Expected life-saving effect of introducing the GTR Head Protection Regulation in Japan

(only GR INF PS161: applies to Bonnet/Wing)

Ministry of Land, Infrastructure and Transport

Outline of the GTR: Bonnet/Wing (1)

Applicable car types (Japan)

- Passenger cars having no more than 10 seats
- Trucks having a GVW not exceeding 2500 kg and
  a similar front shape as passenger cars

Test area (Bonnet/Wing)

Child head impactor: 1000 mm $\leq$ WAD $\leq$ 1700 mm

Adult head impactor: 1700 mm $\leq$ WAD $\leq$ 2100 mm

Impactor

Child head impactor: Diameter 165 mm, weight 3.5 kg

Adult head impactor: Diameter 165 mm, weight 4.5 kg

Outline of the GTR: Bonnet/Wing (2)

- Impact speed and angle -

	Child head impactor		Adult head impactor	
	speed (km/h)	angle (deg)	speed (km/h)	angle (deg)
Category 1	35	50	35	65

Assumed head impact conditions* at accident speed of 44 km/h

*angle is simplified as one angle for each

Criteria

HIC ≤ 1000: 2/3 of the test area

HIC ≤ 1700: 1/3 of the test area

* In the calculation of life-saving effects, the distribution in the 1/3 and 2/3 areas are assumed to be similar between adult areas and children areas.

Life-saving effect

Pedestrian fatalities in Japan

		Child	Adult	
		2982 **persons**		National Police Agency (NPA) traffic accident statistics (Death within 30 days in 1999)
		Child: 127	Adult: 2855	
Percentage of fatalities involving head injury (Japan)	**64%**	↓	↓	NPA traffic accident statistics (1993 to 1999)
		81	1827	
Percentage of fatalities involving cars (Japan)	**77%**	↓	↓	NPA traffic accident statistics (Death within 24 h in 1999)
		63	1407	
Percentage of fatalities involving head to bonnet/wing impact (IHRA)	**38.2% (child)** **17.1% (adult)**	↓	↓	IHRA statistics (Mizuno Y. ESV 2005)
		24	241	
Percentage of fatalities involving vehicle speed of 44 km/h or less (Japan)	**50%**	↓	↓	ITARDA (Traffic accidents survey and analysis report, 1999)
		12	**120**	
Life-saving ratio - HIC 1000 or less 2/3 area - **HIC 1700** or less 1/3 area	**84%**	↓	↓	MacLenghlin, et al. 'Vehicle Interactions with Pedestrians' (1993)
		10	**101**	
Life-saving Effect		**111 persons**		

# Conclusions

- The expected effects of introducing PS-GTR Head Protection Regulation (Bonnet/Wing area) in Japan were calculated and compared with the case of not introducing the regulation.

- The calculation showed that pedestrian fatalities are expected to be reduced by more than 100 persons per year.

- This accounts for about 1.4% (1/70) of the 7,800 traffic fatalities that occur in 2005. Introducing this GTR, the social loss caused by traffic accidents will be significantly reduced.

- In addition, introducing this GTR is also expected to reduce the severity of injuries, thus further reducing the social costs in addition to the reduction of fatalities.

．The Government currently executes about 370 billion yen every year for traffic safety. As the effect, reducing annual fatalities by around 300 to 500 persons, gradually.

Appendix: Base data

Base data (1)

