

ITARDA INFORMATION

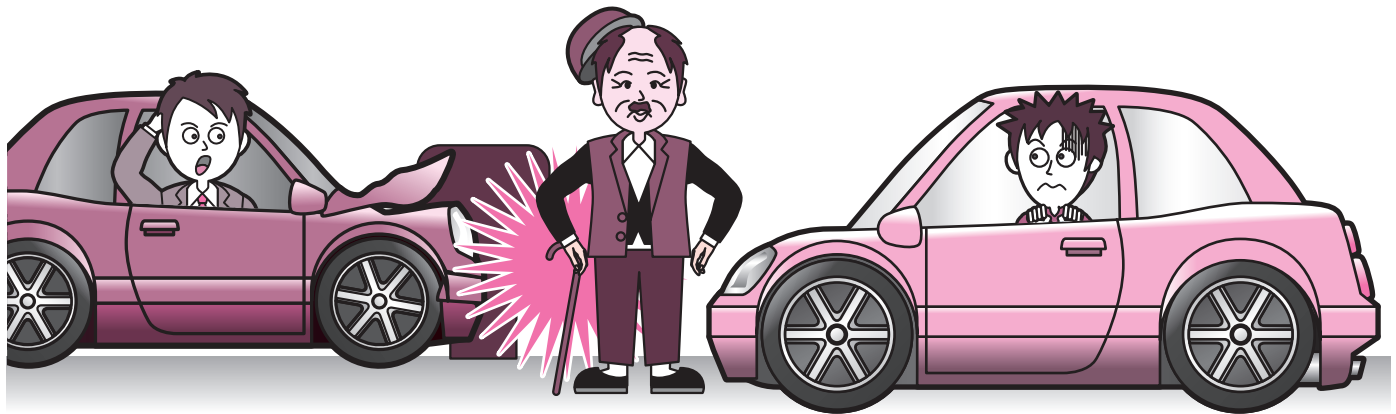
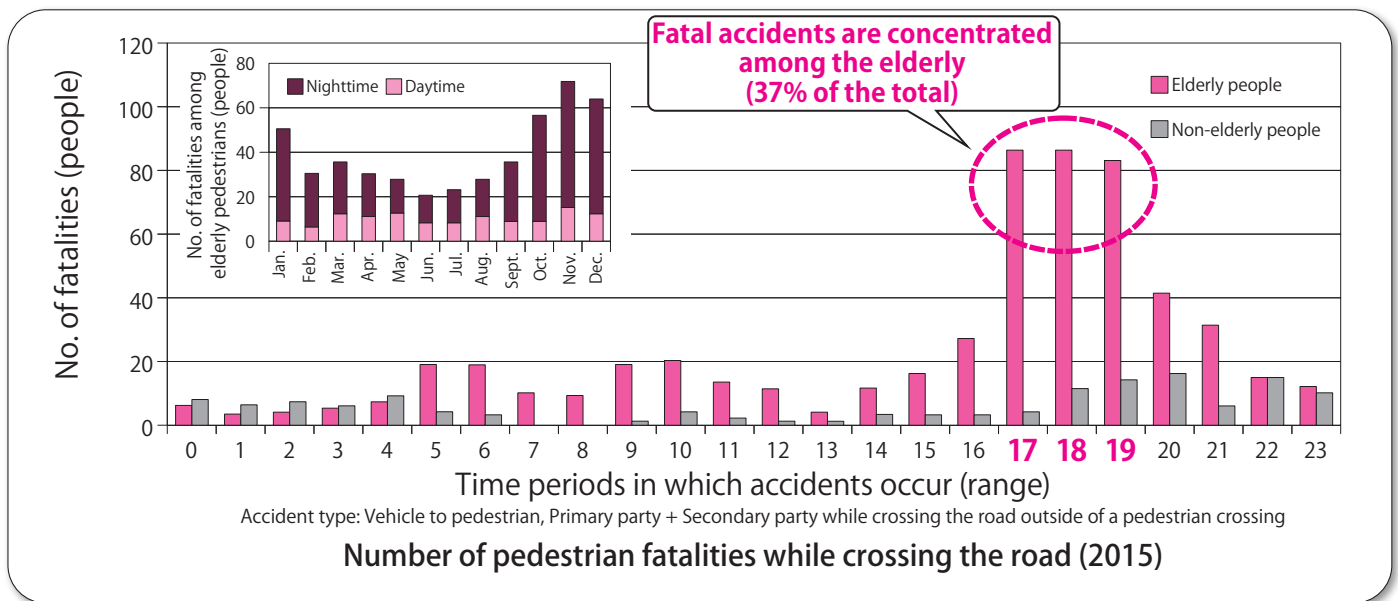
交通事故分析レポート

No.118

Special
feature

Accidents involving elderly pedestrians while crossing the road

~ Confirming safety while crossing the road prevents collision accidents ~



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1 Introduction

Of the 4,117 fatalities from traffic accidents in 2015, 2,247 people were elderly people aged 65 or older, accounting for 54.6% of the total. When this is converted to the number of fatalities per a population of 100,000 people, the number of 6.8 fatalities among elderly people is 3.4-times higher than the 2.0 among non-elderly people. Fig. 1 shows the number of fatalities by situation for each age group. It reveals that the number of fatalities of elderly people of 1,048 accounts for roughly 71% of the total of 1,486 fatalities from traffic accidents while walking. Fig. 2 shows the fatality rate of elderly pedestrians by type of accident for accidents involving a vehicle, in which collisions between a pedestrian and a four-wheeled vehicle account for 95.8% of the total of the 1,036 fatalities from vehicle to pedestrian traffic accidents. The share of collisions with a four-wheeled vehicle while the pedestrian is crossing at a location other than a pedestrian crossing comes to roughly 54%.

ITARDA Information¹⁻²⁾ has dealt with analyses of accidents involving elderly pedestrians in the past from a number of different perspectives. But this time we will focus on fatal accidents from collisions with vehicles occurring while elderly people cross the road at a location other than a pedestrian crossing, to take a look at the characteristics unique to elderly pedestrians based on the accidents that occurred in 2015.

