

TBI: Mortality and Nonfatal Hospitalization

Data Analysis Report

Minnesota 2009

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Text Overview

Background: Minnesota is one of only four states funded by the CDC to conduct surveillance of traumatic brain injury (TBI) mortality and hospitalization for the 2005-2009 data period.

Methods: Electronic, centralized discharge data from death certificates, the Minnesota TBI/Trauma Registry and the Minnesota Hospital Association were analyzed using the CDC's TBI case definition. Analysis for this report was limited to Minnesota residents.

Results: In 2009, there were 749 TBI deaths, an adjusted rate of 13.4 per 100,000 population. The number of nonfatal hospitalized (NH) TBIs in 2009 was 5,606, yielding an adjusted rate of 103.2 per 100,000 population. The data show a decrease in the rate of TBI mortality across recent years and a notable increase in the rate of TBI-NH. Comparison with 1993-1997 is difficult because of changes in case identification methods.

The TBI mortality data show a bi-modal curve, with peaks among adolescents/young adults and the elderly. The TBI-NH data show a tri-modal curve, with peaks among the infants, adolescents/young adults, and the elderly. Both the TBI mortality and TBI-NH peaks occur in older adults, with the highest rates among persons age 85 and above (113.9 per 100,000 population for mortality and 551.8 per 100,000 population for TBI-NH). The TBI mortality and TBI-NH rates for males were consistently higher than those for females, with male rates among infants and adolescents/young adults approximately twice that of the female rates. Male TBI mortality rates were approximately 2.5 times that of the female rates for elders 80-84 and male TBI-NH rates were about three times higher than female rates for young adults age 20-39. Some age- and gender-specific TBI mortality rates were not calculated due to small numbers.

The leading causes of TBI mortality were unintentional falls, firearms, especially self-inflicted, and motor vehicle traffic (MVT). The leading causes of TBI-NH were unintentional falls, MVT, and assault. TBI deaths from firearms were concentrated around middle-aged adults, while MVT fatalities were most prevalent in teens and young adults and unintentional fall deaths most often occurred in older adults. For TBI-NH, unintentional fall rates showed a bi-modal curve with the highest rates among older adults 65 years and above with a smaller peak in infants age < 1. MVT and assault TBI-NH rates were highest for adolescents/young adults, ages 15-24 for MVT and for assault.

