17	14.2%	13.3%
Injured	525	481	562	620	835	12.3%	34.7%
Not injured	153	131	160	191	224	10.0%	17.3%
<b>Impaired</b>	<b>104</b>	<b>135</b>	<b>160</b>	<b>180</b>	<b>209</b>	<b>19.1%</b>	<b>16.1%</b>
<b>Motorcycle</b>	<b>69</b>	<b>98</b>	<b>102</b>	<b>124</b>	<b>141</b>	<b>19.6%</b>	<b>13.7%</b>
Fatal	21	19	22	32	26	5.5%	-18.8%
Injured	38	56	71	77	91	24.4%	18.2%
Not injured	10	23	9	15	24	24.5%	60.0%
<b>Moped</b>	<b>35</b>	<b>37</b>	<b>58</b>	<b>56</b>	<b>68</b>	<b>18.1%</b>	<b>21.4%</b>
Fatal	6	1	2	6	6	0.0%	0.0%
Injured	22	32	49	41	53	24.6%	29.3%
Not injured	7	4	7	9	9	6.5%	0.0%
<b>% impaired — overall</b>	<b>2.8%</b>	<b>4.2%</b>	<b>4.8%</b>	<b>5.2%</b>	<b>5.2%</b>		
Motorcycle	2.3%	3.9%	4.0%	4.8%	4.9%		
Moped	4.8%	5.5%	7.4%	6.3%	5.9%		
<b>% impaired — fatal injuries</b>	<b>22.9%</b>	<b>18.7%</b>	<b>24.0%</b>	<b>33.6%</b>	<b>23.7%</b>		
Motorcycle	20.6%	21.6%	23.7%	34.8%	23.2%		
Moped	37.5%	5.3%	28.6%	28.6%	26.1%		

Source: Indiana State Police

**Table 11. Motorcycle and moped operators killed in collisions, by blood alcohol content, 2008-2012**

BAC (g/dL) range	2008	2009	2010	2011	2012	Annual rate of change	
						2008-2012	2011-12
<b>Operators killed</b>	<b>118</b>	<b>107</b>	<b>100</b>	<b>113</b>	<b>135</b>	<b>3.4%</b>	<b>19.5%</b>
Not reported or no test	42	58	44	38	53	6.0%	39.5%
0	44	21	29	32	45	0.6%	40.6%
0.01 < 0.08	5	8	3	5	5	0.0%	0.0%
0.08 < 0.15	12	11	10	13	12	0.0%	-7.7%
0.15+	15	9	14	25	20	7.5%	-20.0%
<b>Operators with 0.08 +</b>	<b>27</b>	<b>20</b>	<b>24</b>	<b>38</b>	<b>32</b>	<b>4.3%</b>	<b>-15.8%</b>
<b>% with reported results</b>	<b>64.4%</b>	<b>45.8%</b>	<b>56.0%</b>	<b>66.4%</b>	<b>60.7%</b>		
<b>% 0.08 or higher (of all reported results)</b>	<b>35.5%</b>	<b>40.8%</b>	<b>42.9%</b>	<b>50.7%</b>	<b>39.0%</b>		

Source: Indiana State Police



## GEOGRAPHY AND LOCATION

ARIES has traditionally classified collisions as *urban* or *rural*, based on whether a collision was within the *incorporated limits* of a municipality. By this criterion, the majority of fatal motorcycle collisions were classified as *rural* from 2009 through 2012. Since 2008, motorcycle collisions involving non-fatal injuries ranged from 60 percent to 66 percent *urban* in 2012 (Table 12).

When the state of Indiana is divided into *urban*, *suburban*, *exurban*, and *rural* categories (based on 2010 U.S. Census definitions of urban places) reflecting a continuum of population density, roughly 70 to 75 percent of fatal collisions occurred in urban and suburban locations.<sup>5</sup> In 2012, only about 14 percent of fatal crashes were located in purely rural areas (i.e., areas five or more miles away from the outer boundaries of U.S. Census-defined urban areas). Thus, most fatal and injury collisions involving

motorcycles occurred within urban and suburban areas. In 2011 and 2012, about 80 percent of non-fatal injury collisions occurred in urban and suburban areas.

Indiana counties vary in their rates of motorcycle and moped collisions as a percentage of total collisions in the county (Map 1). Large population counties tend to have lower (overall) motorcycle collision rates (e.g., Marion or Lake). Counties with the highest overall motorcycle collision rates in 2012 were located in the southern half of Indiana. Point-level patterns of fatal collisions were distributed less systematically among various areas within the state in 2012, although it is possible to identify clusters in various counties (e.g., Lake, Allen, Porter, Lawrence, Madison, Delaware). In contrast, several counties with the highest rates of motorcycle-involved collisions had no fatal motorcycle collisions (e.g., Brown, Dubois, Fayette, Howard, Knox, Martin, Perry, Pike, Posey, Switzerland, Wabash, Wayne).

