THE RELATIONSHIP BETWEEN THE ACTUAL CONDITIONS OF "ISOLATED DEATH" AND RESIDENTIAL ENVIRONMENTS IN DISASTER RESTORATION PUBLIC HOUSING

Case of the Great Hanshin-Awaji Earthquake

Masato TANAKA

Urban Research and Planning Office., Inc., Kobe City, Japan
Managing Director, Dr. Eng.
t_toshichosa@m7.dion.ne.jp

1. Introduction

This study focuses on the "isolated death" occurrences in Disaster Restoration Public Housing and attempts to grasp the relationship between the actual conditions of the "isolated death" and residential environments. The main data are reports issued by the medical examiner's office and the police.[1]

What is "isolated death"? Isao Nukata defines it as people who have a low income, chronic disease and are completely socially isolated die of sickness or commit suicide in a very bad dwelling or the peripheral environment.[2] That is to say, it is distinguished from death that occurs when a person is alone by chance despite relations with family, relative(s), friend(s), or community. This study pays attention to such "isolated death" as the death after becoming socially isolated.

However, even if such a distinction is possible in theory, it is difficult to actually distinguish. This is because all the cases of "the victims of living alone die alone at home" are considered to be "isolated death". We redefine "isolated death" through the analysis of the following chapters.

"Isolated death" has been regarded as a symbol of the lack of human relationships in public temporary housing.[3] However, no solution to this problem was discovered, and the number of "isolated deaths" reached over 230 in about five years until the time when public temporary housing was closed.[4] After that, the "isolated death" problem remained and was continued as a problem of Disaster Restoration Public Housing.

Of course, the "isolated death" problem in Disaster Restoration Public Housing was recognized as an important issue of the disaster stricken municipality. In fact, watch support measures (ex. "LSA Life Support Adviser" and "SCS Senior Citizen Supporter") have been established.[5] Certainly, such support is important, but in addition, the consideration of the following 2 points is essential.

First, is the "isolated death" problem resolved adequately by the watch support system? Nukata (2005) describes that no matter how much the safety confirmation by watch support is strengthened in Disaster Restoration Public Housing where a lot of single senior residents dwell, there is no solution to the problem.[6] Actually, the number of "isolated deaths" in Disaster Restoration Public Housing has not decreased as will be discussed later.

Secondarily, what factors contribute to the increasing need for watch support? Shiozaki, Tanaka, et al. (2007) clarify that the difference of the spatial characteristics of recovery housing (location, scale, and residence floor) influences the formation of human relations of residents and contributes to residents' social isolation[7]. Namely, needs for watch support has grown by residents moving into Disaster Restoration Public Housing.

If there is a limit in the watch support, it is important to target the resources toward the people who need them most. We need to clarify what kind of residents in what kind of room of what kind of Disaster Restoration Public Housing died an obscure death after becoming socially isolated.

There is an accumulation of studies of "isolated death" in the medical field. For instance, Ueno et al. (1998) clarify the following: 1) There are a lot of "isolated death" of males especially 50-69 years old. 2) 40% of males 54 years old or younger died of liver

disease. 3) Many of them have a long history of drinking and chronic alcoholism. Nukata (1999) also points out similar findings based on clinical experience.

However, there is little research which considers the spatial implications of the site of "isolated death". This research first observes the number of "isolated deaths" in Disaster Restoration Public Housing and changes in these numbers overtime. Next, the relation between the number of deaths and characteristics of the residential environment of the housing is analyzed. Finally, we redefine "isolated death" and propose ways to create Disaster Restoration Public Housing which does not cause "isolated death" in future disaster restoration.

What space has caused "death after becoming socially isolated"? This is one of the most basic and definitely important questions to examine the ideal way to supply, plan and design recovery housing in the disaster stricken urban area.

2. Method and Outline of "Isolated Death"
2-1. Research Method

As described in the introduction, the main data of this article are reports issued by the medical examiner's office and the police. The information for the analysis is acquired based on this material.[8] The research subject is all "isolated death" in Disaster Restoration Public Housing located in Higashinada Ward, Nada Ward, Chuo Ward, Hyogo Ward, Nagata Ward, Suma Ward, and Tarumi Ward, Kobe City. As for Disaster Restoration Public Housing, the ones leased from the Japan Housing Corporation and private organizations are included besides those that the local government constructed and reconstructed. Table 1 shows the number of housing complexes and the units included in this research.

The procedure of the selection of "isolated death" is as follows: 1) 403 cases of residents of Disaster Restoration Public Housing are selected from 9,894 reports issued by the medical examiner's office from 1995 to the end of 2003. 2) 190 cases that died alone at home living alone are selected. These 190 cases are analyzed as "isolated deaths". The analysis criteria is shown in Table 2.