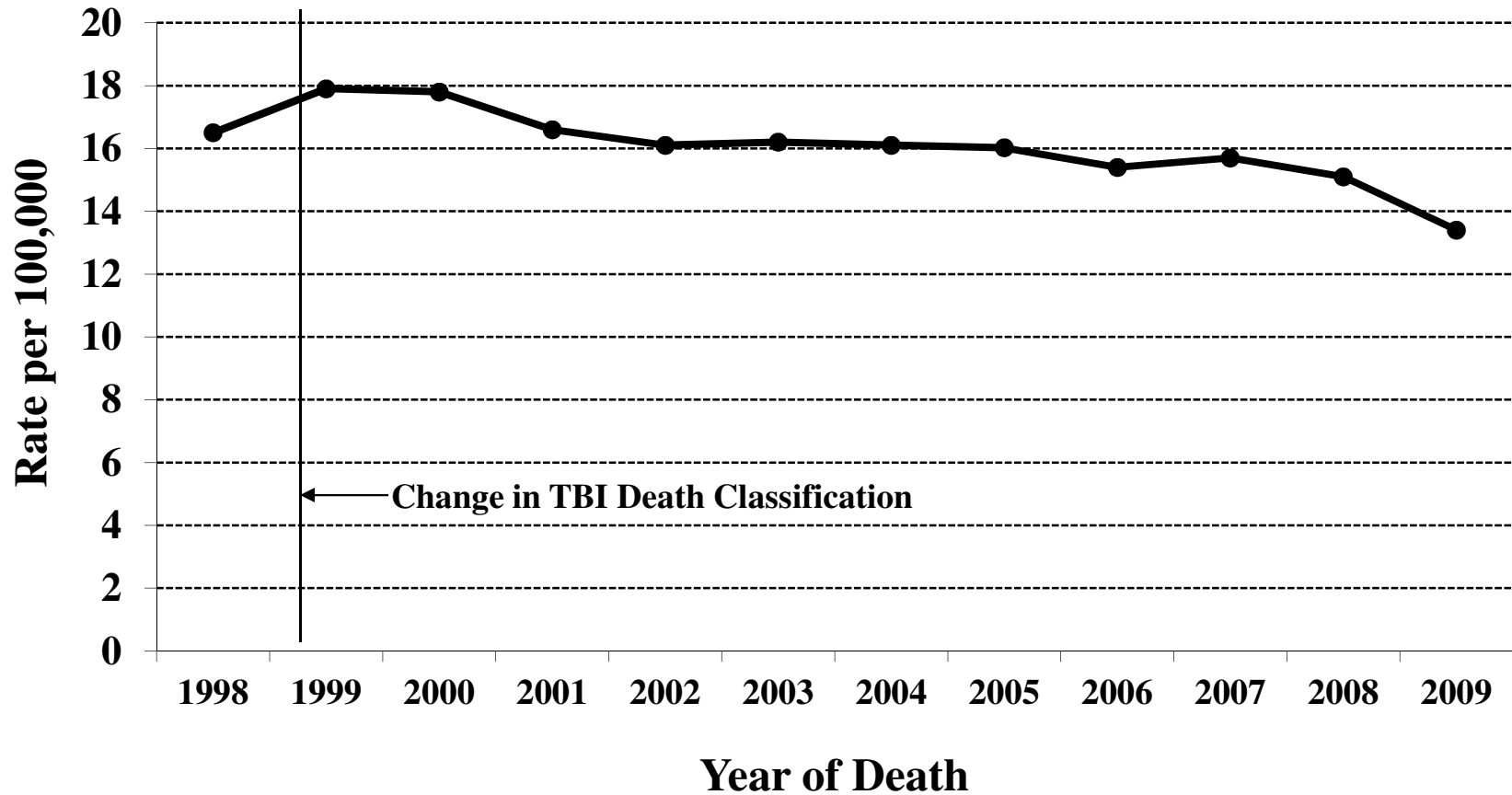
Discussion: Data in this report show the importance of TBI as a public health problem. Population-based information regarding TBI deaths and hospitalizations can be useful in assessing the effect of prevention efforts. Additionally, abstracted data will yield important information on demographic features (e.g., race/ethnicity), modifiable risk factors (e.g., alcohol use), and circumstances at time of injury (e.g., specific activity in which the individual was engaged at time of injury) that in turn can be used to guide intervention activities.

Table 1: TBI Mortality Number and Rate by Gender, Age Group, and Leading Causes, Minnesota 2009

