A STUDY ON EVALUATION OF RISK FACTORS IN DAILY EMERGENCY USING THE CALL-OUT RECORDS OF THE OSAKA CITY EMERGENCY SERVICES

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ABSTRACT :

There are many accidents in dwellings that can be classified as daily disasters, and in such accidents over 10,000 persons lose their lives every year in Japan. The overwhelming majority of the casualties due to daily disasters are the elderly or over 65 years old. And the elderly are tend to get injured severely. These tendencies are also common with natural disasters. In this research, we examined the status of daily disasters in the elementary school districts, which form the base unit of human services by the public administration in Osaka using the call-out records of the Osaka City Emergency Service for the year 1990, 1995, 2000 and 2005. According to the occurrence and spread of the daily emergency in these areas for elementary school administrative districts with consideration to time of day, place of occurrence and ages, the results show that while emergency within home in the elderly occur highest in and around the inner city that in the infants (0-4-year-old) occur in and around the city.

KEYWORDS: *Daily accidents, Call-out records, External causes, Risk factors, Elementary school districts*

1. INTRODUCTION

The Great Hanshin and Awaji Earthquake of 1995, which struck directly below an urban area encompassing diverse local characteristics, caused massive damage to the city of Kobe and the suburbs between Kobe and Osaka. The quake destroyed more than 100,000 buildings, and directly caused the deaths of 5,502 people—the greatest loss of life in Japan since the end of the war. The fact that more than half of the people killed were elderly has given rise to a new recognition of the particularly high risk of harm that accidents and disasters pose to elderly people. Incidentally, apart from the unexpected occurrence of natural disasters such as earthquakes, people are also vulnerable to the many types of accidents and incidents that can occur in their living environments. In addition to fires and traffic accidents, these include unforeseen accidents in the home. Each year 10,000 people in Japan die from accidents at home. As in the case of natural disasters, the overwhelming majority of the people who die in these “daily emergencies” are elderly. Thus, the age dependency of the fatality risk is a common feature of the two kinds of emergencies.

There are two kinds of data that express daily emergencies—population statistics that only consider deaths, and emergency service call-out records, which consider both deaths and injuries/illnesses.

This study analyzes emergency service call-out records to assess situations that do not lead to fatalities based on small-scale districts. Such an analysis would be impossible using population statistics, which are compiled at the prefecture level.

To date we have studied emergency service call-out records in the city of Osaka for the past 11 years and determined the daily emergency patterns at the levels of each of three administrative units - city (shi), ward (ku), and village (cho). The results of our age-dependency analysis show that the elderly and infants are at highest risk, and men are more likely than women to suffer harm. We also found that although the number of call-outs per year has increased over the years, the differences in daily emergency risk levels between localities have not changed.

The main risk factors associated with daily emergencies are the characteristics of the residential environments in which people live, such as building characteristics (building construction, building age, distribution by usage,

and building-to-land ratio) as well as the characteristics of the people who live in the locality (age, gender, household composition). However, although we organized the basic data according to the cities, wards and villages studied so far, we were unable to perform a suitable evaluation of local characteristics due to the unevenness of the data.
Therefore, in this study, we assessed the daily emergency characteristics for the elementary school administrative districts in Osaka using the call-out records of the Osaka City Emergency Services for the year 1990, 1995, 2000, 2005 as a FIRST step for analyzing the relationship between these results and the characteristics of the corresponding localities we tried to evaluate the risk levels of the various localities.

2. METHOD

We analyzed the 296 elementary school districts located in the 24 administrative wards of Osaka City (as of April 1, 2004) (Fig 2.1). These elementary school districts serve as the basic local divisions for disaster prevention measures, as well as for health and welfare services provided by the government. The emergency service call-out data used are from the records for the one-year period of 1990, 1995, 2000, and 2005. Emergency call-outs can be classified under a number of categories, such as fires, natural disasters, traffic accidents, work accidents, common accidents, and emergency illness, but our analysis here focuses on the external cause like common injuries, typified by unforeseen accidents, in terms of time of day and place of occurrence. The number of external injuries is extracted from the number of emergency transports, without distinction between the number of injury/illness cases and the number of accidents (Fig 2.2). The analysis method used was SPSS14.0J, and the map database was created using GIS.