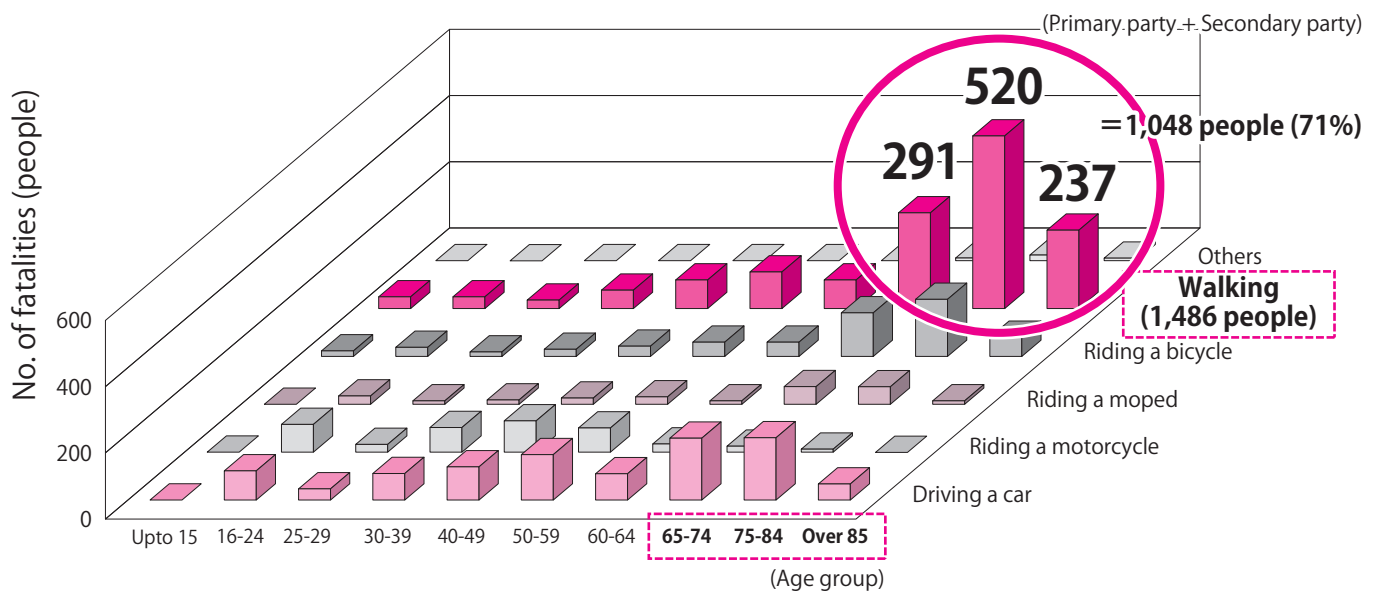


Fig. 1. Number of fatalities from traffic accidents by situation for each age group

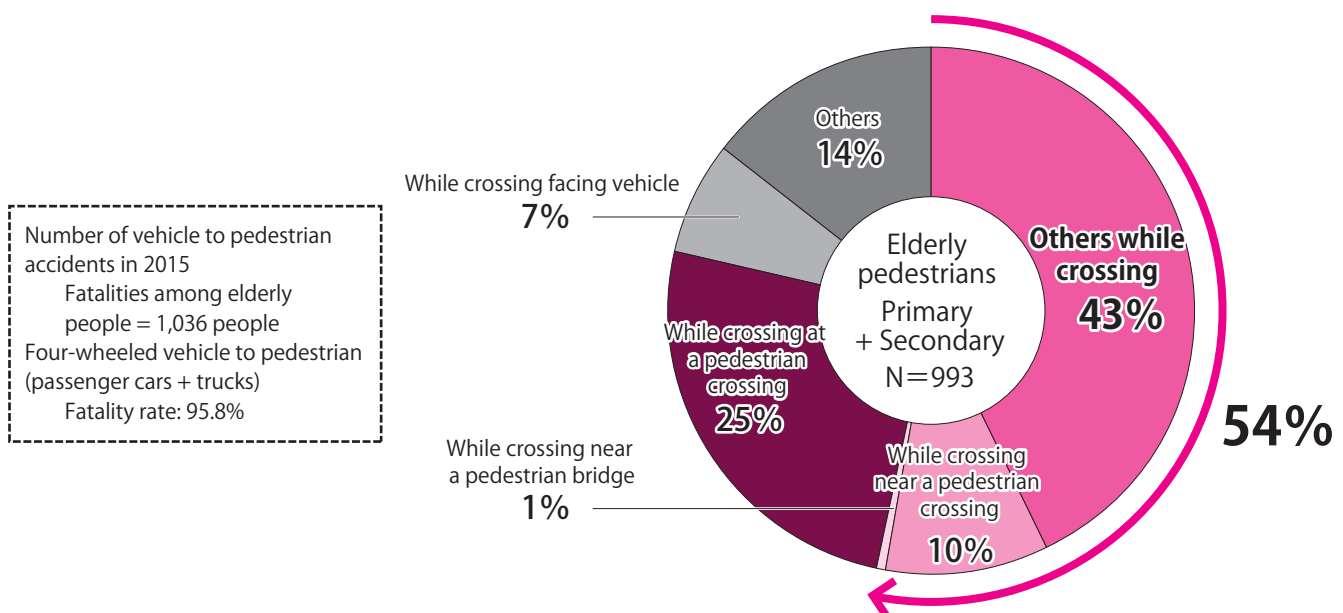


Fig. 2. Fatality rate among elderly pedestrians by type of accident

2 Time periods and locations where fatal accidents involving elderly pedestrians while crossing the road frequently occur

The graph on the front cover shows the number of fatalities from collision accidents with vehicles while elderly and non-elderly people are crossing the road at locations other than pedestrian crossings by time periods. The number of fatalities among elderly people vastly exceeds that from among non-elderly people at all times except between 22:00 - 5:00 at night. This reveals that fatal accidents occur in a concentrated manner in the early morning, the first half of the morning, and for several hours at around sundown on into the evening, especially between 17:00 - 20:00. An analysis of accidents revealed that the number of fatal accidents from after sundown into the evening is roughly 2.8-times higher as an annual average, and that accidents occur with higher frequency on Mondays out of the weekdays.

