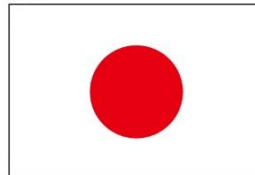


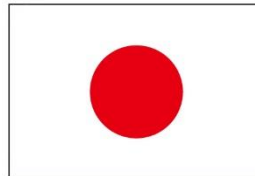
The Hazardous Spot Countermeasure Project in Japan

Seminar on Road Safety National Policies and Programs
12 November 2013, Buenos Aires, Argentina

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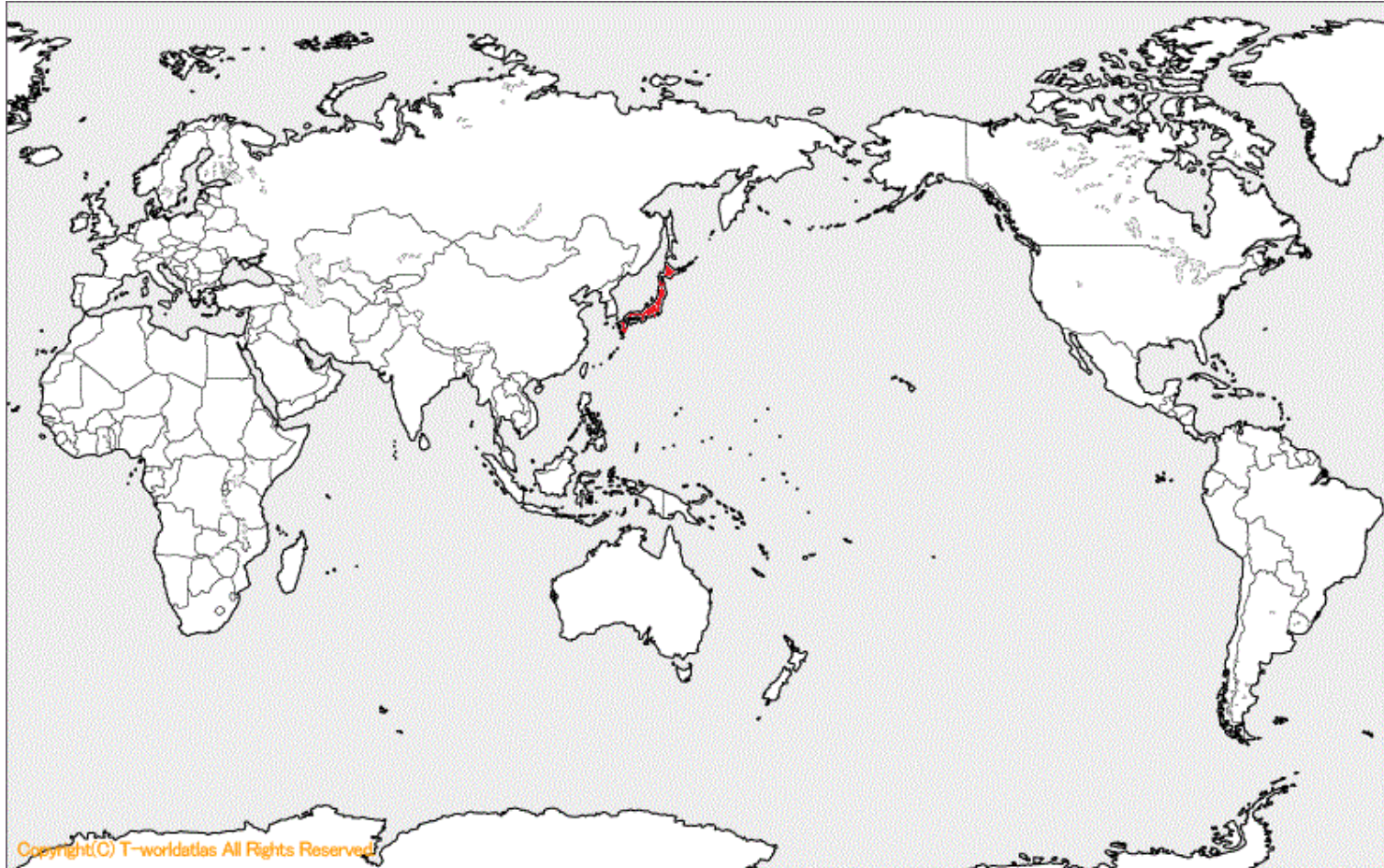
- Introduction
- Method of identifying hazardous spots
- State of implementation of countermeasure at hazardous spots
- Effectiveness of countermeasures at hazardous spots
- Conclusion