**Table 12. Collisions involving motorcycles or mopeds, by severity and location, 2008-2012**

Collisions by location	2008	2009	2010	2011	2012
<b>Incorporated limits</b>					
<b>Fatal</b>	<b>125</b>	<b>111</b>	<b>110</b>	<b>117</b>	<b>146</b>
Urban	52.0%	42.3%	49.1%	40.2%	47.3%
Rural	48.0%	57.7%	50.9%	59.0%	52.7%
Unknown	0.0%	0.0%	0.0%	0.9%	0.0%
<b>Non-fatal</b>	<b>3,697</b>	<b>3,165</b>	<b>3,319</b>	<b>3,434</b>	<b>3,958</b>
Urban	60.4%	63.1%	62.8%	64.5%	66.3%
Rural	39.5%	36.8%	37.1%	35.5%	33.6%
Unknown	0.1%	0.1%	0.1%	0.1%	0.2%
<b>Locality</b>					
<b>Fatal</b>	<b>125</b>	<b>111</b>	<b>110</b>	<b>117</b>	<b>146</b>
Urban	56.8%	45.0%	50.9%	49.6%	49.3%
Suburban	20.8%	27.0%	17.3%	20.5%	25.3%
Exurban	9.6%	9.0%	7.3%	9.4%	9.6%
Rural	12.0%	16.2%	16.4%	15.4%	13.7%
Unknown	0.8%	2.7%	8.2%	5.1%	2.1%
<b>Non-fatal</b>	<b>3,697</b>	<b>3,165</b>	<b>3,319</b>	<b>3,434</b>	<b>3,958</b>
Urban	62.5%	64.2%	61.5%	66.4%	67.5%
Suburban	14.7%	12.9%	13.1%	13.4%	13.6%
Exurban	7.4%	6.2%	7.4%	6.3%	6.5%
Rural	9.4%	9.5%	9.9%	9.5%	7.9%
Unknown	6.1%	7.2%	8.1%	4.4%	4.5%

Sources: Indiana State Police; U.S. Census Bureau



## END NOTES

<sup>1</sup>Please note that the classification of motorized two-wheel vehicles as mopeds or motorcycles is not standardized among Indiana law enforcement, to the extent that some of the variation in moped counts could be because of changing classification practices among police investigators.

<sup>2</sup>Indiana motorcycle registrations for 2012 were estimated based on 2007-2011 Indiana Bureau of Motor Vehicle data.

<sup>3</sup>This section excludes cases where gender, age, or injury status is unknown, unless otherwise noted. In addition, motorcycles and mopeds are combined as a single group.

<sup>4</sup>Note (as shown in Table 11) that the BAC reporting rate in 2012 (61 percent) was lower than 2011 (66 percent), so some reduction in the fatal impairment rate might be linked to a lower reporting in 2012 ARIES data.

<sup>5</sup>The U.S. Census delineation of *urban places* changed in 2010 after the most recent decennial census. ARIES data for 2008 to 2012 are “geotagged” with the 2010 *urban place* boundaries.

## DEFINITIONS

**Alcohol-impaired** — A driver is classified as alcohol-impaired when the driver has a blood alcohol content (BAC) test result at or above 0.08 g/dL.

**Annual Rate of Change (ARC)** — The rate that a beginning value must increase/decrease each period (e.g. month, quarter, year) in a time series to arrive at the ending value in the time series. ARC is a “smoothed” rate of change because it measures change in a variable as if the change occurred at a steady rate each period with compounding. For example, to measure change in a variable from 2008 to 2012, it is calculated as  $(\text{Value in 2012} / \text{Value in 2008})^{1/4} - 1$ .

**Census locality** — *Urban* is defined as Census 2000 Urban Areas, *suburban* as areas within 2.5 miles of urban boundaries, *exurban* as areas within 2.5 miles of suburban boundaries, and *rural* as areas beyond exurban boundaries (i.e., everything else).

**Relative risk (RR)** — ratio of the probability of an outcome (e.g., fatal injury) for one group (e.g., helmeted motorcyclists) to that of another group (e.g., unhelmeted motorcyclists). The RR is statistically significant ( $p < 0.05$ ) if it falls between lower and upper limits that exclude 1.

**Non-fatal injury** — A non-fatal injury includes those reported as incapacitating, non-incapacitating, possible, not reported, unknown, refused (treatment), and invalid injury categories.