Total	All causes		Fall,		Firearm				Motor vehicle traffic			
	total		unintentional		Total		Self-inflicted		Total		Occupant	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
All Ages	749	13.4	242	4.2	226	4.1	207	3.8	156	2.9	99	1.8
<1	6	.	0	.	0	.	0	.	2	.	1	.
1-4	10	.	0	.	0	.	0	.	5	.	3	.
5-9	3	.	1	.	0	.	0	.	2	.	1	.
10-14	5	.	1	.	3	.	3	.	1	.	1	.
15-19	43	11.7	1	.	19	.	15	.	18	.	17	.
20-24	48	12.9	6	.	22	5.9	19	.	15	.	8	.
25-29	36	9.7	1	.	20	5.4	17	.	8	.	5	.
30-34	25	7.6	2	.	9	.	9	.	8	.	5	.
35-39	33	9.9	3	.	15	.	12	.	8	.	3	.
40-44	38	10.6	3	.	17	.	16	.	13	.	7	.
45-49	57	13.7	13	.	22	5.3	20	4.8	14	.	8	.
50-54	70	17.7	8	.	35	8.9	34	8.6	19	.	9	.
55-59	58	17.1	20	5.9	20	5.9	19	.	8	.	6	.
60-64	35	13.3	12	.	10	.	10	.	8	.	3	.
65-69	30	15.3	10	.	11	.	10	.	3	.	2	.
70-74	33	22.2	18	.	7	.	7	.	6	.	5	.
75-79	51	42.2	32	26.5	5	.	5	.	3	.	3	.
80-84	47	47.7	30	30.5	5	.	5	.	6	.	4	.
85+	121	113.9	81	76.3	6	.	6	.	9	.	8	.
Male	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
All Ages	557	21.9	152	6.4	203	7.5	189	7.0	116	4.4	70	2.7
<1	5	.	0	.	0	.	0	.	2	.	1	.
1-4	6	.	0	.	0	.	0	.	2	.	1	.
5-9	2	.	1	.	0	.	0	.	1	.	0	.
10-14	4	.	1	.	2	.	2	.	1	.	1	.
15-19	36	19.2	1	.	19	.	15	.	13	.	12	.
20-24	39	20.7	4	.	20	10.6	18	.	11	.	6	.
25-29	27	14.1	1	.	17	.	14	.	6	.	5	.
30-34	19	.	1	.	8	.	8	.	6	.	4	.
35-39	27	15.8	1	.	13	.	11	.	8	.	3	.
40-44	30	16.5	2	.	15	.	14	.	9	.	3	.
45-49	49	23.3	10	.	19	.	19	.	14	.	8	.
50-54	58	29.2	7	.	31	15.6	30	15.1	14	.	6	.
55-59	45	26.5	14	.	18	.	17	.	6	.	4	.
60-64	23	17.7	7	.	10	.	10	.	4	.	1	.
65-69	26	27.6	9	.	10	.	10	.	2	.	1	.
70-74	25	36.1	12	.	6	.	6	.	5	.	4	.
75-79	37	69.2	21	39.3	4	.	4	.	3	.	3	.
80-84	30	75.8	15	.	5	.	5	.	5	.	3	.
85+	69	213.8	45	139.5	6	.	6	.	4	.	4	.
Female	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
All Ages	192	6.1	90	2.6	23	0.9	18	.	40	1.4	29	1.0
<1	1	.	0	.	0	.	0	.	0	.	0	.
1-4	4	.	0	.	0	.	0	.	3	.	2	.
5-9	1	.	0	.	0	.	0	.	1	.	1	.
10-14	1	.	0	.	1	.	1	.	0	.	0	.
15-19	7	.	0	.	0	.	0	.	5	.	5	.
20-24	9	.	2	.	2	.	1	.	4	.	2	.
25-29	9	.	0	.	3	.	3	.	2	.	0	.
30-34	6	.	1	.	1	.	1	.	2	.	1	.
35-39	6	.	2	.	2	.	1	.	0	.	0	.
40-44	8	.	1	.	2	.	2	.	4	.	4	.
45-49	8	.	3	.	3	.	1	.	0	.	0	.
50-54	12	.	1	.	4	.	4	.	5	.	3	.
55-59	13	.	6	.	2	.	2	.	2	.	2	.
60-64	12	.	5	.	0	.	0	.	4	.	2	.
65-69	4	.	1	.	1	.	0	.	1	.	1	.
70-74	8	.	6	.	1	.	1	.	1	.	1	.
75-79	14	.	11	.	1	.	1	.	0	.	0	.
80-84	17	.	15	.	0	.	0	.	1	.	1	.
85+	52	70.3	36	48.7	0	.	0	.	5	.	4	.

Rates are per 100,000 population. Total rates are age-adjusted to the U.S. 2000 standard population.