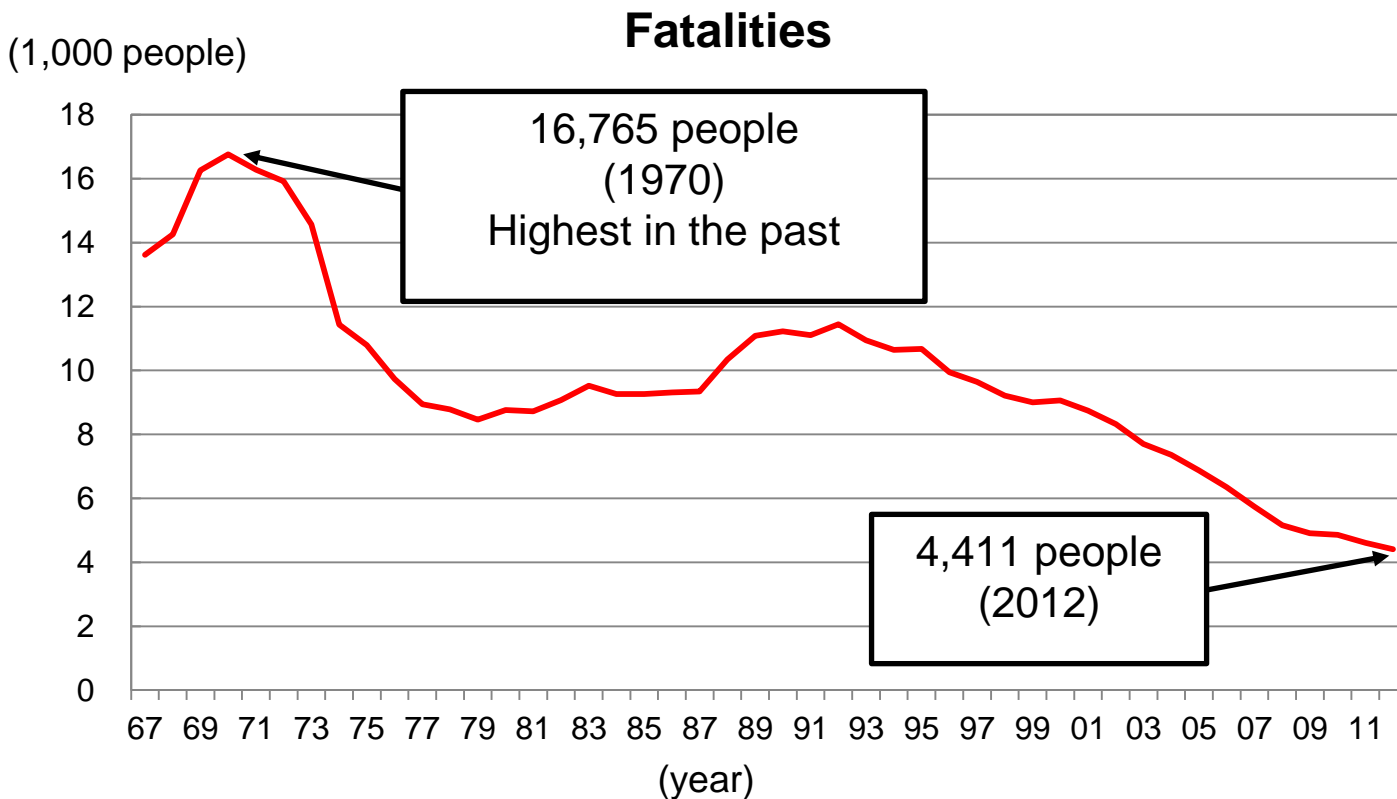


Population 127 million

Area 378,000km²



- Change of number of traffic accident fatalities in Japan
 - As a result of the spread of motorization, traffic accidents fatalities reached a historical peak of 16,765 in 1970.
 - In 2012, the number decreased down to less than one third of the 1970-level.
 - Many people are still losing their lives or suffering injuries in traffic accidents, so further efforts is needed.



