

STUDY OF CASUALTIES DUE TO EARTHQUAKE DISASTERS AND OTHER ACCIDENTS IN JAPAN

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SUMMARY

There are common and contrary factors in casualties between earthquake disaster and daily accidents in Japan. In this paper, it means that daily accidents are some kind of accidental events those occurred internal and external of housing. The purpose of this study is to examine age difference and sex difference on disaster or accident-proneness. And the difference between earthquake disaster and daily accident is made clear. As a result of the investigation, slight difference in the survival capacity due to physical force and other factors become decisively important. Death rate due to tsunami or fire after earthquake showed clear difference between male and female. Especially, women who were young mother suffered death at rather high rate because of helping their children. In general, children and elderly people were killed at higher rate. In daily accidents, male suffers death at higher rate than female. The documents of the ambulance activities in Suita City, Japan used to study about such tendency.

INTRODUCTION

The total number of casualties due to the 1995 Kobe Earthquake (Hyogoken Nanbu Earthquake) reached 5,502 killed and 41,521 wounded. These casualties were occurred directly by the earthquake. About 90% of the fatalities were crushed, suffocated or burnt to death due to the totally collapsed buildings. About half of the victims were the elderly over 60 years old. The death rate of female was slightly higher than that of male in every age group. This is a same tendency to those of the past some earthquakes.

However, it can be seen opposite tendency in daily accidents. Death rate of male is higher than that of female in such accident. Death rate distribution by age shows same tendency between earthquake and daily accident. Therefore, an investigation on age and sex difference in casualties due to the 1995 Kobe Earthquake and some major earthquakes in Japan was conducted. Afterward, the result of this investigation was compared with that of daily accidents.

CASUALTY DUE TO THE 1995 KOBE EATHQUAKE

The death toll caused by the 1995 Kobe Earthquake reached 5,502 with 2 persons missing. Table 1 shows the number of dead by each cause in Hyogo, Osaka and Kyoto prefectures. Over 90% of fatality were crush or suffocated to death by building or furniture. Because this earthquake occurred at 5:46 a.m., most of the residents in damaged areas were sleeping, and so, many people were trapped in the debris or crushed by collapsed houses. After the earthquake 294 fires broke out and some of them spread. About 10% of dead persons were burnt to death by the fire.

Table 2 shows the number of dead persons by age and sex in Kobe Earthquake. About 53% of fatality were the elderly over 60 years old. Female suffered to death slightly higher than male. These characteristics are clearer in Figure 1. This figure shows the number of dead person and death rate in Kobe City by age and sex.

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Table 1 Cause of death

	Hyogo Pref.	Osaka Pref.	Kyoto Pref.	Total
Crush or suffocated to death by building or furniture	4,823	7	1	4,831
Burnt to death by fire	550	0	0	550
Others	107	14	0	121
Total	5,480	21	1	5,502

Table 2 Number of dead persons by age and sex

Age	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-	Total
Male	128	133	227	120	206	355	247	328	253	22	2,199
Female	121	177	243	141	262	459	634	701	483	73	3,294
Total	249	310	470	261	468	814	1,061	1,029	736	95	5,493