Now, at what sorts of locations do elderly pedestrians encounter accidents? Fig. 3 shows the number of fatalities among elderly pedestrians by road configuration for each time period. This indicates that many fatal accidents occur at non-signalized intersections, near intersections, and especially on uninterrupted road sections, at 47% of the total. In addition, a graph that extracts out locations where fatal accidents frequently occur is shown in Fig. 4. In heavily populated regions there tends to be a relatively higher number of fatal accidents on community roads such as municipal roads, while in non-urban areas they tend to be higher on general national highways. Fatal accidents frequently occur when the road being crossed is an uninterrupted road section where a general single lane in one direction is about 5.5 - 9m wide at 42% of the total, or within intersections at about this same size at 22%.

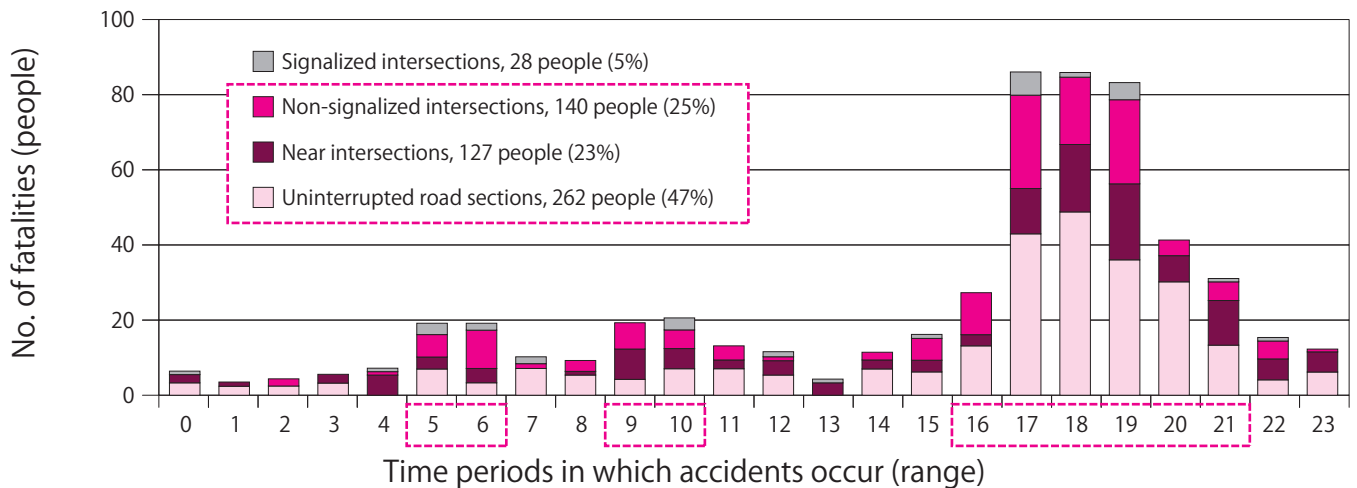


Fig. 3. Number of fatalities among elderly pedestrians by road configuration for each time period (while crossing at locations other than a pedestrian crossing)

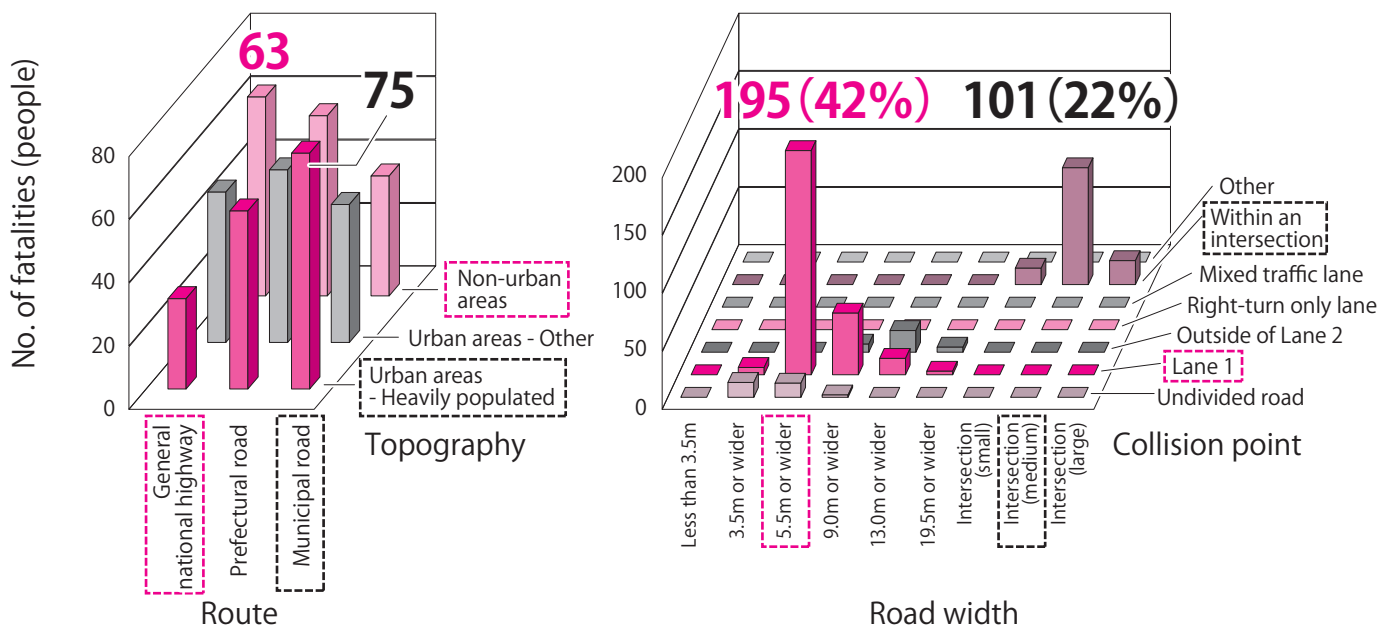


Fig. 4. Number of fatalities among elderly pedestrians by type of accident site (while crossing at locations other than a pedestrian crossing)

3 Characteristics of fatal accidents involving elderly pedestrians while crossing the road

Why do elderly pedestrians encounter accidents at these time periods and locations? The fatality rate is particularly high on uninterrupted road sections without pedestrian crossings, including non-signalized intersections and near intersections. When you focus in further on collision accidents with vehicles traveling straight on, their characteristics become apparent from the purpose and range of the elderly pedestrians' actions, the characteristics of their actions, and the factors that caused the accident.