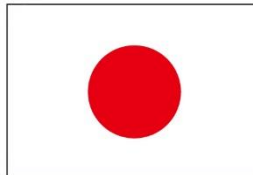
◇ Goal in 2015

- (1) Reduce the annual number of fatalities less than 3,000, to be a nation with the world's safest road traffic.
- (2) Reduce injuries to 0.7 million or fewer.

◇ Countermeasures

<Point of view>

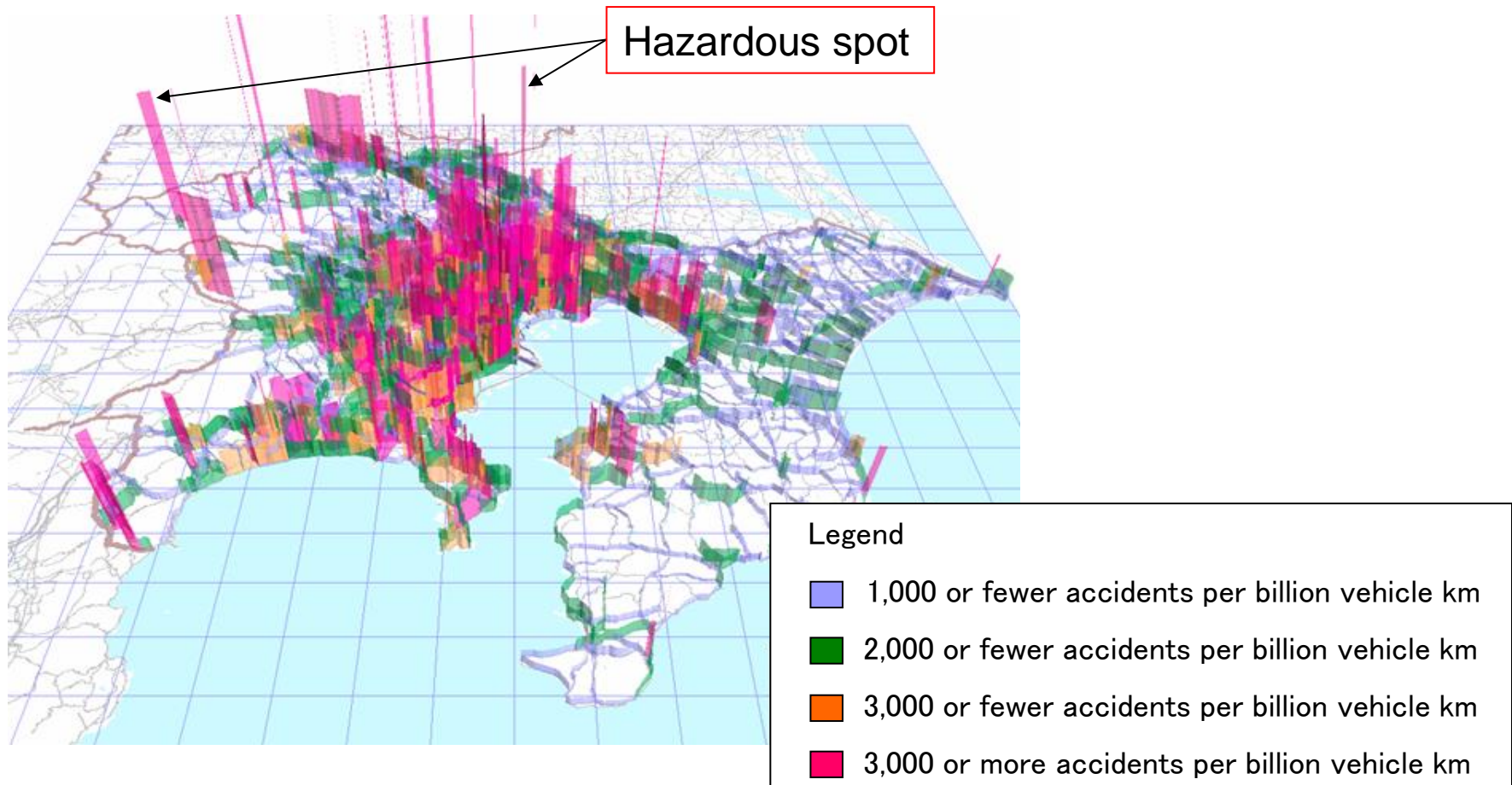
- 1) Elderly and children.
- 2) Pedestrians and cyclists.
- 3) Residential and arterial roads.