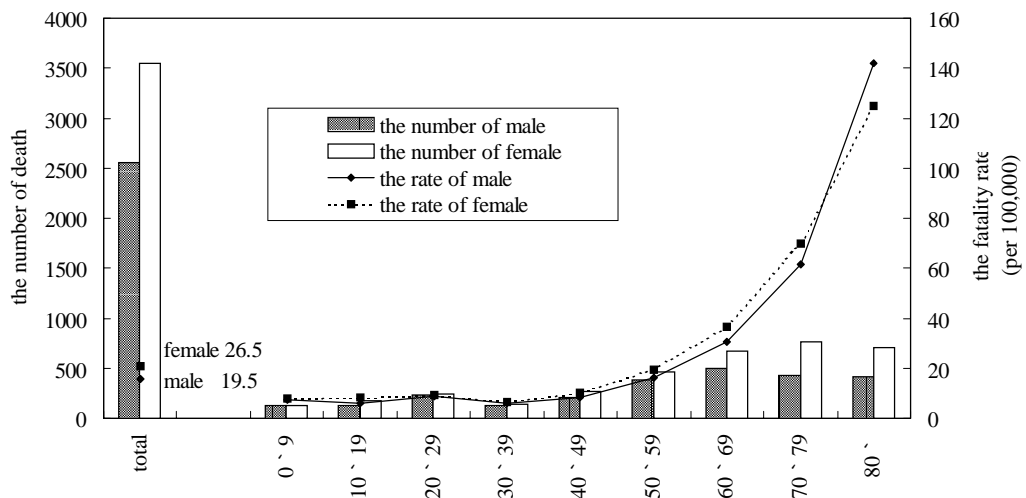


Figure 1 The number of death and the fatality rate (Kobe City)

The injured persons due to the 1995 Kobe Earthquake were as follows; 1,814 persons suffered heavy injuries, 25,028 persons suffered slight injuries, and the injuries of 14,679 persons were unknown (United Nations Center for Regional development, 1995).

Figure 2 shows the number of severely injured person and the rate of injury by age and sex. According to this figure, the difference of severely injured rate between female and male is clearer than that of death rate. The difference is more obvious at the elderly.

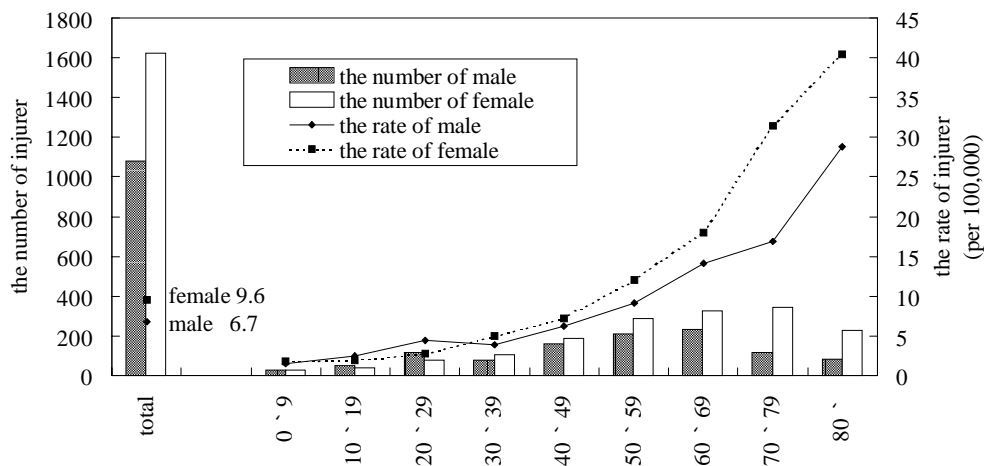


Figure 2 The severely injured person (Kobe City)

CASUALTY DUE TO SOME LARGE EARTHQUAKES IN JAPAN

There are some earthquakes those casualty data have been got in detail. From figure 3 to figure 5 shows death rate, severely injured rate and slightly injured rate each other. These figures are drawn based on six earthquakes as below; Niigata, 1968 Tokachi-oki, Izuoshima Kinkai, Miyagiken-oki, Urakawa-oki and Hokkaido Nansei-oki Earthquake.

According to figure 3, the death rate of the elderly is higher than that of younger generation except young children. Also, female suffered higher death rates than males. This is a typical tendency in some large earthquakes in Japan.