Tab.1 The Number of Housing Complexes and the Units included in This Research

		Higashi nada	Nada	Chuo	Hyogo	Nagata	Suma	Tarumi	total
Housing Complexes	Managed by Hyogo Prefecture	3	5	6	4	4	2	1	25
	Managed by Kobe City	22	23	20	31	50	14	7	167
	total	25	28	26	35	54	16	8	192
Units	Managed by Hyogo Prefecture	218	729	1,102	734	288	238	144	3,453
	Managed by Kobe City	1,316	1,008	1,210	1,183	1,403	1,037	1,739	8,896
	total	1,534	1,737	2,312	1,917	1,691	1,275	1,883	12,349

Resource) Reports of Disaster Restoration Public Housing by Local Municipality

Tab.2 The Analysis Criteria

Criteria	Contents of Data
Situation of Death and Discovery	Date of Discovery/Factor of Death/Presumed Time of Death/
Situation of Housing	Address/Name of Housing/Residence Floor
Attribute of Victim	Age/Job/Family
Health Condition of Victim	Disease/ADL/Dementia/Drinking

2-2. The Number of "Isolated Death"

Figure 1 shows the number of cases according to the age at "isolated death". There are a large number of cases especially from 50s to 70s. The number of males is more than that of females except for those in

their 80s. Young people from 20s to 40s also exist though in small numbers.

"Isolated death" increased greatly from 1998 till 2000, and afterwards, the number of deaths varied between 30 and 50 [figure 2]. But the number of residents of Disaster Restoration Public Housing has also increased and the share of the elderly is high overall. It is guessed that the number of deaths has increased as time passed. Therefore, "isolated death" as the ratio might not necessarily increase. However, an increase in death of these under 60s until 2000 is remarkable as shown in figure 3. An increase of "isolated death" is not necessarily due to only the residents' aging.
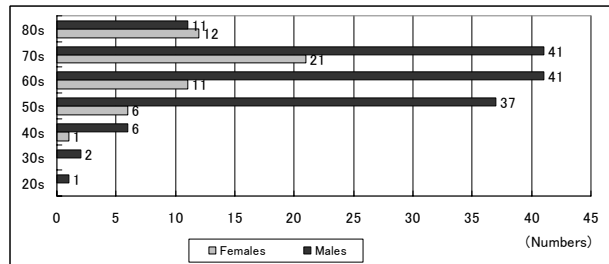

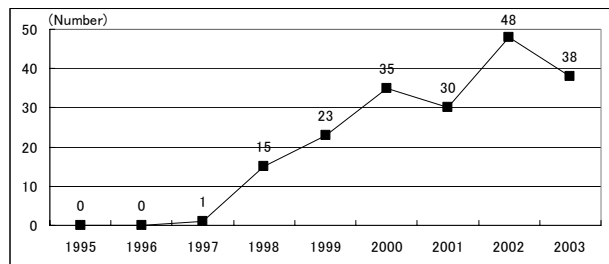Fig.1 The Number of Cases According to the Age at "Isolated Death"
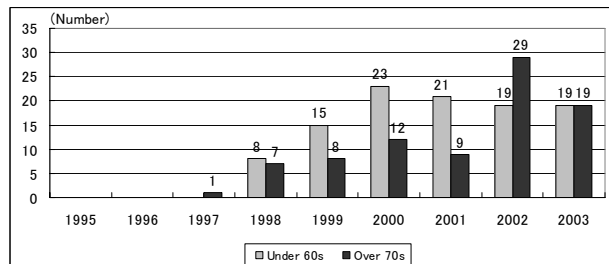

Fig.2 "Isolated Death" by Year

Fig.3 "Isolated Death" by Year according to Age

2-3. "Isolated Death" and "Elapsed Time"

The discovery date and time of death are recorded in reports issued by the medical examiner's office. The difference is "elapsed time from the death till the discovery". It is assumed to be an index that measures whether it is "death after becoming socially isolated". That is to say, it is considered that victims were in isolated circumstances as the elapsed time is longer.

Certainly, there are cases discovered by chance immediately after the death though they were completely isolated, and oppositely, there might be cases which were discovered later by chance though they have the chance of daily and rich community contact. But it can be said that many of the diseased that nobody had noticed for several weeks after death had lost the chance for contact with family, friend(s),

and community. It is thought that elapsed time is related to richness/poverty of social contact in most cases.