Introduction

Traffic accident countermeasures on arterial roads

- Hazardous spot countermeasure projects (from 2003)
 - On arterial roads, accidents tend to occur concentrated at specific spots.
 - Concentrated prioritized countermeasure are taken at these spots



Method of identifying hazardous spots

- Standards are set from A to C
- In 2003, a total of 3,956 spots were designated as hazardous spots.
- The goal is to reduce accidents causing injury or death by 30%.

Hazardous spot identification standards

Standard category	Description
A	Spots where a fatal accident could occur once in 10 years <ul style="list-style-type: none">• Accidents causing injury or death: 28 accidents / 4 years or more• Fatal accident conversion factor*: 0.4 accidents / 4 years or more
B	Spots with an accident rate equal to 5 or more times the average accident rate on arterial roads <ul style="list-style-type: none">• Uninterrupted straight roads: 325 accidents / 100 million vehicle – kilometers or more• Intersections: 500 accidents / 100 million vehicle -kilometers or more
C	Among spots satisfying the above standards, those where it is recognized that there is a serious danger of many traffic accidents occurring and emergency concentrated countermeasures are required

* Fatal accident conversion factor indicates total cases, found by obtaining the product of the number of accidents causing injury or death by type of accident at hazardous spots by the nationwide fatal accident rate by type of accident.

- State of implementation of countermeasures
 - Among 3,956 spots, by 2007, countermeasures were completed at 3,271 spots (83%).
 - By the end of 2009, countermeasures were completed at 3,692 spots (93%).

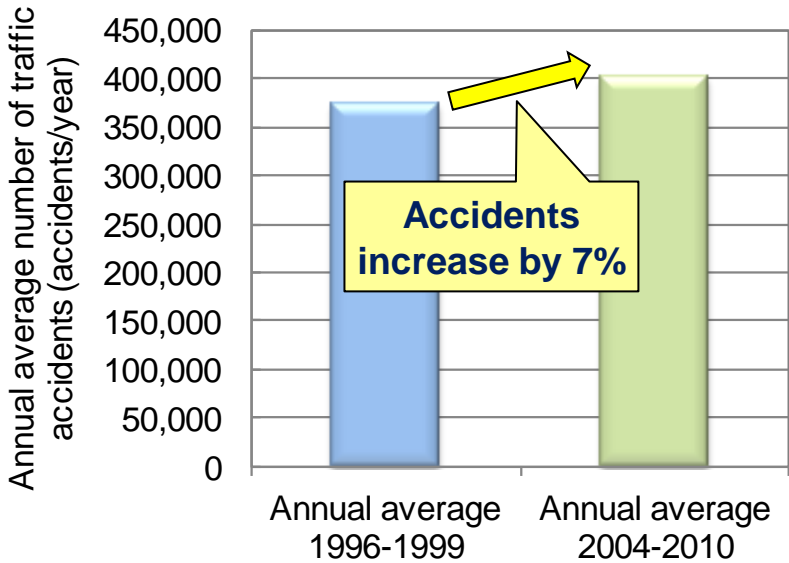
State of implementation of countermeasures

	No. of spots countermeasures construction started	No. of spots countermeasures were completed
Project period (by 2007)	3,837 (97%)	3,271 (83%)
After project period (2008 to 2009)	86 (2%)	421 (11%)
Total	3,923 (99%)	3,692 (93%)