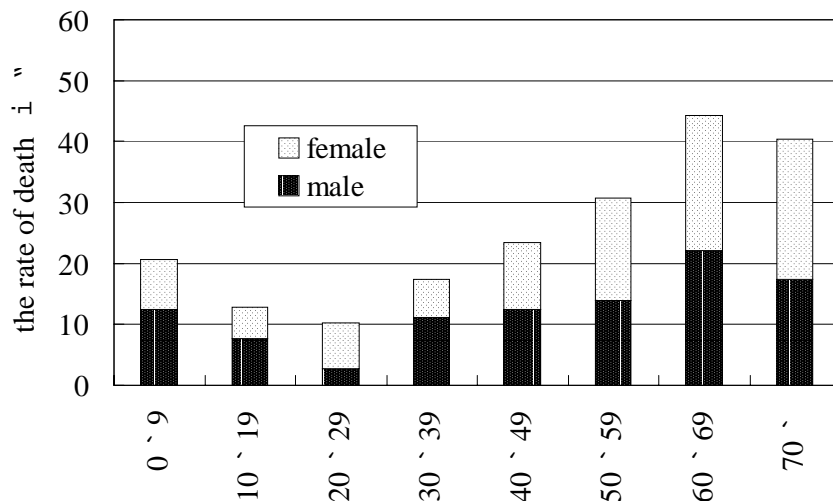


Figure 3 Age and sex difference in death rate due to the large earthquakes in Japan

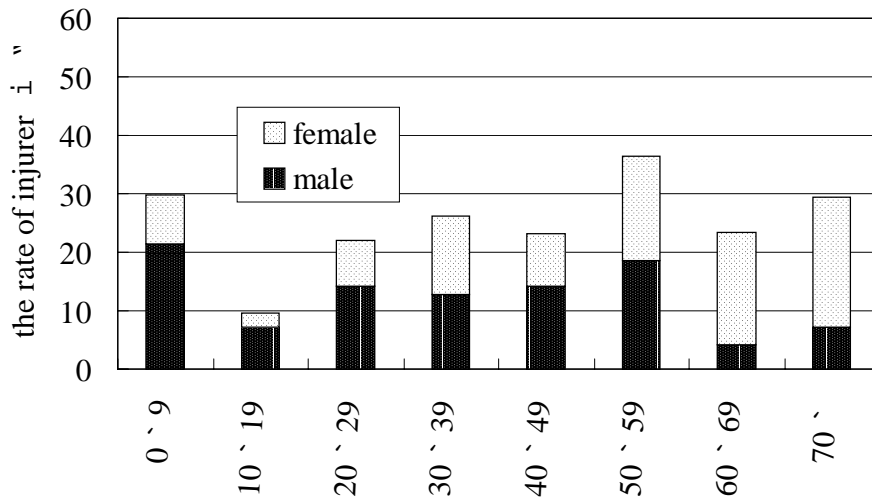


Figure 4 Age and sex difference in the rate of severely injured person due to the large earthquakes in Japan

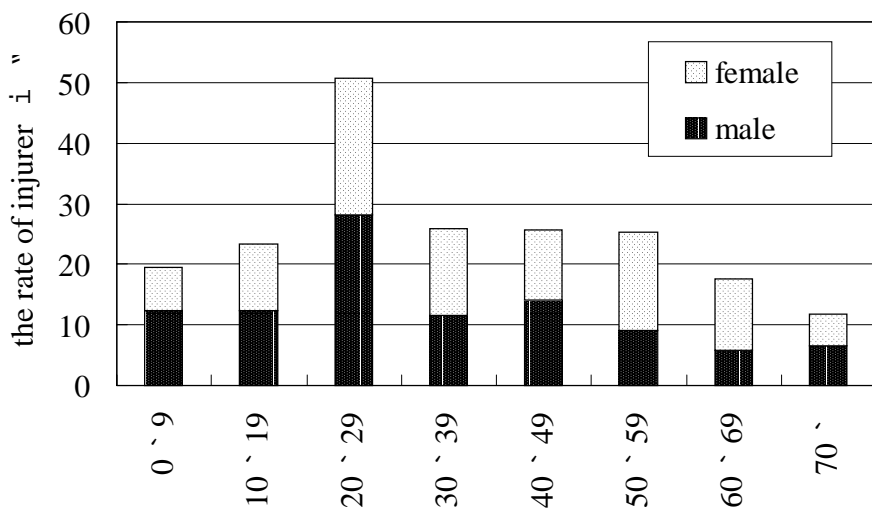


Figure 5 Age and sex difference in the rate of slightly injured person due to the large earthquakes in Japan

Figure 3 and figure 5 clearly show opposite tendency. Young men and women survived and got off with just a slight injury. In figure 4, sex difference at injury rate of the elderly is clear. This fact means that old women suffered most from the earthquake.