- Ratio of head injury (Japan) -
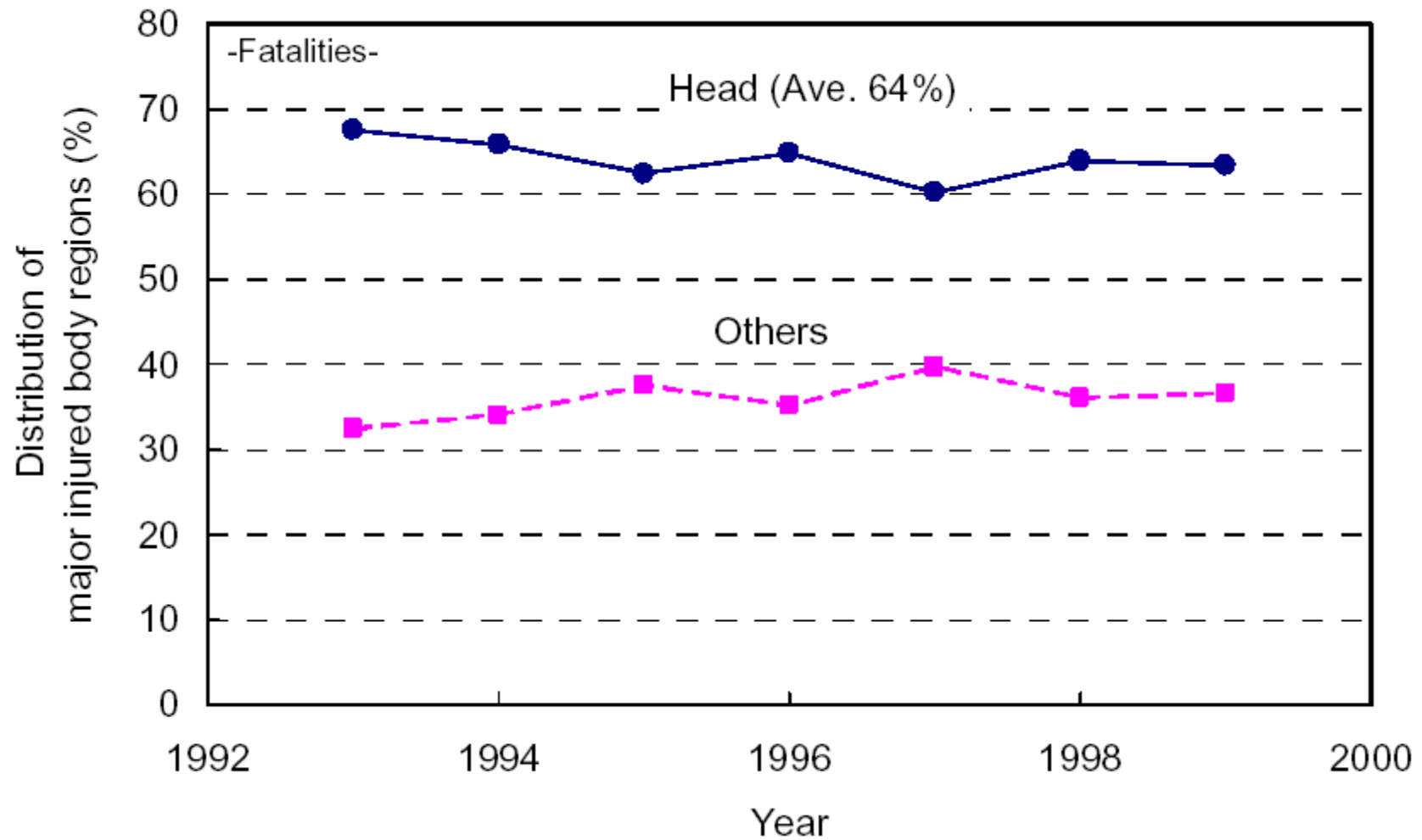
Base data (2)
- Ratio of car types involved (Japan) -

In cases where the regulation on pedestrians' head protection is applicable to only certain types of vehicles
(Ordinary-sized passenger cars, mini-sized passenger cars, mini-sized trucks, ordinary-sized trucks of 2.8 ton or less)

Preventable deaths caused by vehicle accident	77	（%）

		Deaths		Serious Injuries		Light injuries	
		(No. of Persons)	（%）	(No. of Persons)	（%）	(No. of Persons)	（%）
Large-sized passenger cars	Buses	12	0.6	37	0.4	284	0.5
	Microbuses	5	0.3	19	0.2	100	0.2
Ordinary-sized passenger cars	1-box	116	6.2	561	5.6	3023	5.8
	Sedans	745	40.0	4576	45.6	24680	47.6
	RVs	87	4.7	322	3.2	1567	3.0
Mini-sized passenger cars	Sedans	125	6.7	920	9.2	4422	8.5
	Others	18	1.0	157	1.6	749	1.4
Trailers	17t＜	7	0.4	16	0.2	37	0.1
	7t＜x≦17t	0	0.0	3	0.0	3	0.0
	≦7t	0	0.0	3	0.0	6	0.0
Dump trucks	8t≦	26	1.4	57	0.6	100	0.2
	＜8t	17	0.9	49	0.5	118	0.2
Concrete mixers	8t≦	5	0.3	9	0.1	17	0.0
	＜8t	1	0.1	4	0.0	14	0.0
Tank trucks	8t≦	2	0.1	7	0.1	11	0.0
	＜8t	3	0.2	7	0.1	9	0.0
Ordinary-sized trucks	20t≦	30	1.6	43	0.4	85	0.2
	8t≦x＜20t	46	2.5	80	0.8	152	0.3
	7t≦x＜8t	74	4.0	134	1.3	446	0.9
	3.5t＜x＜7t	68	3.7	264	2.6	1293	2.5
	2.8t＜x≦3.5t	46	2.5	147	1.5	628	1.2
	≦2.8t	68	3.7	267	2.7	1486	2.9
	Vans	42	2.3	239	2.4	1352	2.6
Mini-sized trucks	Vans	49	2.6	329	3.3	1538	3.0
	Others	181	9.7	780	7.8	3807	7.3
Two-wheeled motor vehicles	Motor-driven cycles	23	1.2	587	5.8	4220	8.1
	Motorcycles	57	3.1	400	4.0	1506	2.9
Others		8	0.4	19	0.2	147	0.3
Total		1861	100.0	10036	100.0	51800	100.0