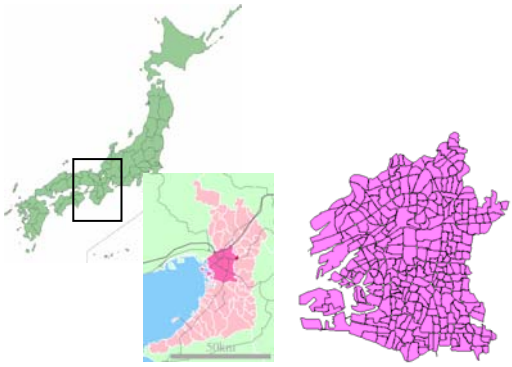

Figure 2.1 Osaka City

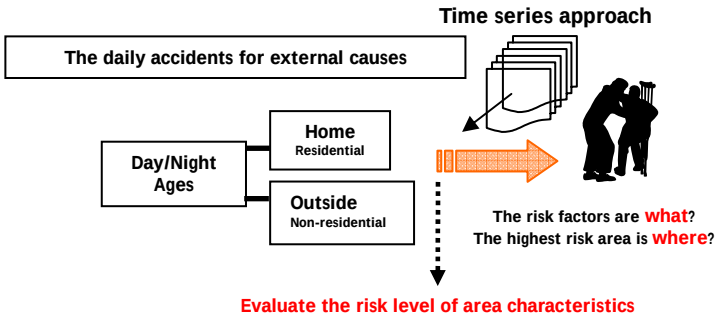

Figure 2.2 Flow charts

3. DAILY ACCIDENTS IN OSAKA CITY

3.1. The human characteristics of Osaka city

Table 3.1 The population in Osaka City each age and year

	0～4	5～14	15～44	45～64	64～74	75～	sum
1990	126,556	268,686	1185,754	716,594	186,407	119,792	2,603,789
1995	114,931	236,928	1110,045	768,699	227,750	138,133	2,602,421
2000	113,502	214,349	1080,665	742,138	275,464	169,276	2,598,774
2005	106,477	208,666	1053,944	695,907	310,715	218,977	2,628,811

The 24 wards (municipalities) of Osaka City have a total resident population of 2.6 million, with a daytime influx of 1.87 million people, and a daytime outflux of 800,000 people. Thus, the total daytime population of the city is 3.66 million (as of 2000) (Table 3.1). This corresponds to a daytime population density of 17,000 people per square kilometer, confirming that Osaka is a very densely populated city. Since the inner city and suburbs differ substantially in terms of living environment, the characteristics of the people who live there also differ significantly. So, if the occurrence of daily emergencies differs according to locality, we can conclude that local characteristics contribute in some way to daily emergencies.

In this section, we determined the basic human and physical characteristics of the 296 elementary school districts of the city.
We assess the characteristics of daily emergencies in Osaka City from the emergency call-out records of the Osaka Emergency Services for the year 1990, 1995, 2000 and 2005 and then examine the geographical differences in daily emergency characteristics across the city's 296 elementary school districts.