The X axis of Figure 4 indicates the elapsed time (days) and the Y axis indicates the proportion of all "isolated deaths" that were discovered by that time (accumulation). The cases discovered within a day are 30% or more, and the longest delay is 210 days (right edge). The distance between points in the X direction increases after 15 days, and the distance increases further after 60 days. Figure 5 looks at the first 30 days. The inclination of the line becomes closer to horizontal once reaching the 6 day mark. In short, there are turning points at the elapsed time of one week, two weeks, and two months. Anyway, the fact that "isolated death" when one week or more has passed before discovery after death exists at a rate of 30% or more is important. In the following chapter, we pay attention to the cases where such an elapsed time is one week or more, and analyze them.
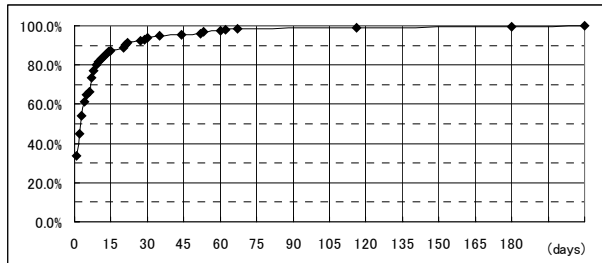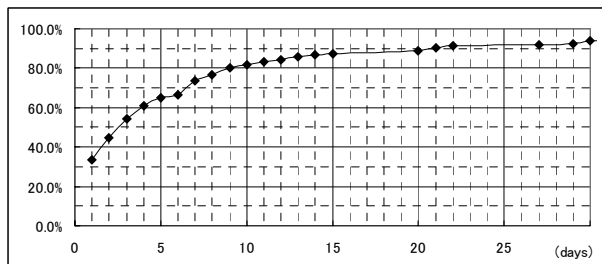

Fig.4 Elapsed Time until Discovery

Fig.5 Elapsed Time until Discovery (the first 30 days)

3. Factors that Influence Elapsed Time

First of all, the age groups contained in cases where the elapsed time until discovery is one week or more is considered. There are more young people compared to the case where discovery time was less than one week [figure 6]. In the case where discovery time was less than one week, people in their 70s account for 50% or more of total death. On the other hand, people in their 70s account for 30% or less of the total death in the case where discovery time was one week or more, conversely, the rate for those under 50 reached 43.7%. "Isolated death" is not limited to the elderly.
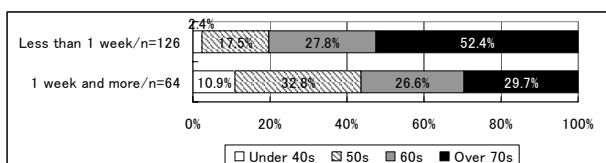

Fig.6 Elapsed Time until Discovery according to Age

However, there is a considerable difference in the case where the elapsed time until discovery is one week or more. We call the cases where the elapsed time until discovery is relatively long the "delayed discovery" group, and the elapsed time until discovery is short the "early discovery" group. Why were some people discovered earlier or later than others?

3-1.Death by Year and Elapsed Time

The relation between deaths by year and elapsed time is shown. Figure 7 is a box plot where the X axis is elapsed time and the Y axis is deaths by year. The top of the box is the 75th percentile and the bottom is the 25th percentile. The heavy line in the box is the median. A small circle sign shows the outlier. The outlier is a value 1.5 times or more of the interquartile range (length of the box) from the top or the bottom of the box away. The following box plots are the same.

According to this, the median and expansion of "box" sift to the discovery delay side as time passes. The cases of 15 days or more are few in 1997-1999. On the other hand, the main distribution exists around 30 days in 2002-2003. "Isolated death that is difficult to be discovered" has definitely increased. This reason is examined in the next chapter.
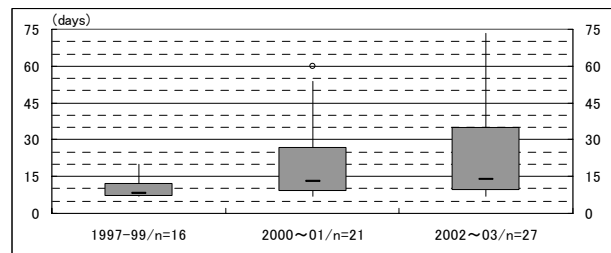

Fig.7 Death by Year and Elapsed Time

3-2. Residential Environment and Elapsed Time

Next, the influence of the surrounding residential environments of the residents in Disaster Restoration Public Housing on elapsed time is considered. Figure 8 shows the relation between elapsed time and location/building scale of Disaster Restoration Public Housing.[9] "Suburbs/waterfront" has the tendency to prolong elapsed time compared with "built-up area". But there is no significant difference. The influence of the building scale is more remarkable than the location of the housing. Large-scale buildings of "over 100 units" have more cases of delayed discovery than small-scale buildings. As for the difference of residence floor [figure 9], most cases on lower floors (1-3rd floor) and middle floors (4-7th floor) are around 15 days. On the other hand, most cases on upper floors (over 8th floor) are distributed around 60 days.