■ Trip purposes of elderly pedestrians are diverse, but fatal accidents frequently occur within a range of 500m from their homes

Fig. 5 shows the number of fatalities among elderly pedestrians by their trip purposes in each time period. This reveals that fatal accidents occur relatively frequently during time period a. while out walking; time period b. while going to the hospital or shopping; and time period c. while shopping, going for a walk, visiting, or heading out to go dining. In the period from 17:00 - 20:00 when accidents are particularly concentrated, shopping and visiting account for roughly half of the number of fatalities during each time period. Fig. 6 shows the trip purposes and the distance from their home to the site where they encountered an accident. The majority took place on roads they are used to traveling on as part of their daily lives within a range of 500m from their homes. The areas surrounding their homes are dotted with numerous facilities like hospitals, convenience stores, department stores, and supermarkets. An analysis of the areas where accidents frequently occur revealed that pedestrian accidents tend to occur with great frequency particularly in locations where these are heavily concentrated and serve as a barrier between roads.

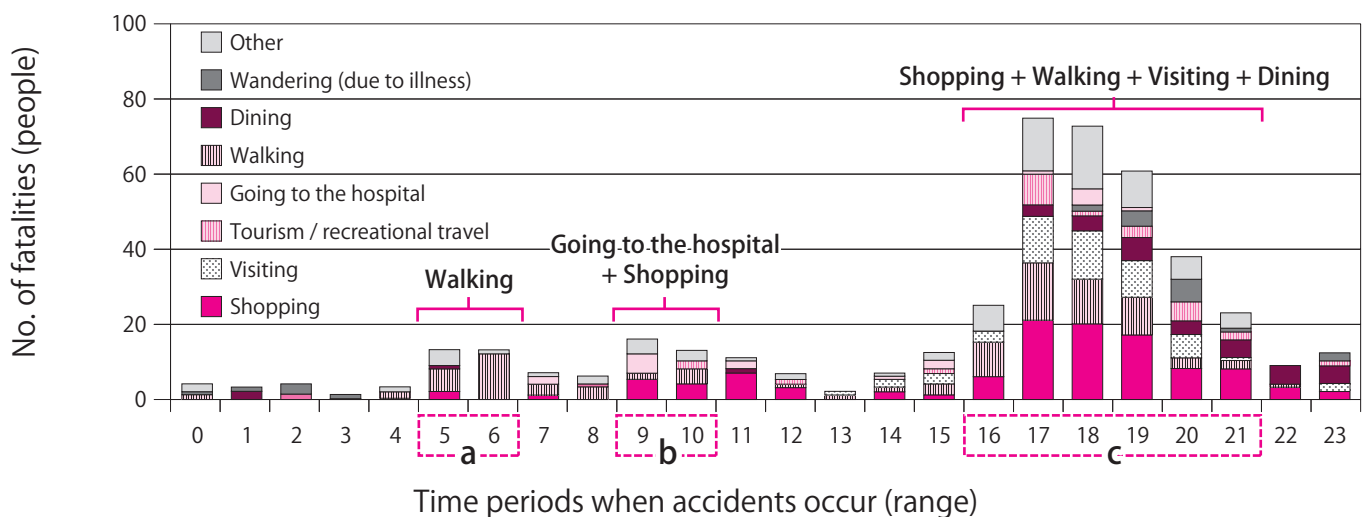


Fig. 5. Number of fatalities among elderly pedestrians by trip purpose for each time period

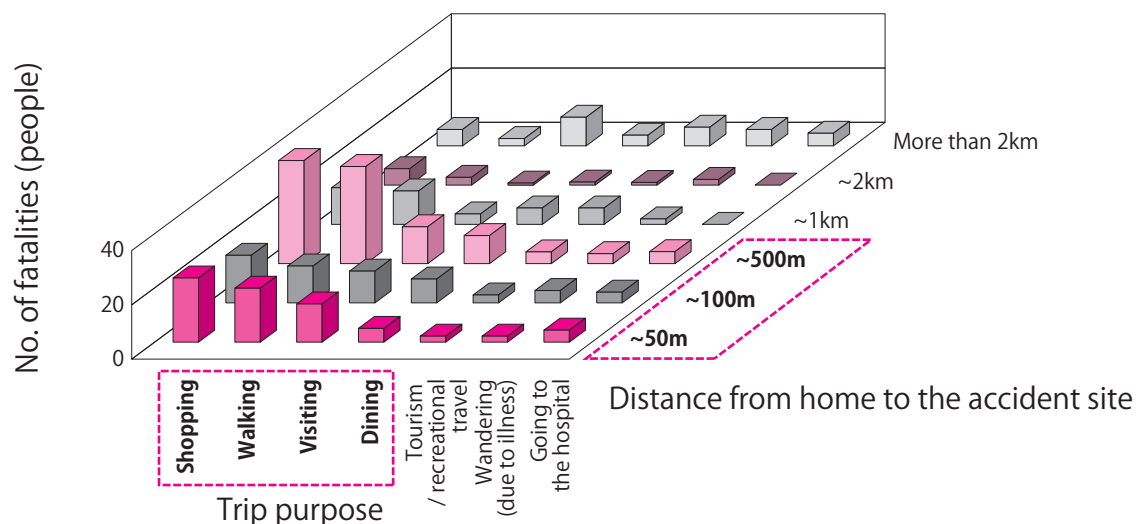


Fig. 6. Number of fatalities among elderly pedestrians by trip purpose and distance from home to the accident site