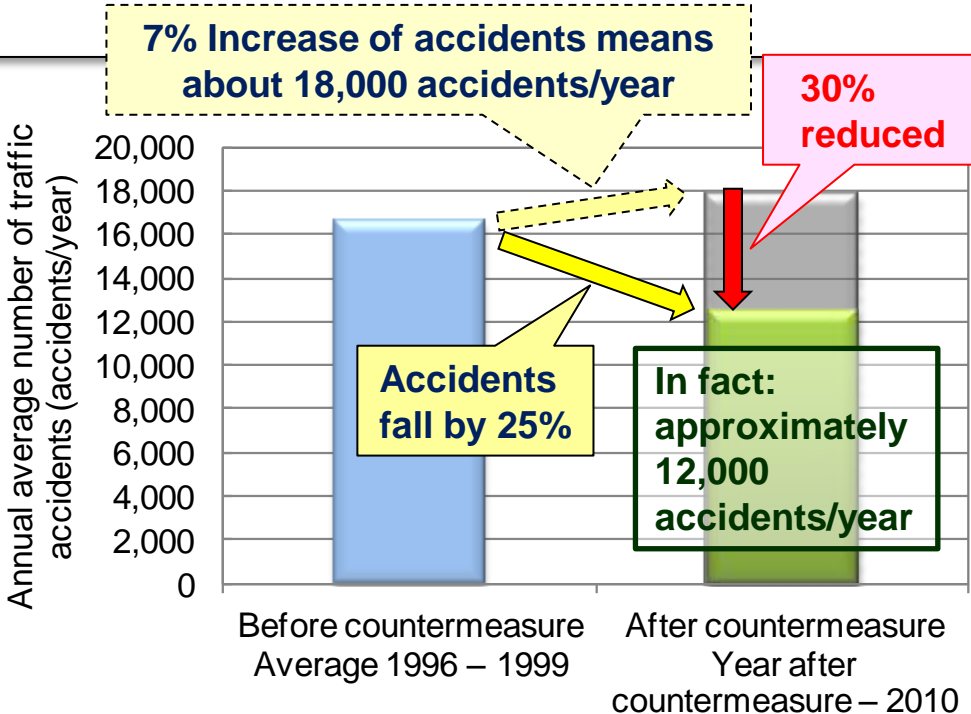
- Objects of the analysis
 - 3,174 spots
 - (Total 3,271 spots were completed by 2007, excluding spots where accident data is unclear.)
- Index used to clarify effectiveness
 - Traffic accidents before and after the countermeasure
 - Reduction rate
 - A reduction rate is an index which shows by what percentage accidents were reduced at hazardous spots considering trend of traffic accidents on all arterial roads in Japan.

- Calculating a reduction rate

- Accidents causing death and injury on arterial roads throughout Japan increase 7%.
- At hazardous spots, after countermeasure implementation, accidents causing death and injury fell by 25%.
 - Comparing numbers of accidents assuming that accidents causing death and injury at hazardous spots changed in the same way as on nationwide arterial roads show it was possible to reduce 30% of accidents.
 - Therefore, the reduction rate of accidents causing death and injury is 30% (numerical target is achieved).