Why does a large-scale building or a multistory residence lead to discovery delay? In general, the common space on an upper floor is used by residents on an upper floor only. But this is not necessarily the case on a lower floor. It is easy for lower floor residents to have contact with outside space, but it is difficult for middle and upper floor residents. That is, an upper floor resident has fewer chances of meeting glances or passing by other people than lower floor residents. Moreover, according to the previous study, contact/communication among residents in large-scale building occurs less than in small-scale buildings.[10] There is certainly a possibility for such factors to have brought discovery delay.

However, residential environments have not influenced all residents equally. Figure 8 and 9 show that the "Box" swells to discovery delay side in multistory residence and large-scale building. At the same time, they also show that the positions in the bottom of the "box" hardly differ. That is, even if the space such as multistory residences and the large-scale buildings have brought discovery delay, the influence is limited to specific people. It is necessary to clarify what group of people are influenced.
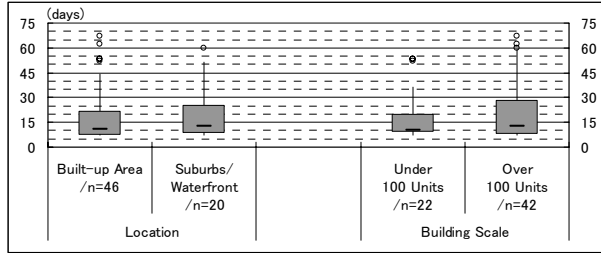

Fig.10 Location and Elapsed Time according to Working Situation
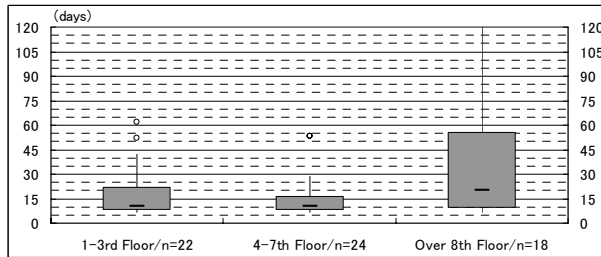

Fig.8 Location / Building Scale and Elapsed Time
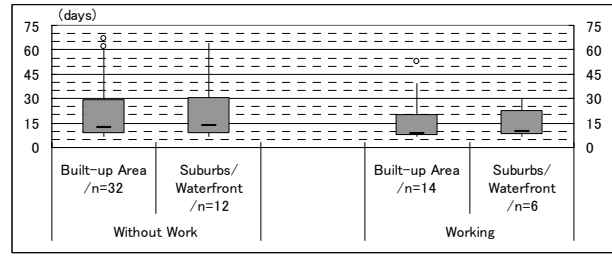
Fig.11 Building Scale and Elapsed Time according to Working Situation
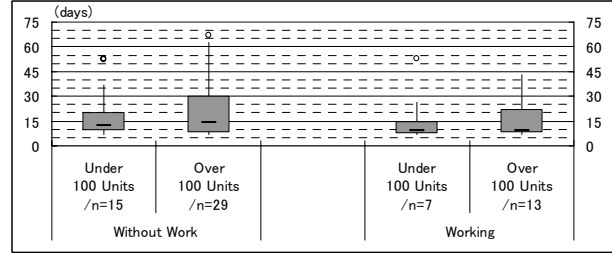
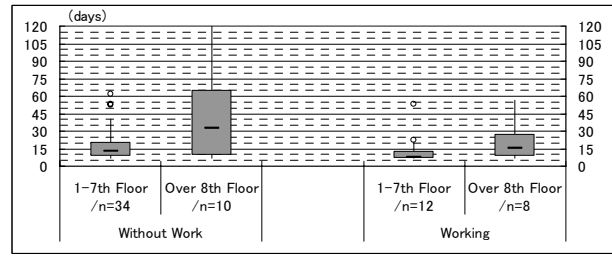Fig.9 Residence Floor and Elapsed Time

Fig.12 Residence Floor and Elapsed Time according to Working Situation

3-3. Living Condition and Elapsed Time

It is examined how the difference of living situation (working situation or tendency of dependence on alcohol) influences the relation between residential environments and elapsed time.

Working situation and residential environments cause a synergistic relation to elapsed time. Figures 10-12 show data about the location, the building scale, and the residence floor, showing the relation to elapsed time according to working situation. As being confirmed in the foregoing section, elapsed time has tendency to be prolonged in suburbs/waterfront, large scale and multistory housing. But an interesting point is that the tendency of "without work" group is more remarkable than "working" group in building scale [figure 11] and residence floor [figure 12]. That of residence floor is especially remarkable.

By the way, this "without work" group is not equal to elderly people as pensioner. Table 3 shows the breakdown of "without work." Less than 60 years old" exists to some degree in each category. This shows that "without work" group has the characteristic of poverty. In a word, specific residential environments (large scale or multistory) strongly influence the poverty and push them to discovery delay side.