Note 1: The number of persons in cases where the pedestrians were the secondary parties
Note 2: Excludes multiple-collision accidents and accidents where two or more parts of the body were impacted.

Source: NPA Traffic Accident Statistics 1999 (24 hours)
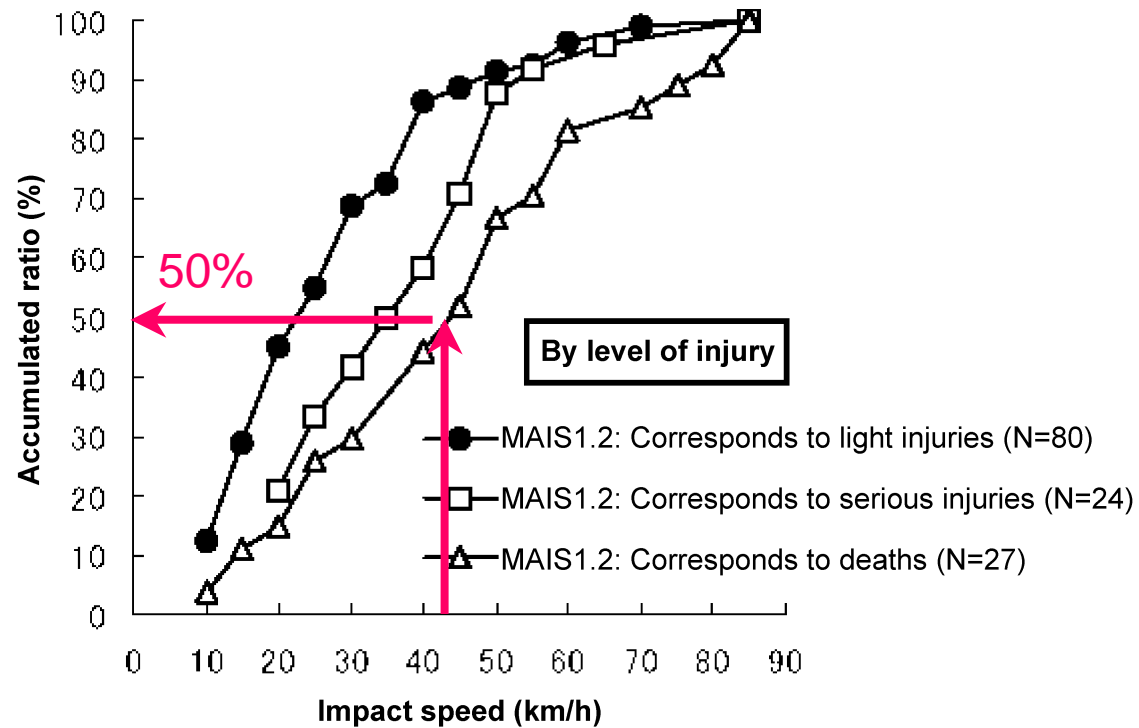
Base data (3)

- Ratio of head to bonnet/wing impact (IHRA) -

Body Region (Head) AIS 2-6	All Ages		Ages ≤ 15 (child)		Ages ≥ 16 (adult)	
	(cases)	(%)	(cases)	(%)	(cases)	(%)
Part of the Vehicle						
Front Bumper	24	2.3%	4	1.8%	20	2.4%
Bonnet/Wing	223	21.5%	83	38.2%	140	17.1%
Leading Edge	15	1.4%	8	3.7%	7	0.9%
Windscreen Glass	344	33.2%	41	18.9%	303	37.0%
Windscreen Frame/A-pillars	168	16.2%	9	4.1%	159	19.4%
Front Panel	5	0.5%	5	2.3%	0	0.0%
Other Vehicle Source	45	4.3%	12	5.5%	33	4.0%
Others						
Indirect Contact Injury	13	1.3%	1	0.5%	12	1.5%
Road Surface Contact	171	16.5%	46	21.2%	125	15.3%
Unknown	27	2.6%	8	3.7%	19	2.3%
Total	1035	100%	217	100%	818	100%

* Data source: Mizuno Y., SUMMARY OF IHRA PEDESTRIAN SAFETY WG ACTIVITIES (2005) - PROPOSED TEST METHODS TO EVALUATE PEDESTRIAN PROTECTION AFFORDED BY PASSENGER CARS, ESV 2005, Paper Number 05-0138.