Elderly pedestrians collide with vehicles traveling from the left while in the latter half of crossing the road

Next, we will look at what sorts of instances elderly pedestrians encounter accidents when crossing the road by breaking this down into uninterrupted road sections and intersections. Fig. 7 shows the number and rate of fatalities versus the direction the pedestrian was moving while crossing the road, and the number of fatalities in the daytime and the nighttime. Accidents involving collisions with vehicles traveling from the left in the latter half of crossing the road account for 71.8% of the total. Of these, cases where they encountered accidents while crossing the road in a straight line stood out at 61.4%. Moreover, viewing the time period accidents occurred by daytime and nighttime reveals that 82% of the accidents occurred at night. Similarly, Fig. 8 shows the movements of elderly pedestrians within intersections. Accidents involving collisions with vehicles traveling from the left while the pedestrian is in the latter half of the crossing were numerous at 66.3%, similar to with accidents at uninterrupted road sections. Especially when viewed from the driver's side, cases in which collisions with elderly pedestrians crossing from the right to the left on the other side of the intersection resulting in fatal accidents accounted for the most at 40.3% of the total, with it learned that 73% of such accidents occurred at nighttime.

It is possible that these collision accidents could have been avoided if either the elderly pedestrian crossing the road or the driver of the vehicle had acted by paying attention. Next we will look at why the accidents occurred and the causes behind the accidents.

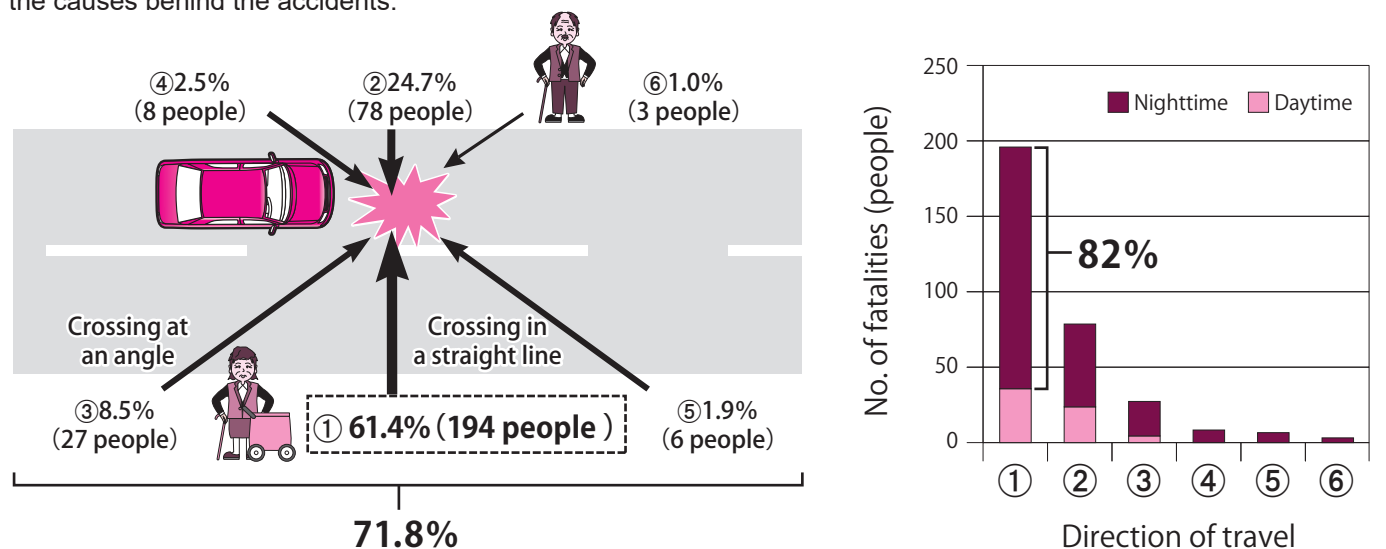


Fig. 7. Number of fatalities among elderly pedestrians by direction of travel while crossing uninterrupted road sections