3.2. Osaka City daily emergency occurrence conditions

The emergency call-out records can be broken down according to parameters such as number of transports, time of year, time of day, method of alert, place of occurrence, age, gender, proximity to home, emergency type, medical treatment, injury/illness degree, cause of injury, and injury/illness type.
In Osaka City in 2005 there was a total of 204,500 transports. This corresponds to 780 call-outs and 700 person-transports per 10,000 citizens (Table3.2 and 3.3). It is growing up the number of injuries under 4 and over 65 year-old (Fig 3.1).
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Table 3.2 Each year's total of transports and person-transports

	1990	1995	2000	2005
transports	114,579	143,880	167,842	204,464
Person-transports	108,186	127,397	152,279	182,906

Table 3.3 Person-transports of external causes by each age and year

	0～04	05～14	15～44	45～64	65～74	75～	sum
1990	1,484	1,959	21,553	12,231	2,519	2,477	42,223
1995	1,587	2,075	21,137	14,333	3,580	3,745	46,457
2000	2,479	2,211	23,240	15,289	5,356	5,344	53,919
2005	2,876	2,724	24,078	15,190	7,445	8,197	60,510

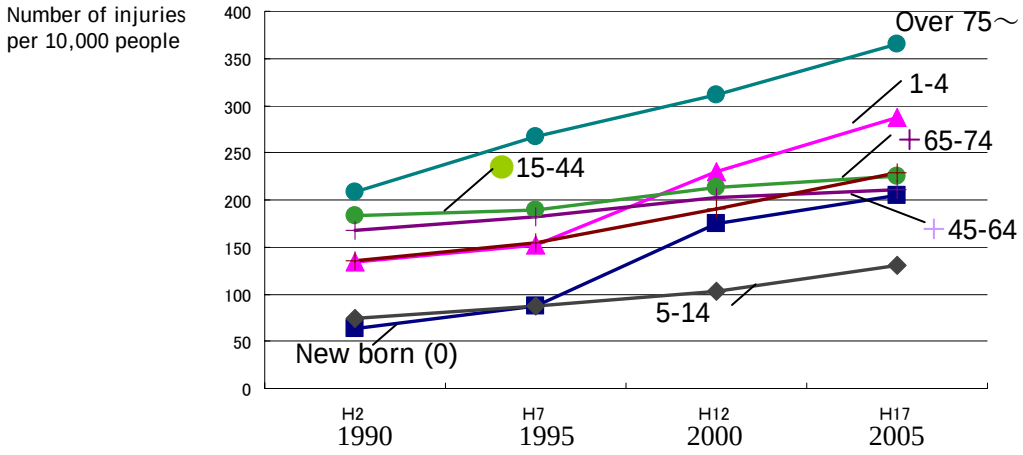


Figure 3.1 Transports of external causes(per 10,000 people)

Some of the main features of the emergency call-out records (sum of number of 4-period, 1990, 1995, 2000 and 2005) are given below.

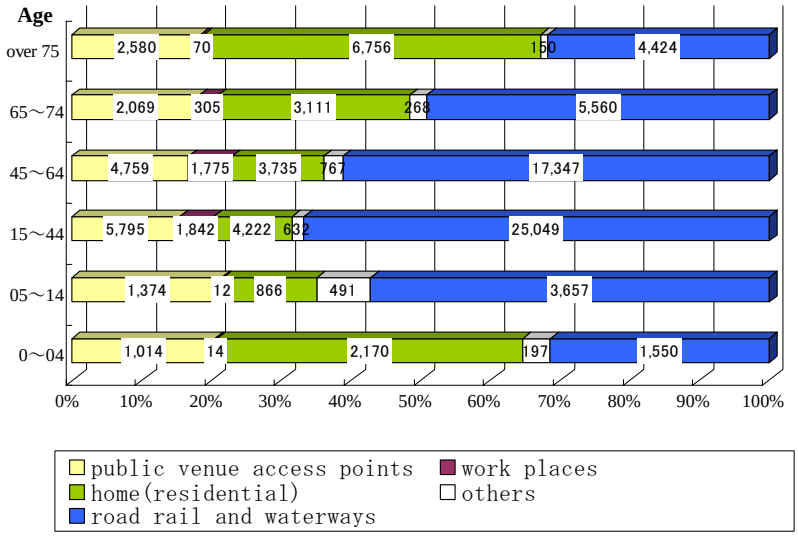
a)Time of year, time of day, alert method

A large number of call-outs occur in December and January, and call-outs occur overwhelmingly during the day. The most frequent alert method is 119 emergency dial calls followed by police reports, and private telephone calls.