Base data (4)

- Dependence of number of fatalities on accident speed (Japan)-

Accumulated ratio (%) vs **Impact speed (km/h)**

50%

By level of injury

● MAIS1.2: Corresponds to light injuries (N=80)

□ MAIS1.2: Corresponds to serious injuries (N=24)
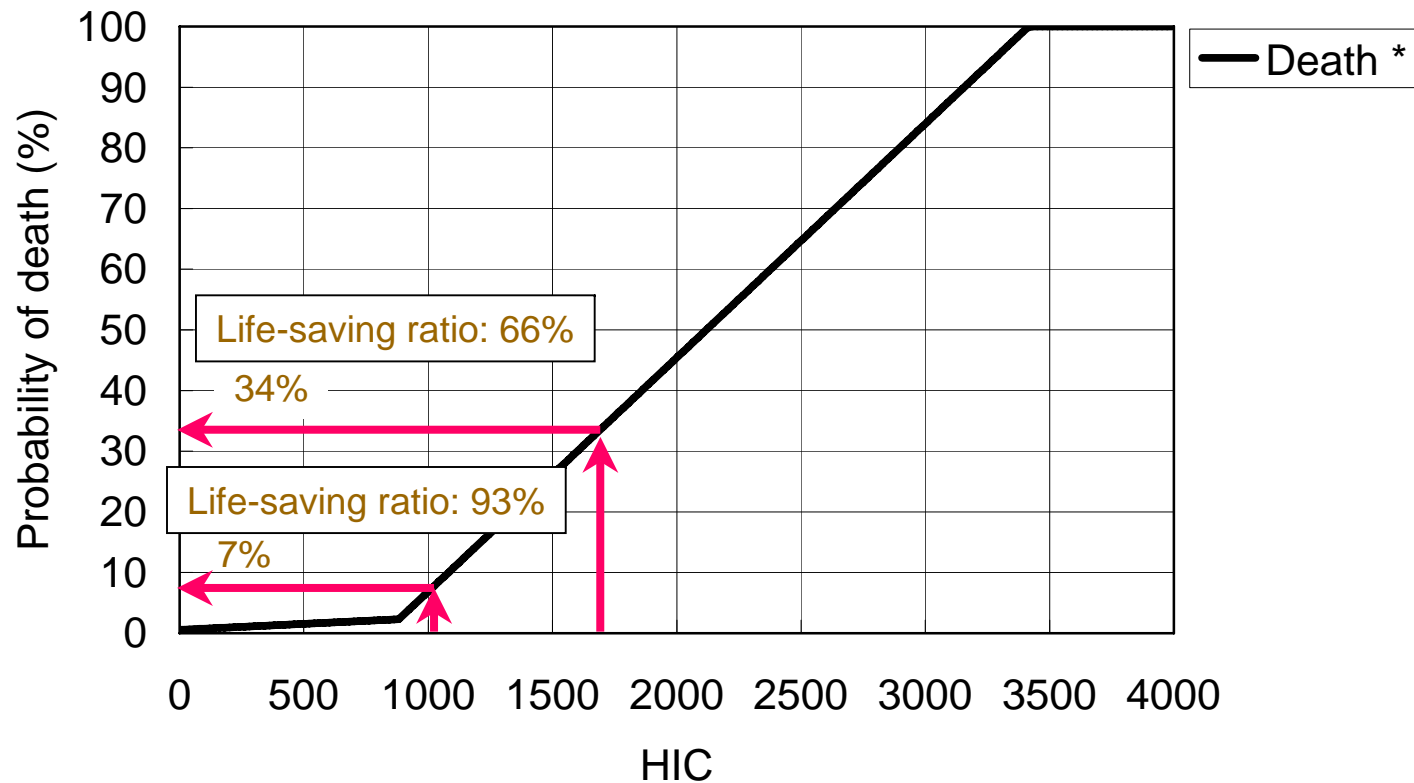
△ MAIS1.2: Corresponds to deaths (N=27)

Fiscal 1999

Source: ITARDA Traffic accidents survey and analysis report, 1999

Base data (5)

- Probability of death -

* MacLaughlin et al., "Chapter 21: Vehicle Interactions with Pedestrians", in
  Accidental Injury -Biomechanics and Prevention-, Springer-Verlag, N.Y., 1993.