How is the tendency of dependence on alcohol? As well as the distinction of working situation, the larger the building scale is, or the higher the residence floor is, the longer elapsed time [figures 14,15]. It is remarkable in the "dependence on ALC" group. Residential environments combine with working situation or tendency of dependence on alcohol to influence each other and effect elapsed time.

Tab.3 Breakdown of "Without Work" Group

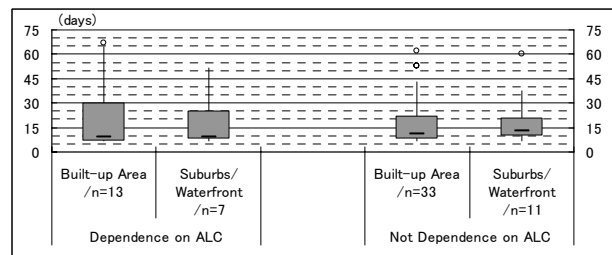|		Under 60	60~69	Over 70	Total
Building Scale	Less than 100 Units	5 33.3%	4 26.7%	6 40.0%	15 100.0%
	Over 100 Units	12 41.4%	7 24.1%	10 34.5%	29 100.0%
	Total	17 38.6%	11 25.0%	16 36.4%	44 100.0%
Residence Floor	1-3rd Floor	6 35.3%	2 11.8%	9 52.9%	17 100.0%
	4-7th Floor	7 41.2%	4 23.5%	6 35.3%	17 100.0%
	Over 8th Floor	4 40.0%	5 50.0%	1 10.0%	10 100.0%
	Total	17 38.6%	11 25.0%	16 36.4%	44 100.0%

Fig.13 Location and Elapsed Time according to the Tendency of Dependence on Alcohol
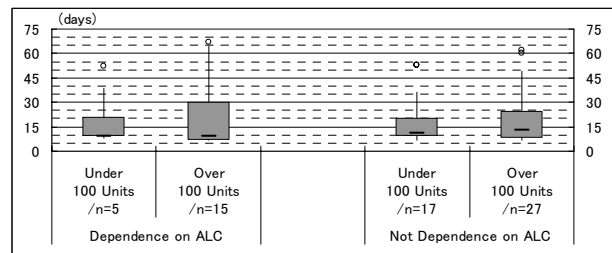

Fig.14 Building Scale and Elapsed Time according to the Tendency of Dependence on Alcohol
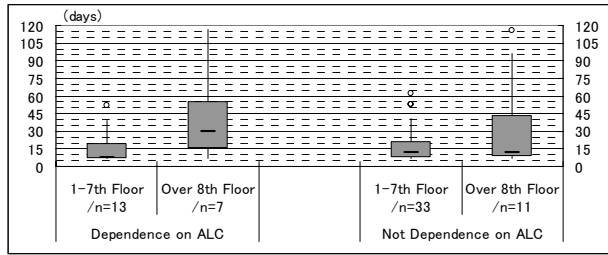
Fig.15 Residence Floor and Elapsed Time according to the Tendency of Dependence on Alcohol

However, the position in the bottom of the "Box" is not so different after all. In a word, specific living conditions or residential environments do not inevitably cause inclusion in the "delayed discovery" group. However, these results of analysis admits a high possibility and hypothesis that when residents who are in a disadvantaged situation in economic and/or physical terms move into a large-scale or multistory housing, a "delayed discovery" group with serious problems is generated.

4. Opportunity of Discovery and Residential Environments

4-1. Opportunity of Discovery and Social Contact

In the preceding chapter, the factors that influenced elapsed time until discovery were analyzed. This chapter examines factors that effect elapsed time consequentially, that is, opportunity of discovery.

Opportunities of discovery are various, but they have a close relation to elapsed time. Figure 16 shows the kind of opportunities for every elapsed time span. Opportunities of discovery were organized from the description of reports issued by the medical examiner's office and the police as shown in Table 4.[11]

Tab.4 Opportunity of Discovery

| Opportunities	Details
Accident or Unpleasant Smell	Neighbor perceived the accident or the unpleasant smell, informed it, and the victim was discovered.
No Procedure	Because arrears of rent or no reciept of the public assistance expense for a long time, staff in the public office reported, and the victim was discovered.
Sign Absence	Neighbor had a suspicion as the light in the room was kept off or not seeing his/her appearance, informed it, and the victim was discovered.
Newspapers Remain	Neighbor had a suspicion because newspapers remained in the mailbox, informed it, and the victim was discovered.
No Response	The relative, friend or helper visited (without the information of suspicion and so on), and the victim was discovered.
No Phone Answer	Because there was no response in the telephone from the relative or friend, he/she had a suspicion, visited, and the victim was discovered.
No Visit/Report	Because the victim did not come to the office or community activities, an acquaintance reported, and the victim was discovered.
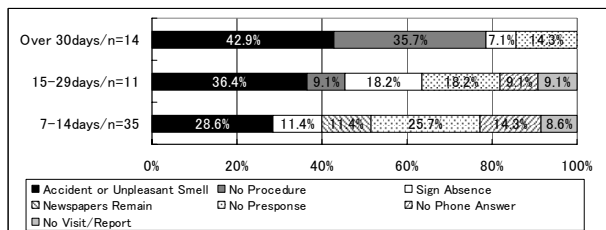
Fig.16 Elapsed Time and Opportunity of Discovery