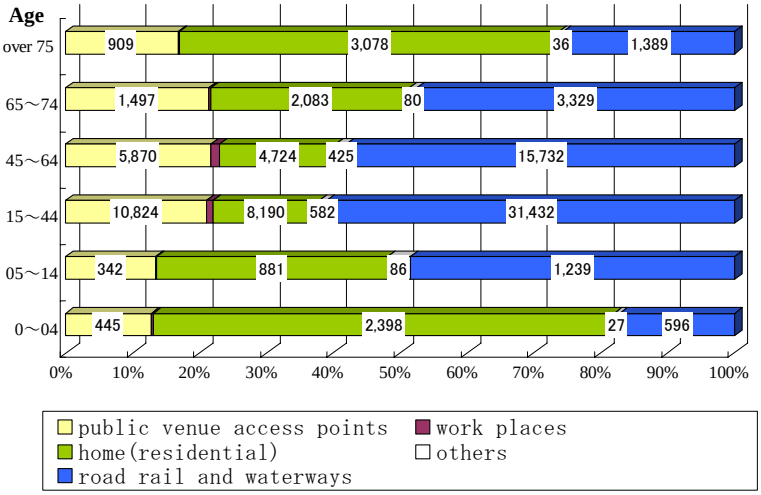
b)Place

The place of the emergencies can be broadly classified as either residential or non-residential. The most frequent were non-residential emergencies (public venue access points, workplaces, road rail and waterways; inside transport facilities, etc.). Residential emergencies occur most frequently in the living room. This is

because, often when the emergency service workers arrive at the scene, the person who discovers the emergency has already moved the affected person from the place where the problem occurred to the living room, so there can be a discrepancy between the place where the emergency originates and the place where the emergency service workers discover the affected person. Under 4 and over 65 years old are tend to get injured at home and 15～64 years old at road rail and waterways regardless of time(Fig 3.2).



Day-time (6 a.m. -5 p.m.)



Night-time (6 p.m. -5 a.m.)

Figure 3.2 Place of occurrence for ages in day/night time(sum of 4-period 1990,1995,2000 and 2005)

c)*Accident type, medical treatment, degree of injury(sum of 4-period)*

In order of the most frequent types of accident, there were traffic accidents (73,483), common injuries (61,695), emergency illness (32,304), others (27,755) and hospital transfers (3,070) (Fig 3.3).

In terms of degree of injury/illness, the most common ranking was “light” (60%). The next rankings in order of frequency were “moderate” (40%), “severe”, and “fatal”. together accounted for only 4% of all emergency call-out. The elderly are tend to get injured severely. (Fig 3.4).

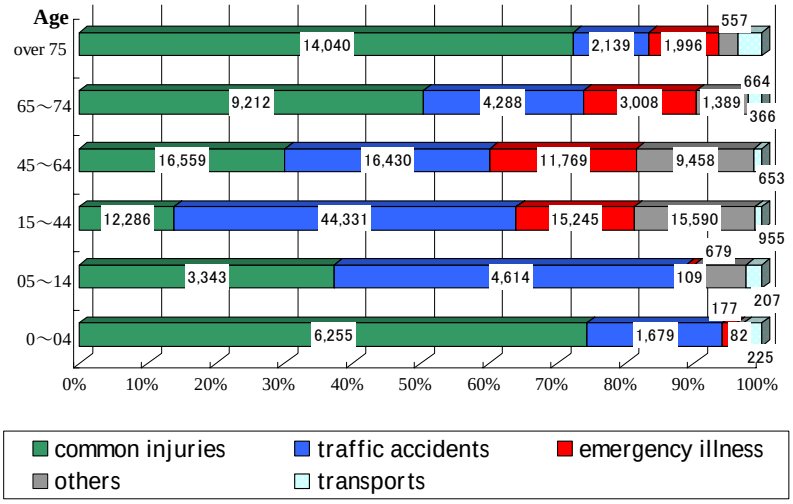


Figure 3.3 Accident type and age(sum of 4-period 1990,1995,2000 and 2005)