Figure 1: TBI Mortality Rate by Year Minnesota 1998-2009



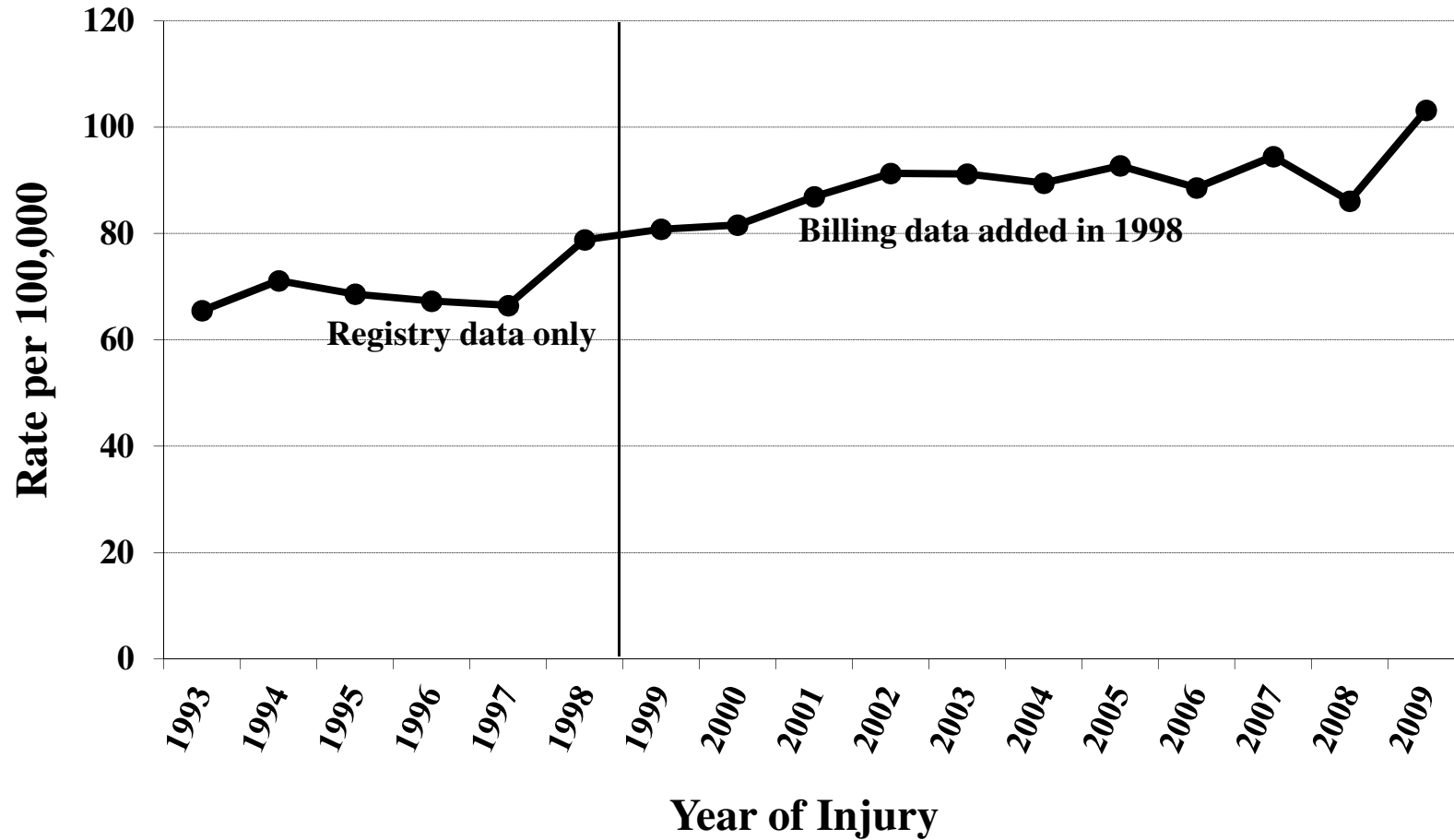
Rates are age-adjusted to the U.S. 2000 standard population.

Table 2: Nonfatal Hospitalized TBI Number and Rate by Gender, Age Group, and Leading Causes, Minnesota 2009