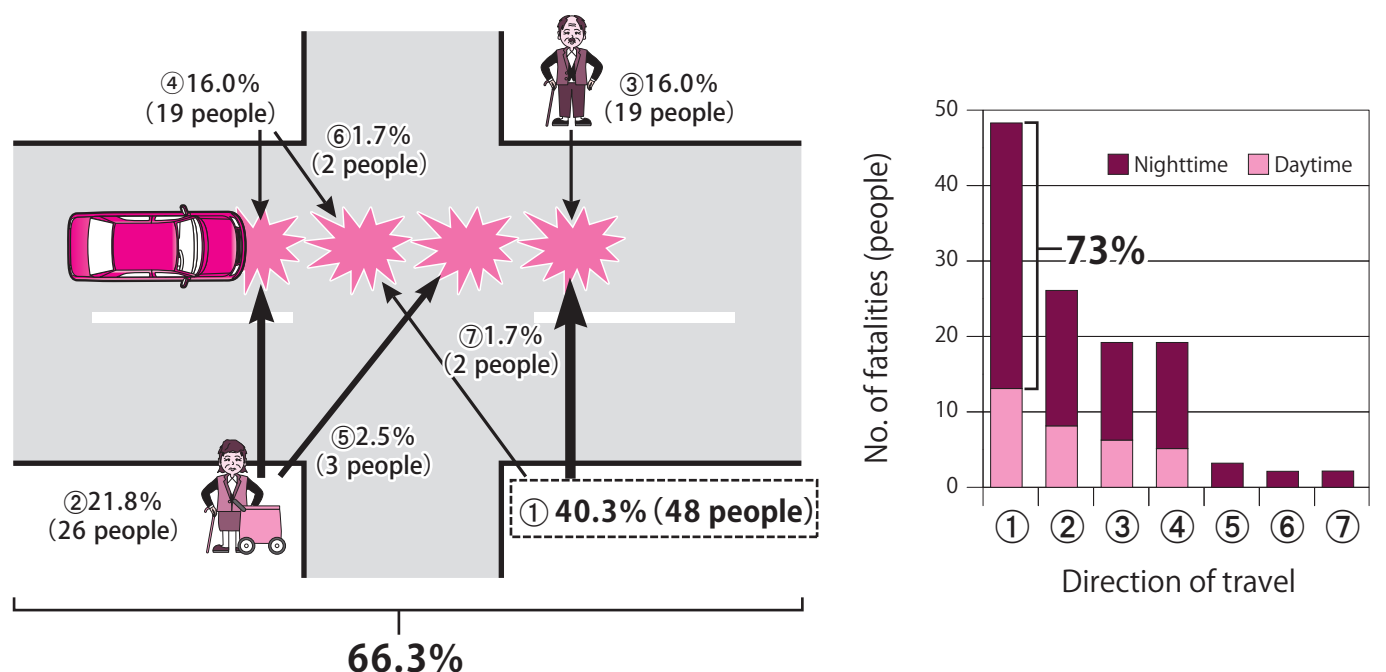


Fig. 8. Number of fatalities among elderly pedestrians by direction of travel while crossing at intersections

Legal violations by elderly pedestrians and human factors leading to accidents

The claim is made that traffic accidents while in motion are frequently caused by violations of traffic rules not only by drivers, but also by pedestrians as well. So let's take a look at what sorts of violations occur on both sides that frequently lead to fatal accidents.

Fig. 9 shows the number of fatalities among pedestrians due to a combination of legal violations by both elderly pedestrians and vehicles. As for violations by pedestrians, it was revealed that in fact 78% of violations led to fatal accidents, as evidenced by the fact that "Crossing directly in front / directly behind a moving vehicle" accounted for the most at 42% of the total. Violations by the driver in such instances involved "Violations of mandatory safe driving" in the form of failure to pay attention forward and failure to confirm safety factors in every case. In particular, failure to pay attention forward for internal reasons, such as being lost in thought or aimless driving, or for external reasons such as distracted driving or fooling around within the car, account for the majority of these.

Fig. 10 shows the number of fatalities among pedestrians when the human factors leading to accidents from both sides are combined. A "Delay in noticing" approaching vehicles because the pedestrian either failed to confirm the safety of their surroundings or did so inadequately prior to beginning to cross the road or while crossing accounted for 51% of the total. Moreover, while the fatality rate is low at 12%, the fact that accidents occur due to "Errors in judgment" prior to starting to cross the road indicates that this is a human factor that warrants attention.

Conversely, the human factors on the vehicle side feature the same categories of legal violations, with this revealing that a failure to pay attention forward accounts for the majority of these.

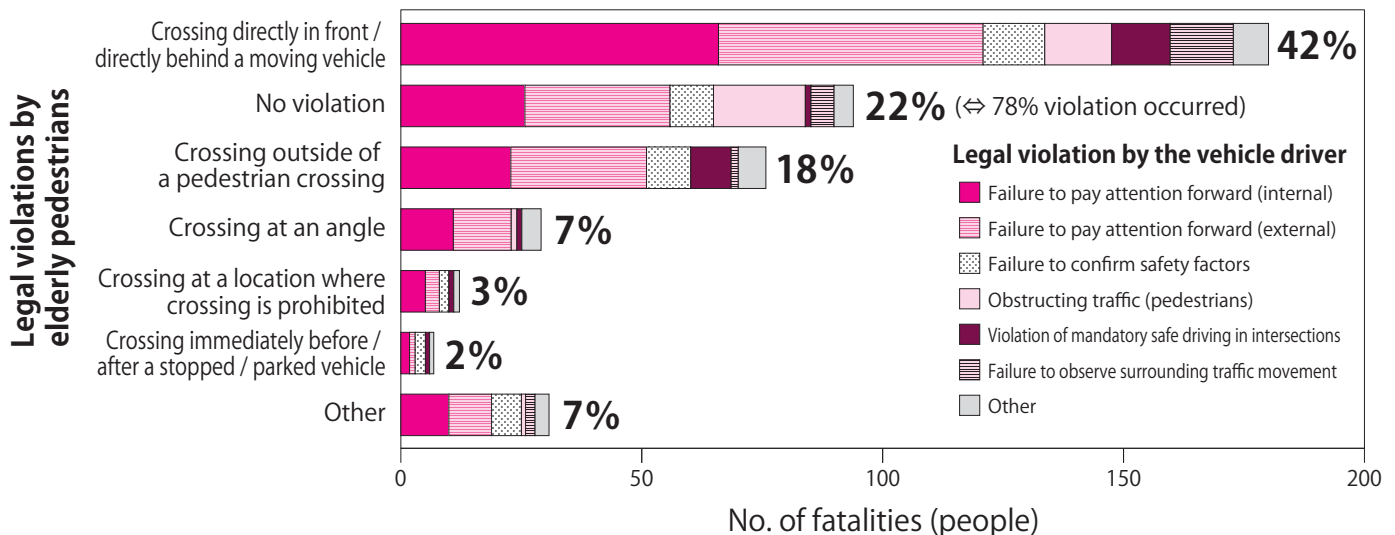


Fig. 9. Number of pedestrian fatalities by type of legal violation by elderly pedestrians and vehicle drivers