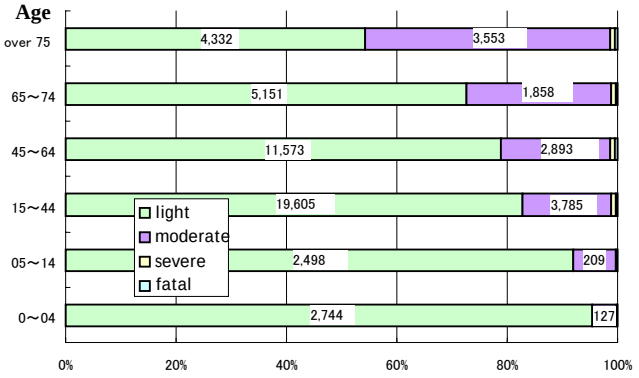


Figure 3.4 Degree of injury and age(sum of 4-period,1990,1995,2000 and 2005)

d)Cause of injury(per 10,000 people)

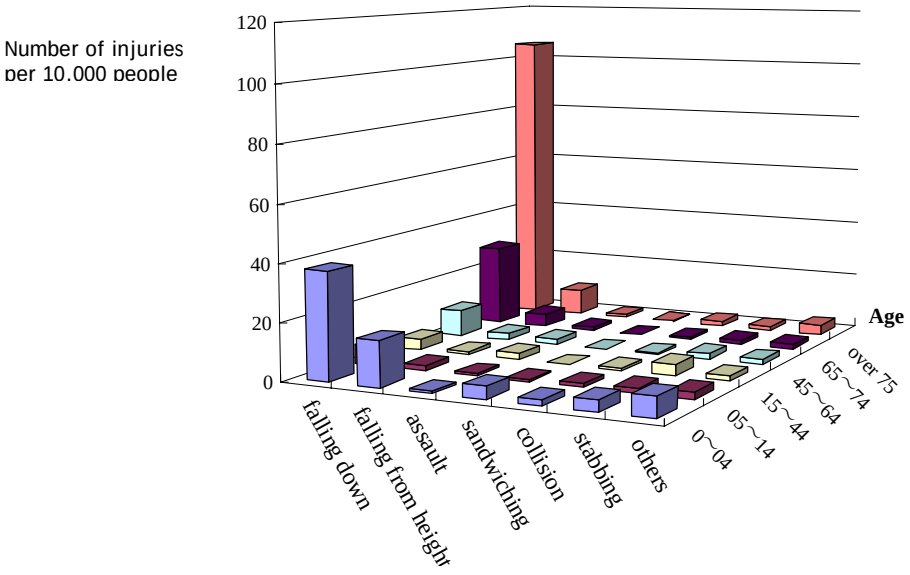


Figure 3.5 Cause of injuries in residential(at home) emergency per 10,000 people

The most frequent type of injury was “external injury,” which accounted for the overwhelming majority of cases (80%), followed by “no injury”. External injuries occur by means such as falling down, collision, sandwiching, falling from a height, assault, and stabbing. Although, regardless of places, under 4-year old and the elderly got injured by falling down, but outside, non-residential ,non-elderly especially 15-44-year old tend to get injured by falling from height and collision(Fig 3.5 and Fig 3.6).