Total	All causes		Fall, unintentional		Motor vehicle traffic				Assault			
	total		unintentional		Total		Occupant		Total		Struck by or against	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
All Ages	5,606	103.2	2,733	49.1	1,375	25.8	956	18.0	395	7.6	259	5.0
<1	128	181.3	74	104.8	5	.	4	.	29	41.1	0	.
1-4	139	47.4	93	31.7	18	.	6	.	3	.	1	.
5-9	127	36.9	51	14.8	29	8.4	17	.	0	.	0	.
10-14	184	54.5	59	17.5	35	10.4	21	6.2	5	.	3	.
15-19	445	120.9	83	22.6	198	53.8	161	43.7	28	7.6	18	.
20-24	406	108.8	67	18.0	174	46.6	122	32.7	69	18.5	56	15.0
25-29	326	87.8	69	18.6	126	33.9	99	26.7	64	17.2	44	11.9
30-34	248	75.5	50	15.2	89	27.1	66	20.1	53	16.1	36	11.0
35-39	237	70.8	61	18.2	89	26.6	67	20.0	33	9.9	24	7.2
40-44	236	65.6	79	22.0	79	22.0	45	12.5	34	9.5	24	6.7
45-49	359	86.2	132	31.7	111	26.7	63	15.1	30	7.2	23	5.5
50-54	366	92.7	169	42.8	97	24.6	56	14.2	23	5.8	14	.
55-59	320	94.5	160	47.2	86	25.4	49	14.5	13	.	10	.
60-64	275	104.2	158	59.8	76	28.8	50	18.9	4	.	2	.
65-69	262	133.2	163	82.9	51	25.9	39	19.8	5	.	3	.
70-74	278	186.7	198	133.0	31	20.8	26	17.5	0	.	0	.
75-79	309	255.7	242	200.3	32	26.5	26	21.5	1	.	0	.
80-84	374	379.9	307	311.9	32	32.5	25	25.4	1	.	1	.
85+	586	551.8	518	487.8	17	.	14	.	0	.	0	.
Male	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
All Ages	3,460	134.5	1,504	60.2	862	32.3	549	20.8	329	12.4	231	8.7
<1	74	203.8	47	129.5	1	.	1	.	13	.	0	.
1-4	85	56.9	55	36.8	10	.	1	.	2	.	1	.
5-9	80	45.5	34	19.3	15	.	8	.	0	.	0	.
10-14	131	75.7	47	27.2	20	11.6	11	.	2	.	2	.
15-19	296	157.9	62	33.1	110	58.7	85	45.4	26	13.9	17	.
20-24	308	163.7	49	26.0	122	64.8	81	43.1	62	33.0	51	27.1
25-29	242	126.3	49	25.6	87	45.4	65	33.9	57	29.8	39	20.4
30-34	190	112.2	39	23.0	58	34.2	40	23.6	43	25.4	31	18.3
35-39	156	91.5	38	22.3	57	33.4	40	23.5	29	17.0	20	11.7
40-44	163	89.6	48	26.4	54	29.7	31	17.0	29	15.9	22	12.1
45-49	250	118.9	95	45.2	65	30.9	32	15.2	26	12.4	21	10.0
50-54	256	129.0	117	59.0	72	36.3	37	18.6	17	.	12	.
55-59	205	120.9	98	57.8	55	32.4	25	14.7	12	.	9	.
60-64	164	126.4	88	67.8	48	37.0	26	20.0	4	.	2	.
65-69	142	150.5	83	88.0	27	28.6	20	21.2	5	.	3	.
70-74	158	228.3	107	154.6	14	.	11	.	0	.	0	.
75-79	158	295.3	116	216.8	18	.	13	.	1	.	0	.
80-84	189	477.2	151	381.3	19	.	14	.	1	.	1	.
85+	213	660.1	181	560.9	10	.	8	.	0	.	0	.
Female	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
All Ages	2,146	73.2	1,229	39.0	513	19.3	407	15.3	66	2.6	28	1.1
<1	54	157.4	27	78.7	4	.	3	.	16	.	0	.
1-4	55	38.2	38	26.4	8	.	5	.	1	.	0	.
5-9	47	27.9	17	.	14	.	9	.	0	.	0	.
10-14	53	32.2	12	.	15	.	10	.	3	.	1	.
15-19	150	83.0	21	11.6	88	48.7	76	42.1	2	.	1	.
20-24	98	53.0	18	.	52	28.1	41	22.2	7	.	5	.
25-29	84	46.8	20	11.1	39	21.7	34	18.9	7	.	5	.
30-34	58	36.5	11	.	31	19.5	26	16.4	10	.	5	.
35-39	81	49.3	23	14.0	32	19.5	27	16.4	4	.	4	.
40-44	73	41.0	31	17.4	25	14.1	14	.	5	.	2	.
45-49	109	52.9	37	18.0	46	22.3	31	15.0	4	.	2	.
50-54	111	56.6	52	26.5	25	12.7	19	.	6	.	2	.
55-59	114	67.4	62	36.7	31	18.3	24	14.2	1	.	1	.
60-64	111	82.7	70	52.1	28	20.9	24	17.9	0	.	0	.
65-69	117	114.3	80	78.2	24	23.5	19	.	0	.	0	.
70-74	121	151.8	91	114.2	17	.	15	.	0	.	0	.
75-79	151	224.3	126	187.1	14	.	13	.	0	.	0	.
80-84	184	312.7	156	265.1	13	.	11	.	0	.	0	.
85+	375	507.3	337	455.9	7	.	6	.	0	.	0	.

Rates are per 100,000 population. Total rates are age-adjusted to the U.S. 2000 standard population.

Figure 2: Nonfatal Hospitalized TBI Rate by Year Minnesota 1993-2009



Rates are age-adjusted to the U.S. 2000 standard population.