The ratio of the cases discovered by "accident or unpleasant smell" is high as elapsed time is long. It accounts for 42.9%in cases of over 30 days. The ratio of "no procedure" has also similar tendency and 0% in cases of 7-14 days, 35.7% in cases of over 30 days. On the other hand, the ratio of "no response", "no phone answer", and "no visit/report" is high as elapsed time is short. What causes such a relation?

Perhaps, it is thought that it is based on whether there was social contact in their life.

Victims who had been discovered by "no response" or " no phone answer " had others who visited or called them. Victims who had been discovered by "no visit/report" had others who were waiting for visit or report. These could be considered that there was a social contact in daily life.

Victims who had been discovered by "sign absence" and "newspapers remain" did not have substantial contact as visit and call. However, the existence was being certainly noticed by surrounding people. Victims discovered by "no procedure" also do not have substantial contact. They have been recognized barely through the business procedure of the local government. Therefore, this group had even less contact than group of "sign absence". It is thought that victims discovered by "accident or unpleasant smell" had not been noticed even their own existence by surroundings. There would have been little social contact.

When the above is based, opportunities of discovery are understood as an amount of social contact. And they are classified into four stages ("almost none", "extremely few", "few", and "not few") as shown in Table 5. Each stage is called "Social relation level 0", "Social relation level 1", "Social relation level 2", and "Social relation level 3" in order from lower to higher contact. It can be said that the length of elapsed time synchronizes with the low degree of "social relation level" based on this viewpoint. In the next section, we analyze the relation between "social relation level" and period of generation of "isolated death".

Tab.5 Opportunity of Discovery and Social Relation Level

Opportunities	Social Contact		Social Relation Level
Accident or Unpleasant Smell	Almost None	····>	Social Relation Level 0
No Procedure	Extremely Few	····>	Social Relation Level 1
Sign Absence Newspapers Remain	Few	····>	Social Relation Level 2
No Presponse No Phone Answer No Visit/Report	Not Few	····>	Social Relation Level 3

4-2. Social Relation Level and Period of Generation

Figure 17 shows the generation number of each period according to social relation levels. As already described, the generation number has increased. What should be paid attention to is the breakdown. The value of "social relation level 0" increases steadily: 5 cases in 1997-99, 6 cases in 2000-01, and 9 cases in 2002-03. If "social relation level 1" is added up, the value becomes 5-->7-->14 in order of the period. On the other hand, the value of "social relation level 2" almost levels off: 3-->4-->4. Increase of the value of level 3 is also small: 7-->7-->9. That is to say, increase of generation number depends on increase of "social relation level 0/1".
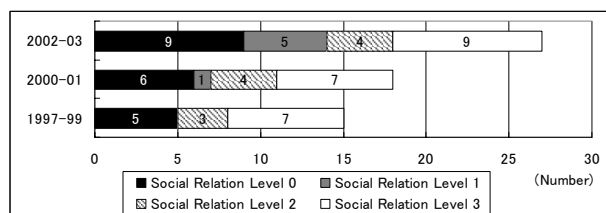

Fig.17 Social Relation Level and the Number of Deaths during Each Period

Seeing the composition ratio of each period, the proportion of "social relation level 0/1" is as follows: 5 in 15 cases (33%) in 1997-99, 7 in 18 cases (39%) in 2000-01, and 14 in 27 cases (52%) in 2002-03. It also increases as a breakdown and the ratio has been exceeding half the number in the recent period.

"Social relation level 0/1" is a category whose opportunities of discovery are "accident or unpleasant smell" or "no procedure". People included in the category hardly had substantial social contact, and it is doubtful whether their existence was even noticed by the community. Such "isolated deaths" have increased every year, and they are the majority. "Isolated death" is not a simple increase as time passed after the earthquake. Some people die an "isolated death" by accident with social contact that occurs at a constant rate and some people die an "isolated death" after losing all social contact in their life. This latter category increases.

From the viewpoint of elapsed time until discovery, it means that the number of "early discovery" group is constant, and " delayed discovery" group has increased. In chapter 3-1, an increase of "isolated death difficult to be discovered" was described. The reason has been reserved for the time being, but it is because "isolated death" of people who hardly had any substantial social contact, moreover, whose existence was doubtfully even noticed by the community has increased.