As these figure show, casualty due to the earthquake is more severe to women than men. This tendency is especially remarkable in the earthquake with a tsunami (tidal wave) and a large-scale fire.

In this case, it is characteristic that the death rate of women whom in one's twenties or in one's thirties, young mother, is high. The reason why young mother became victims was that they could not escape from tsunami or large-scale fire because of helping their children.

CASUALTY DUE TO DAILY ACCIDENT

The survey of daily accidents based on the injuries obtained through ambulance activities from 1986 to 1989 in Suita City, Osaka Prefecture was conducted. Along this survey, 4206 data of the daily accidents were picked up. These data could be classified into some groups by correspondence analysis.



Figure 6 Deaths and injuries caused by daily accidents, per 1,000 inhabitants

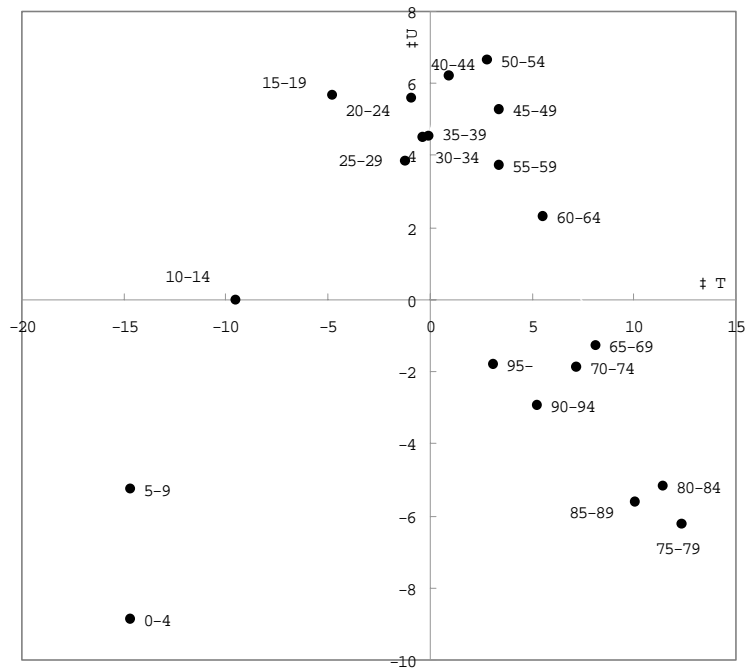


Figure 7 Result of correspondence analysis for age

Figure 6 shows accidental rate with each year group. According to this figure, the accidental rate is high in the children and the elderly. This is a same tendency to the death rate distribution at earthquakes as shown in figure

3. The accident at fall, fracture and the injury of their leg and waist come to be the major daily accidental type with aging.

As shown in figure 7, by the correspondence analysis, the age-group can be classified into three main group. And also, two factors on daily accidents were extracted, i.e. the first factor was age group, the second factor was outside-inside. Each accidental categories find position in the coordinate plane.

CONCLUSION

Death toll by the 1995 Kobe Earthquake was high at the elderly. Also, the death rate of female was slightly higher than that of male in every age group. These are same tendency in some large earthquakes those occurred in Japan. However, it was not so clear as in case of the past tsunami or large-scale fire by earthquake. Therefore, it can be presumed that under boundary conditions, slight difference in the survival capacity due to physical force and other factors become decisively important. In case of some past large earthquakes, sex difference in severely injured persons was clear rather than those of dead persons.

In daily accident, male suffers death at higher rate than female. This is an opposite condition from the death rate by earthquakes. However, over half of the victims were also the elderly in daily accidents. According to the correspondence analysis, the age-group could be classified into three main group.

REFERENCE

United Nations Center for Regional Development (UNCRD)(1995), *Comprehensive Study of the Great Hanshin Earthquake*, p47.