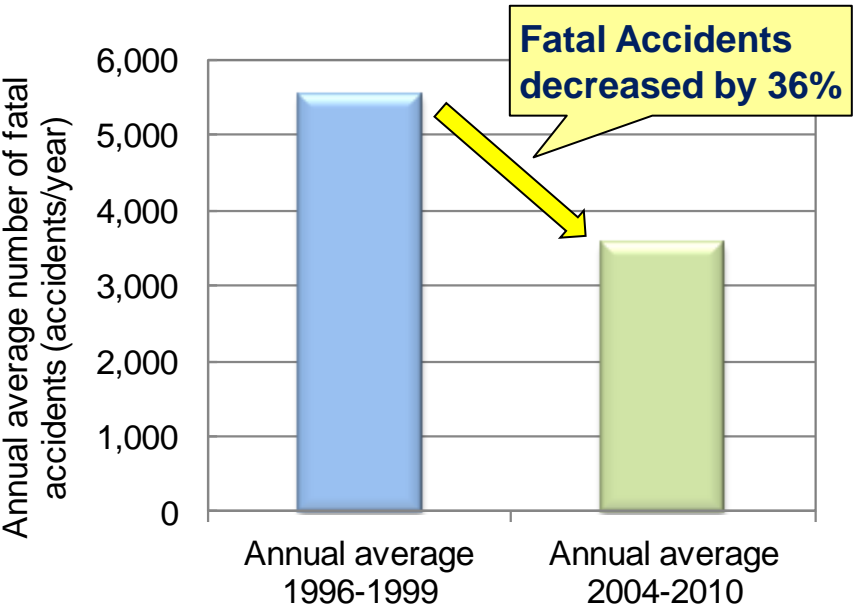
Arterial Roads Nationwide



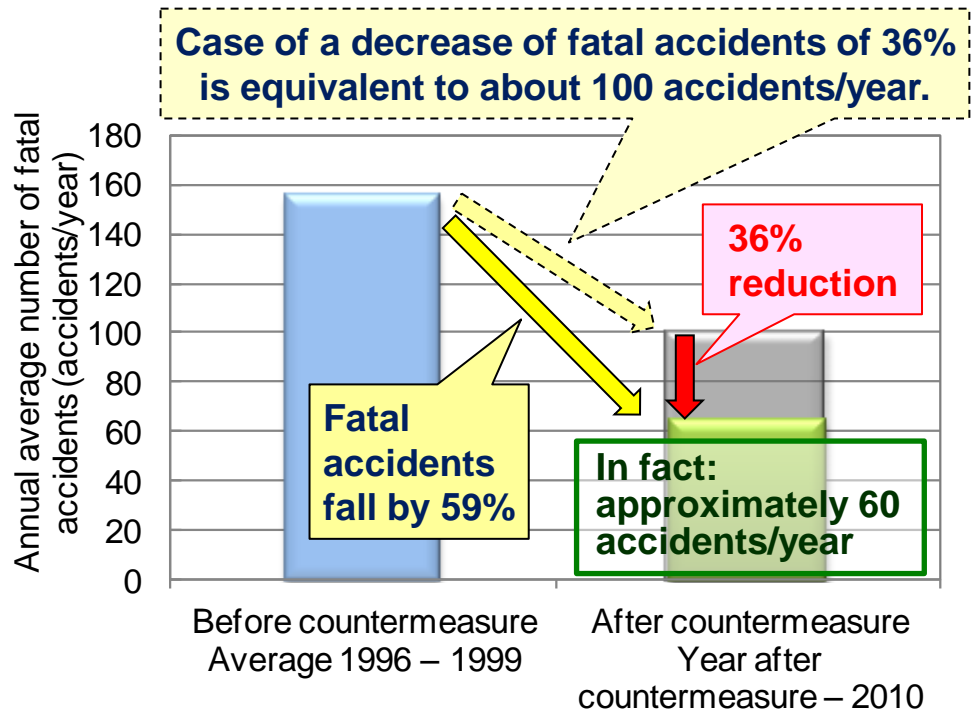
Hazardous Spots

Effectiveness of countermeasures at hazardous spots

- Fatal accidents reduction rate
 - On nationwide arterial roads, fatal accidents down 36%
 - At hazardous spots, after implementation of countermeasure, fatal accidents down 59%
 - Fatal accident reduction rate of 36%