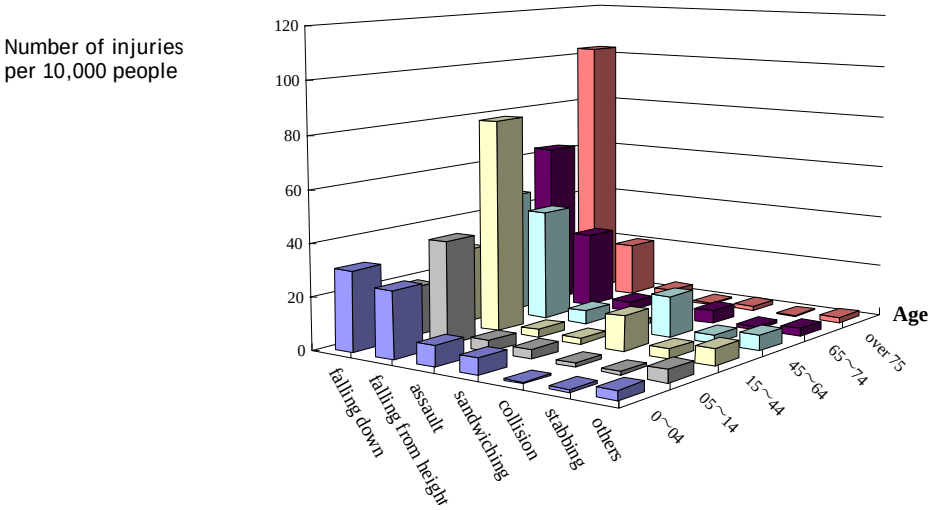
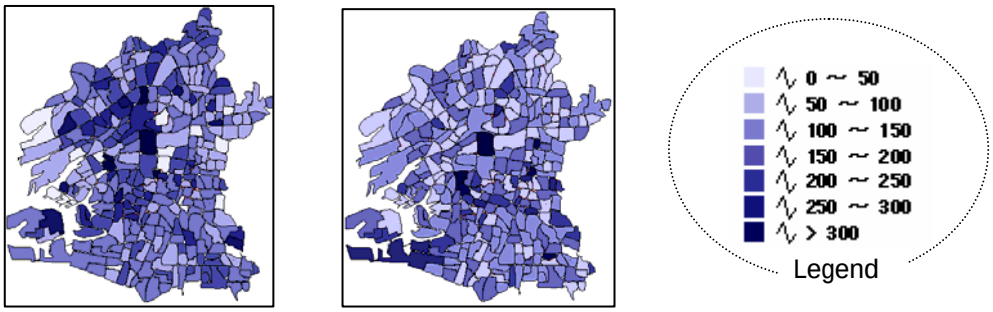
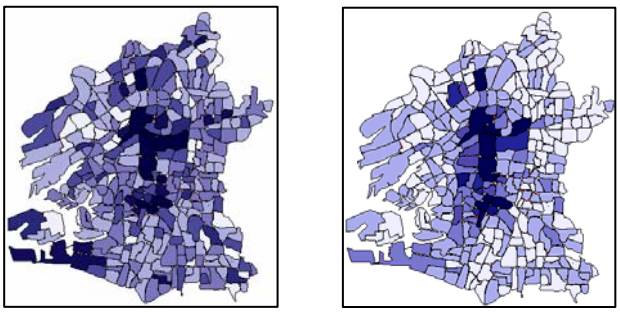


Figure 3.6 Cause of injuries in non-residential(outside) emergency per 10,000 people

3.3. Spread of the locality characteristics



Day-time (6 a.m. -5 p.m.) Night-time (6 p.m.-5 a.m.)
Residential(at home) emergency in 2005(per 10,000 people)



Day-time (6a.m. -5p.m.) Night-time (6 p.m.-5 a.m.)
Non-Residential(outside) emergency in 2005(per 10,000 people)

Figure 3.7 Locality characteristics

In this study we focus on injuries as typical examples of unforeseen accidents. We examined the injury emergencies (per 10,000 persons) in the 296 elementary school districts in terms of time of day and place of occurrence. Note that calculations of injuries occurring during the day-time (per 10,000 persons) are based on the daytime population, while calculations of common injuries occurring at night-time (per 10,000 persons) are based on the permanent population. The terms used in this analysis are defined below (Fig3.7).