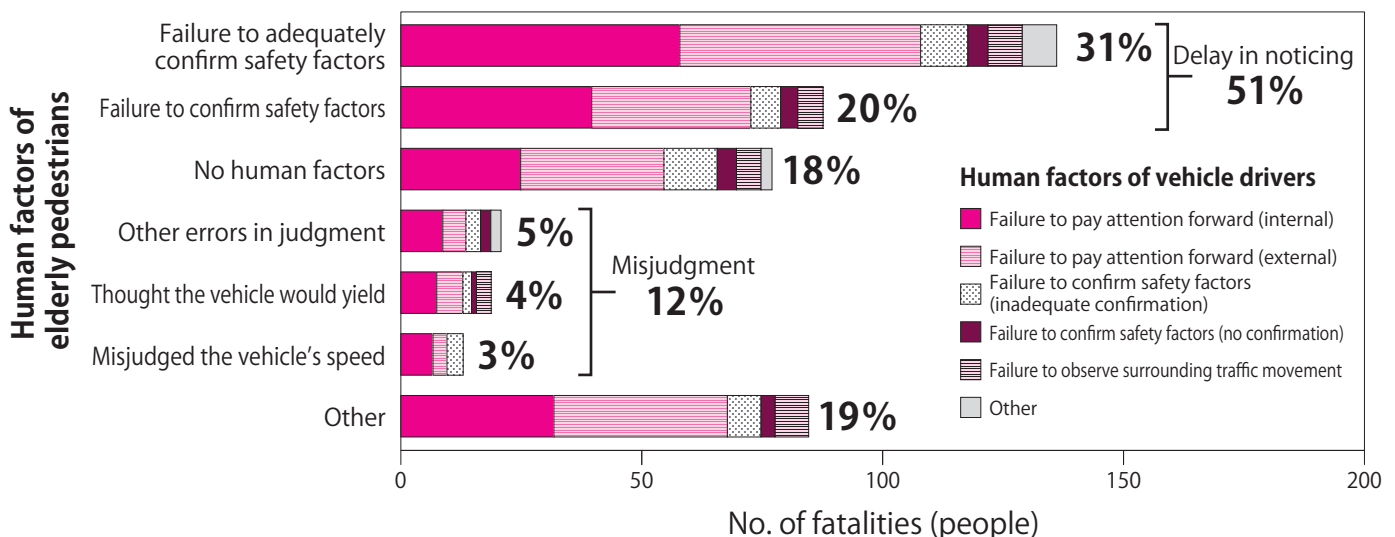


Fig. 10. Number of pedestrian fatalities by human factor of elderly pedestrians and vehicle drivers

■ Characteristics of actions by elderly pedestrians while crossing the road

As has been described above, elderly pedestrians encounter collision accidents with vehicles traveling straight ahead while they are crossing the road in particular time periods and locations, road environments, and when going out for certain reasons. Now we will look at their actions on such occasions.

Fig. 11 shows the actions of elderly pedestrians when crossing uninterrupted road sections. It shows the time that elderly pedestrians need to cross the road, the traveling distance of vehicles moving straight ahead at a speed of 50km/h from the left or right side of the road towards them, and the major series of actions taken by the pedestrians while crossing. Despite the significant range of variance in the walking speeds of elderly people while crossing, a fact-finding survey³⁾ on crossing behavior shows that on average this is 1.27 m/s.

As shown in Fig. 11, when they maintain the same walking speed it takes them roughly eight seconds from when they start crossing to go across a single one-way lane that is 9m wide, which is a road width where fatal accidents frequently occur. When pedestrians cross the road, they take the following actions: ① Cognition: See to their left and right sides if there are any vehicles approaching and confirm this visually and audibly prior to crossing; ② Decision: Estimate the speed and distance of any approaching vehicles there may be and decide whether they can cross safely judging from the road width; ③ Action: Either cross or wait based on their decision. In the roughly eight seconds that pedestrians are crossing these traffic conditions are constantly changing, so they must continuously repeat these three steps in an effort to ensure that they can cross the road safely. However, it was learned that there is a tendency for them to neglect to confirm safety factors even when they are cognizant of the fact that vehicles are approaching from both directions. For example, when they turn their attention to a vehicle approaching from the right in the lane immediately in front of them they may forget about the presence of a vehicle approaching from the left in the far lane.⁴⁾ It is also frequently the case that elderly people misjudge the speed or distance of vehicles due to declining eyesight and begin crossing, or that after they begin crossing they only focus on the direction they are moving or what is directly underfoot, and continue walking without noticing their surroundings. It is also not uncommon for them to completely fail to notice nearby vehicles due to declining hearing acuity. Noticing vehicles but being unable to cross the road in a hurry due to declining motor functions, or getting into fatal accidents due to collisions with vehicles where the driver failed to pay attention forward could be deemed characteristics of actions that are seen particularly frequently among elderly pedestrians. Together with the declining physical functions as people age, they also unavoidably experience a decline in their cognitive functions for reading the changing traffic conditions surrounding them, as well as their ability to make decisions by estimating the speed of and distance to vehicles. In order to ensure safety while crossing the road, pedestrians must continuously go through the cycle from ① → ② → ③ → ① ... and grasp the traffic conditions that are constantly changing from moment to moment. They must then reach a decision quickly based on the conditions on whether they should continue to cross or turn back, or whether they should stop and wait. Presumably, doing so should make it possible to avoid a considerable number of collision accidents.