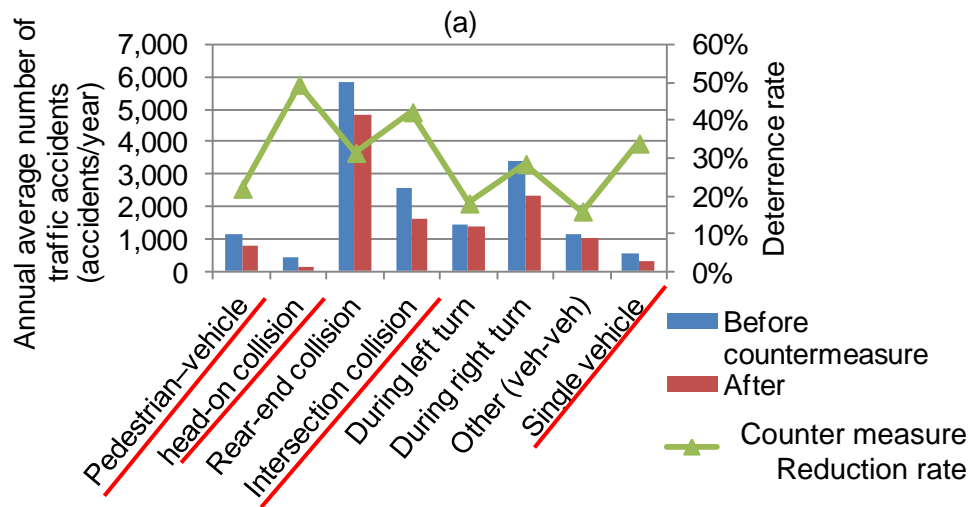
Arterial Roads Nationwide



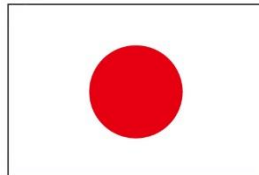
Hazardous Spots

Effectiveness of countermeasures at hazardous spots

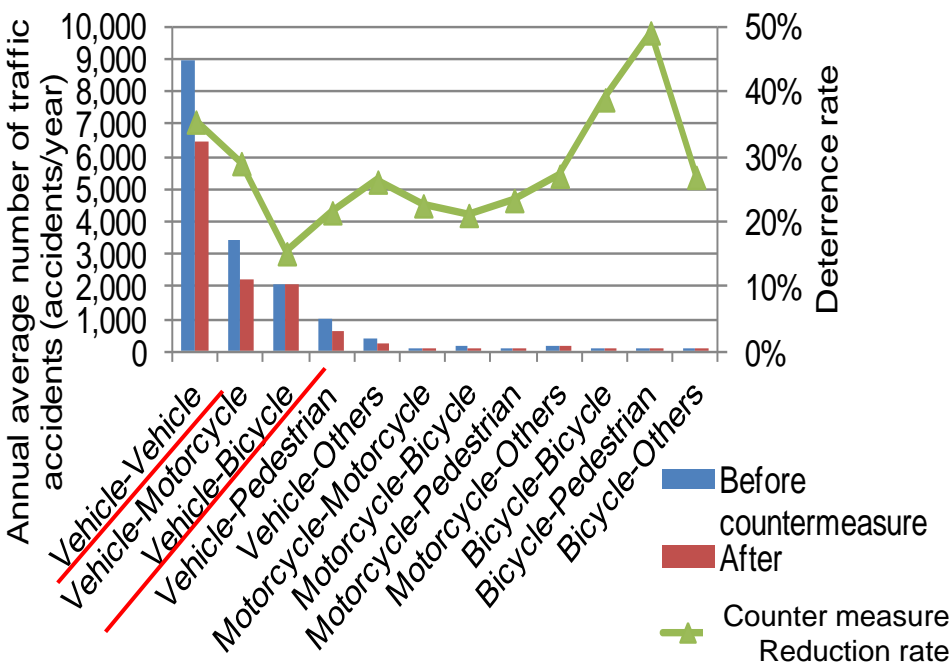
- Effectiveness of countermeasures by type of accident
 - Reduction rates for head-on collisions, intersection collisions, and single vehicle accidents are high.
 - Reduction rate for pedestrian – vehicle accidents is relatively low.



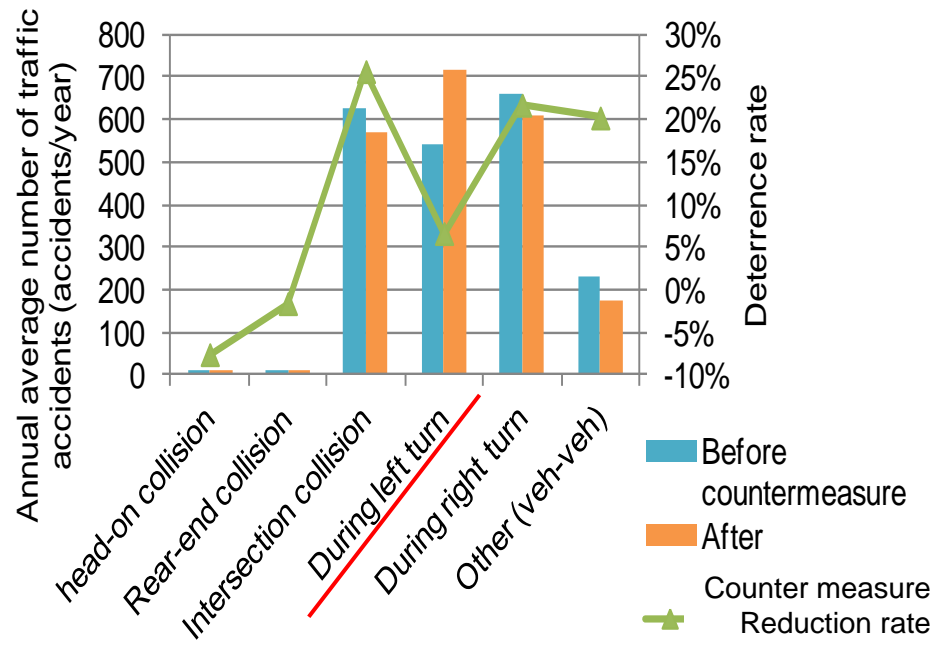
Results of totaling for all spots where countermeasures were completed



- Effectiveness of countermeasures by combination of parties involved in accidents
 - Vehicle – vehicle accidents, which often cause death or injury, is high.
 - Bicycle – vehicle accidents causing death and injury is low.
 - Bicycle – vehicle accidents during left turning is particularly low.