a)Number of day-time residential injury emergencies (per 10,000 persons)

Although the occurrence (per 10,000 persons) of daytime non-residential injury emergencies is fairly evenly dispersed across the city, it is particularly high in the south central area. Theses areas consist of elderly people who reside in older homes. These homes are not built to endure natural disasters. It could be a factor in the number of injured in these areas.

c)Number of night-time residential injury emergencies (per 10,000 persons)

Although the occurrence (per 10,000 persons) of night-time non-residential injury emergencies is fairly evenly dispersed across the city, it is particularly high in the east area near port.

b)Number of day-time non-residential injury emergencies (per 10,000 persons)

The occurrence (per 10,000 persons) of nighttime residential injury emergencies is highest in the central and east are near port. The areas near the ports have many factories. Theses factories might be dangerous therefore causing many injuries.

d)Number of night-time non-residential injury emergencies (per 10,000 persons)

The occurrence (per 10,000 persons) of nighttime non-residential residential injury emergencies is highest in the central and around central areas of the city. The inner city is made up of mostly commercial buildings that are very compact .although some buildings are designed to withstand natural disasters there are many buildings that are not. Because of the proximity of the building is effected it can in turn damage surrounding buildings.

4. CONCLUSIONS AND FURTHER CHALLENGES

In this study we clarified the locality characteristics of the 296 elementary school districts in Osaka City, and we studied the occurrence of daily accidents of external causes in these areas with consideration to time of day and place of occurrence. According to the occurrence and spread of the daily emergency in these areas for elementary school administrative districts with consideration to time of day, place of occurrence and ages, the results show that while emergency within home in the elderly occur highest in and around the inner city that in the infants (0-4-year-old) occur in and around the city. The main risk factors could be associated with daily emergencies are the characteristics of the residential environments in which people live, such as building characteristics (building construction, building age, distribution by usage, and building-to-land ratio) as well as the characteristics of the people who live in the locality (age, gender, household composition).

In future work, we need to assess the area characteristics and compare the risk of daily emergencies with the risks due to natural disasters such as earthquakes and to comprehensively study potential risk factors associated with locality in daily and non-daily emergencies (Fig4.1).

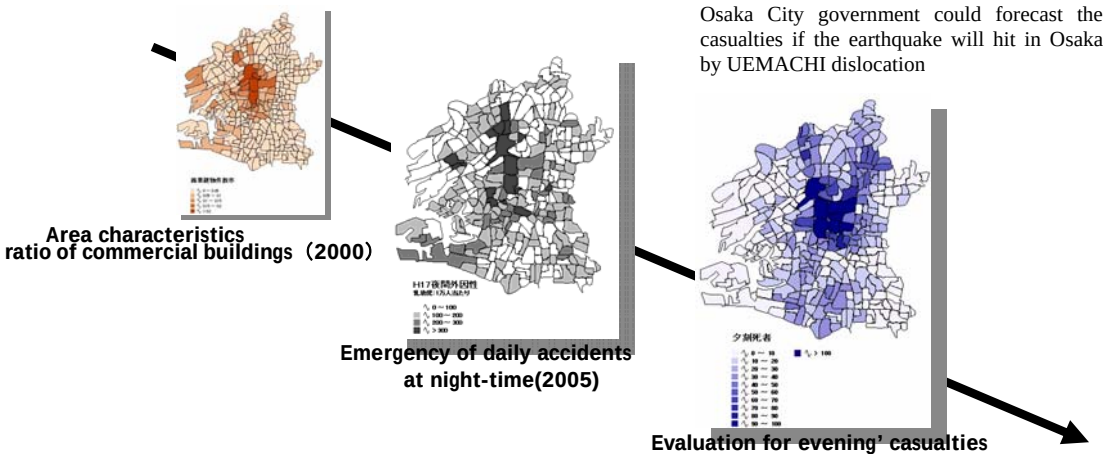


Figure 4.1 Image of link between daily and non-daily emergency risk

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