4-3. Social Relation Level and Residential Environment

Why has the number of such people increased? It can be inferred that though people who normally would have been able to avoid the circumstances such that not even their existence was noticed, were not able to do so for some reason. To presuppose a conclusion, residential environments are one of the contributing factors.

Figure 18 shows the relation between social relation level and residential environments. Looking at the ratio of the total of "social relation level 0" and "social relation level 1", that of "suburbs/waterfront" is 13.4 points higher than "built-up area" as the location of Disaster Restoration Public Housing. In building scale, the ratio of "over 100 units" is 12.5 points higher than "less than 100 units". The higher the residence floor is, the higher the ratio is, and the difference between "over 8th floor" and "1-3rd floor" reaches 35 points.

Thus, the ratio of the group for whom social relation level is low is relatively high under specific residential environments: large-scale, multistory residence, and suburbs/waterfront. It is not thought that this group is concentrated in such specific residential environments by chance. Instead, it might be that specific residential environments have influenced social relation level.

On the other hand, looking at the ratio of "social relation level 2", that of "built-up area" is about twice as many of "suburbs /waterfront" by location. The ratio of "less than 100 units" is about 2.5 times as large as "over 100 units" by building scale. The ratio of lower or middle floor (1-7th floor) occupies 21-30% while that of upper floor (over 8th floor) is 0% by residence floor. This shows exactly the tendency opposite to the ratio of "social relation level 0/1". However, the ratio of "social relation level 3" has a difference of only 4-5 points by location and building scale. As for residence floor, the difference between

lower floor (1-3rd floor) and middle floor (4-7th floor) is 12.6 point, but the difference between middle floor and upper floor (over 8th floor) is small.

It is logical that if in a specific residential environment, the ratio of the group with low social relation level is high, that therefore in not such an environment, the ratio of the group with high social relation level is high. However, the height of the ratio is mainly due to "social relation level 2", but not due to "level 3".

This is a notable result. The influence that residential environments such as large building scale, multistory, and suburbs/waterfront location exert is significant between "social relation level 0/1" and "level 2". The influence doesn't reach "level 3".

"Social relation level 2" is a category of people discovered by "sign absence" or "newspapers remain". They might not have had a substantial contact with the community, but their existence was certainly being noticed by surrounding people. On the other hand, "social relation level 0/1" is a category of people discovered by "accident or unpleasant smell" or "no procedure". It is extremely doubtful whether even their own existence was noticed by surrounding people. That is, residential environments function as devices that divide whether the existence of residents who couldn't have substantial contact with the community can be noticed by surrounding people.

Such people are noticed by surrounding people through a little chance based on an non-specified contact that happens by accident: for instance, to meet somebody's eye, to pass each other, and to detect light or noise from their room. Such contact is the last safety net of social life for them. Losing them means losing the chance that their own existence is noticed. The last safety net of their social life depends on the characteristic of residential environments such as residence floor and building scale. This can't be emphasized enough.
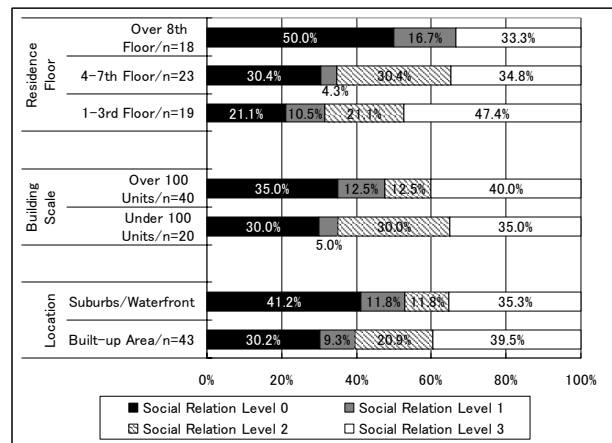

Fig.18 Social Relation Level and Residential Environment

4-4. Redefinition of "Isolated Death"

What is the relation between "isolated death" and residential environments of Disaster Restoration Public Housing? Specific residential environments do not always influence all residents equally. They strongly affect residents who are in a disadvantaged situation in economic and/or physical terms, especially those who don't have substantial social contact. They prevent generation of non-specified contact by accident. Presently the chance that their

own existences are noticed is missed. "Death after being socially isolated" happens as an inevitable consequence. This is a generating mechanism of "Isolated death".

What is "isolated death" in Disaster Restoration Public Housing? It is defined as follows: Residents who are in a disadvantaged situation in economic and/or physical terms have gradually lost social contact, and because of living in residential environments such as large-scale housing or on an upper floor, they not only have no relation with surrounding people but also are led to the circumstances that even their own existence is not noticed, and they die after complete social isolation.

5. Conclusion

The result of consideration is as follows.