Changes and Reduction Rates of Numbers of Traffic Accidents by Combinations of Involved Parties at Hazardous Spots



Changes and Reduction Rates of Numbers of Bicycle – Vehicle Accidents by Type of Accident at Hazardous Spots

- Effectiveness by type of countermeasure
 - Head on collision countermeasures
 - All countermeasures provide high reduction rates

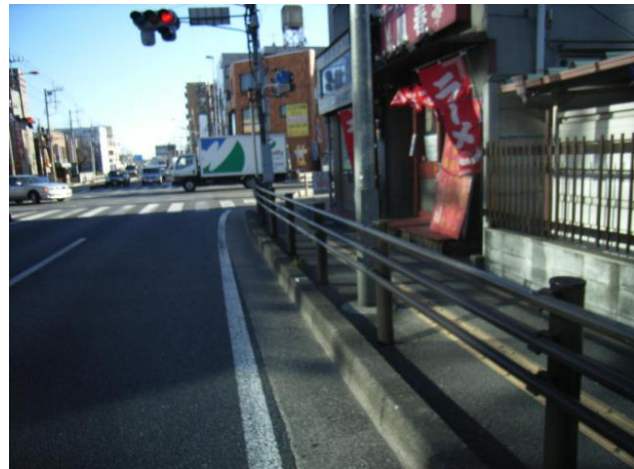
Head-on collision accident countermeasures

	Before	After	Reduction rate
Delineators	51.3	12.4	64.0%
Road markings (clarifying traveling location)	33.8	7.1	68.5%
Signboards	26.3	6.2	65.1%
Center median strips	29.3	8.2	58.3%

Effectiveness of countermeasures at hazardous spots

- Effectiveness of **pedestrian – vehicle accident** countermeasures
 - Reduction rate of guard fences is relatively low

	Before countermeasure	After countermeasure	Reduction rate
Road lighting	45.0	22.2	43.5%
Guard fences	22.5	16.9	13.6%
Signboards	21.8	13.4	29.6%
Sidewalk improvements	12.5	7.5	30.9%



Example of installing a continuous guard fence at intersection; accidents decreased



Example of constructing a discontinuous guard fence on an uninterrupted straight road; In some cases; accidents were not reduced

Effectiveness of countermeasures at hazardous spots

- Effectiveness of countermeasures to deal with **bicycle – vehicle accidents when the vehicle is turning left**
 - At locations where an intersection is improved or the sidewalk is improved, accidents decline and the reduction rate is high.

	Before countermeasure	After countermeasure	Reduction rate
Intersection improvements	15.3	9.0	58.2%
Sidewalk improvements	10.8	6.7	56.0%
Signboards	17.8	19.5	21.9%
Road markings (clarifying traveling location)	11.8	15.1	8.7%

- There are cases where intersections and sidewalks were improved by relatively low cost countermeasures such as bollards, decreasing traffic accidents.



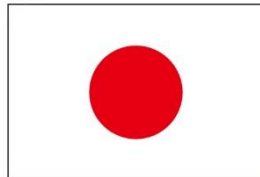
Example of placing bollards, improving the radius at the corners of the intersection



Example of placing bollards to expand sidewalk waiting space

- **Conclusion**

- Accident reduction of 30%, which was the numerical target, were achieved for all hazardous spots.
- Countermeasure effectiveness varies according to the type of accident and the combination of parties in the accident



• Future challenges

- Continuous effort on hazardous spots countermeasure is needed.
- To achieve next target, effective use of budget is necessary.
- Therefore,
 - Apply knowledge accumulated through past efforts.
 - Continue to implement countermeasures which comparatively easily provide effects by changing road environment such as head-on collisions or single vehicle accidents.
 - Improve low reduction rate countermeasure by further research.

Gracias por su atención
Thank you for your attention