## DATA SOURCES

Fatality Analysis Reporting System, National Highway Traffic Safety Administration, current as of March 30, 2013 (see <http://www-fars.nhtsa.dot.gov/Main/index.aspx>).

Indiana Bureau of Motor Vehicles, current as of March 20, 2012.

Indiana State Police Automated Reporting Information Exchange System (ARIES), current as of April 9, 2013.



# TRAFFIC SAFETY FACTS

This publication was prepared on behalf of the Indiana Criminal Justice Institute (ICJI) by the Indiana University Center for Criminal Justice Research (CCJR). Please direct any questions concerning data in this document to ICJI at 317-232-1233.

This publication is one of a series of fact sheets that, along with the annual Indiana Crash Fact Book, form the analytical foundation of traffic safety program planning and design in the state of Indiana. Funding for these publications is provided by ICJI and the National Highway Traffic Safety Administration.

An electronic copy of this document can be accessed via the CCJR website ([www.ccjr.iupui.edu](http://www.ccjr.iupui.edu)), the ICJI website ([www.in.gov/cji/](http://www.in.gov/cji/)), or you may contact the Center for Criminal Justice Research at 317-261-3000.



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## Traffic Safety Project

A collision produces three levels of data: collision, unit (vehicles), and individual. For this reason, readers should pay particular attention to the wording of statements about the data to avoid misinterpretations.

Designing and implementing effective traffic safety policies requires data-driven analysis of traffic collisions. To help in the policy-making process, the Indiana University Center for Criminal Justice Research is collaborating with the Indiana Criminal Justice Institute to analyze 2012 vehicle crash data from the Automated Reporting Information Exchange System (ARIES), maintained by the Indiana State Police. This marks the seventh year of this partnership. Research findings are summarized in a series of fact sheets on various aspects of traffic collisions, including alcohol-related crashes, trucks, dangerous driving, children, motorcycles, occupant protection, and drivers. An additional publication provides information on county and municipality data, and the final publication produced is the annual Indiana Crash Fact Book. These publications serve as the analytical foundation of traffic safety program planning and design in Indiana.

Indiana collision data are obtained from Indiana Crash Reports, as completed by law enforcement officers. As of December 31, 2012, approximately 99 percent of all collisions are entered electronically through ARIES. Trends in collisions incidence as reported in these publications incorporate the effects of changes to data elements on the Crash Report, agency-specific enforcement policy changes, re-engineered roadways, driver safety education programs, and other unspecified effects. If you have questions regarding trends or unexpected results, please contact the Indiana Criminal Justice Institute, Traffic Safety Division for more information.

## The Indiana Criminal Justice Institute

Guided by a Board of Trustees representing all components of Indiana's criminal and juvenile justice systems, the Indiana Criminal Justice Institute serves as the state's planning agency for criminal justice, juvenile justice, traffic safety, and victim services. ICJI develops long-range strategies for the effective administration of Indiana's criminal and juvenile justice systems and administers federal and state funds to carry out these strategies.

## The Governor's Council on Impaired & Dangerous Driving

The Governor's Council on Impaired & Dangerous Driving, a division of the Indiana Criminal Justice Institute, serves as the public opinion catalyst and the implementing body for statewide action to reduce death and injury on Indiana roadways. The Council provides grant funding, training, coordination, and ongoing support to state and local traffic safety advocates.

## Indiana University Public Policy Institute

The Indiana University Public Policy Institute (PPI) is a collaborative, multidisciplinary research institute within the Indiana University School of Public and Environmental Affairs (SPEA), Indianapolis. PPI serves as an umbrella organization for research centers affiliated with SPEA, including the Center for Urban Policy and the Environment and the Center for Criminal Justice Research. PPI also supports the Indiana Advisory Commission on Intergovernmental Relations (IACIR).

## The Center for Criminal Justice Research

The Center for Criminal Justice Research (CCJR), one of two applied research centers currently affiliated with the Indiana University Public Policy Institute, works with public safety agencies and social services organizations to provide impartial applied research on criminal justice and public safety issues. CCJR provides analysis, evaluation, and assistance to criminal justice agencies; and community information and education on public safety questions. CCJR research topics include traffic safety, crime prevention, criminal justice systems, drugs and alcohol, policing, violence and victimization, and youth.

## The National Highway Traffic Safety Administration (NHTSA)

NHTSA provides leadership to the motor vehicle and highway safety community through the development of innovative approaches to reducing motor vehicle crashes and injuries. The mission of NHTSA is to save lives, prevent injuries and reduce economic costs due to road traffic crashes, through education, research, safety standards and enforcement activity.

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