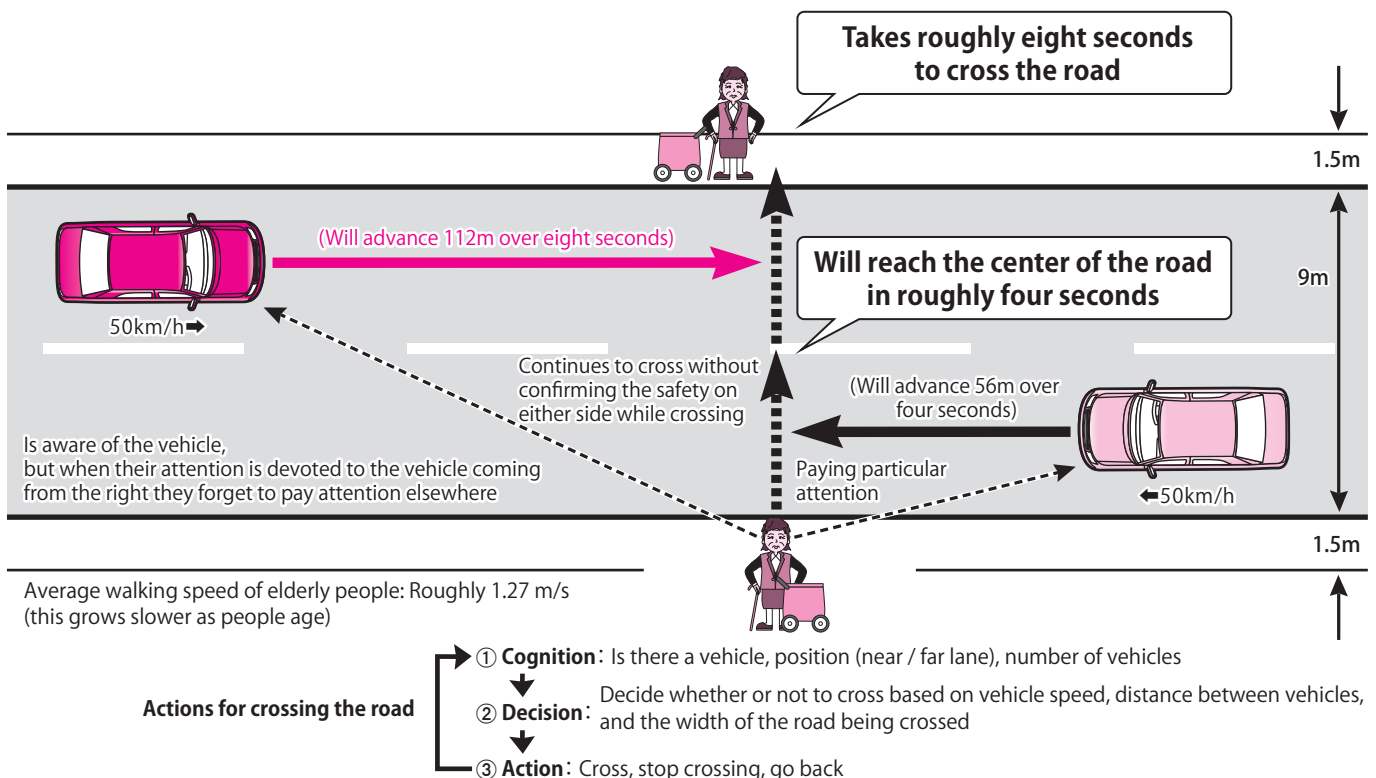


Fig. 11. Characteristics of actions taken by elderly pedestrians when crossing uninterrupted road sections

4 Conclusion

Based on the characteristics of fatal accidents involving elderly pedestrians while crossing the road, we would like to mention precautions that should be heeded by both pedestrians and drivers.

■ Precautions to be heeded by elderly pedestrians

- Elderly pedestrians should be aware of their own declining physical functions and refrain from crossing when it's unsafe to do so. When they detect a vehicle far in the distance they should wait it out rather than crossing.
- They should refrain from crossing at an angle, which takes longer to cross the road, and cross the road in a straight line.
- They should confirm safety factors from either side without just looking at what is ahead of them and underfoot when walking across the road. Particularly when they are in the latter half of the crossing, they must look at their left side to confirm any changes in the traffic conditions, and stop crossing if they get the slightest impression that it's dangerous.
- The majority of accidents occur at nighttime. As such, while it wasn't mentioned in this report, elderly pedestrians should make efforts to protect themselves by devising ways so that they can be detected right away by the drivers of vehicles. This includes by wearing clothing with colors that are highly visible, or that have reflective materials that reflect car lights attached to them.
- Even if a person is familiar with normally walking through a place, or have not been put in danger, traffic conditions are constantly changing. This familiarity and mental carelessness is what leads to a great many tragic accidents. The more familiar a person is with a place the more they must soundly confirm the safety factors while maintaining a sense of wariness.

■ Precautions to be heeded by vehicle drivers

- Drivers should turn on their headlights early before the sun goes down in order to make elderly pedestrians aware of the vehicle's presence.
- Many elderly pedestrians think that vehicles will yield the road to them. Drivers who detect such a pedestrian standing on the sidewalk or road shoulder should consider that they may cross, be cautious of their surroundings, and drive while being prepared for all eventualities.
- They should pay due attention to pedestrians standing on the sidewalks or road shoulders of oncoming traffic lanes, or those crossing over oncoming traffic lanes. Especially at nighttime, they should frequently switch their headlights between high beam and low beam in an effort to detect pedestrians sooner.
- When drivers relax their attention and drive aimlessly because they are on a road they are familiar with driving, or when their caution declines significantly because they are lost in thought, it delays them in detecting that there are pedestrians crossing the road. They should take the wheel with the awareness that there are all the more latent dangers when they are on roads they are familiar with.
- They must consider that elderly pedestrians may cross despite the fact that there are vehicles driving towards them in locations where facilities like hospitals, convenience stores, shopping centers, and family restaurants are concentrated, especially locations where they are lined up facing one another. Rather than thinking that there's definitely no way that a pedestrian would start crossing right in front of them, they must drive cautiously, especially in the several hours immediately after the sun sets.
- Paragraph 2-2, Article 71 of the Road Traffic Act clearly states that drivers must come to a temporary stop or slow down so as not to hinder the passage of elderly pedestrians who may have moving disabilities. As such, it mandates that drivers must protect elderly pedestrians.

(Hiromu Shibasaki)

Reference material

- 1) ITARDA Information No. 87: "Nighttime fatal accidents involving senior pedestrians," February 2011
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- 3) Michiaki Sekine, Yasuhiro Matsui, et. al., "Basic survey on traffic characteristics and road crossing times by elderly people for preventing pedestrian traffic accidents," overview of a lecture at the National Traffic Safety and Environment Laboratory Forum, PP38-42, 2012
- 4) Kazutaka Mitobe, Fourth Traffic Safety Education Using Simulators, People and Cars, P30-31, Jan. 2016

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