1) "Isolated death" occurrences in Disaster Restoration Public Housing are not limited to the elderly, and the number has continued to increase at least until 2003. However, it is not a simple increase. Some people die "isolated death" by accident with social contact that occur at a constant rate and some people die "isolated death" after losing all social contact in their life. This latter category increases.

2) As a result, "isolated deaths that are difficult to discover" have increased gradually. One of the factors is a characteristic of the residential environment of Disaster Restoration Public Housing. The environment of a large scale or multistory housing delays the discovery of an "isolated death". However, the influence is limited to specific people.

3) Residential environments strongly affect residents who are in a disadvantaged situation in economic and/or physical terms. When residents with such disadvantages live in large residential buildings or on upper floors, they are more likely to lose opportunities for social contact and die alone.

4) The residential environment might have a fatal effect on residents who don't have substantial social contact. Such people are noticed by their neighbors through contact that happens by accident. The possibility of chance contact depends on the residential environment. The environment of a large scale and multistory housing prevents the chance.

5) Some deceased residents are discovered early and some later. This difference is not due to chance. In the cases when deceased residents are discovered after a long time, they are found by accident, not because anyone is checking on them. In a large scale or multistory housing, no one noticed that they passed away, or even was aware of their existence when alive. As expected, large scale or multistory housing leads inevitably to this kind of "isolated death".

Needless to say, the goal of this study is not to examine a strategy for shortening the elapsed time until "isolated death" is discovered. It is quite meaningless for people dying "isolated death" to shorten the elapsed time. Not so, the intention of this article is to find a way to wipe out avoidable "isolated death" by catching factors and mechanisms by which elapsed time is prolonged. Avoidable "isolated death" is "isolated death" as an inevitable consequence. It is "death which should not happen in society". What can architecture or city planning studies do to wipe out such "isolated death"? We propose some.

According to previous work by authors[12], contact with neighbor(s) of residents in Disaster Restoration Public Housing tends to be lost under a residential environment such as large-scale or multistory housing. And, people who are apt to lose relations in such environments often depend on non-specified contact like seeing other people or passing them in the neighborhood. In other words, when people who depend on non-specified contact move into a large-scale housing or upper floor, they become isolated.

This mechanism of "becoming isolated" tallies on 2 points with the mechanism of "isolated death" shown by 4-4. One is that residential environments where residents live in large-scale housing or on upper floors cause them to lose social relations. The other is that it happens to people who depend on non-specified contact. These mean "isolated death" and "becoming isolated" are on the same line. The former is on the edge as the worst ending, and the latter is located somewhere on the line showing the vector to the ending.

Disaster Restoration Public Housing has the possibility to cause "death which should not happen in society" in the future if no measures are taken.[3] If residents who are becoming isolated are recognized, "isolated death" as an inevitable consequence might be avoidable. The strategy that can be taken is as follows.

First, if environments such as large-scale or upper floor are the problem, a system where residents can move to another room or housing easily should be created. Secondarily, it is needed for all–residents who have such needs to be contacted without exception. The role of watch support should expand beyond safety confirmation and support of daily life activities but also to take the initiative to find out such needs. Thirdly, is goal of building and unit design that creates non-specified contact naturally. "Sign absence" and "newspapers remain" were the opportunities of discovery of "isolated death". It suggests the effectiveness of specification as an indoor situation that has a connection to the outside: permeable doors, windows on the common corridor side, and so on. Some such units might have to be set up. Fourthly, the most fundamental point is to reduce "becoming isolated". As for the issues, it is as shown in previous reporte.[14]

Finally, future tasks are described. This study analyzed "isolated death" from the aspect of characteristics of residential environments. However, the index treated as residential environments was only three points (location, building scale, and residence floor). Especially for location, in-depth data is required. Moreover, it can hardly be treated as a limitation of data how community and watch support activities have related to the results of this study. Though it is difficult to grasp them quantitatively, accumulation of such data to confirm the validity of results of this study is necessary.

Notes
[1] This research was able to be executed by cooperation of the medical examiners' office in Hyogo.
[2] Reference 6)
[3] 63-year-old victim living alone in public temporary housing in Amagasaki City which was one of the areas stricken by the Great Hanshin-Awaji Earthquake was discovered two days after death

on March 9, 1995. Later, the word "isolated death" was used in a press report for the first time.

4) Hyogo prefectural police announcement

5) SCS is a measure of Hyogo Prefecture and its fiscal resource is the restoration funds. The main roles are support of daily life activities and safety confirmation for the elderly. System and structural problems of watch support are considered by Tanaka (2007,pp.16-19).

6) Reference 7)

7) Reference 1)

8) The description of the medical examiner's reports is as follows. Name, Sex, Present address, Date of birth, Presumed time of death, Place of death, Claimant, etc. And following information is obtained from the police. Family, Health condition before death (from bereaved family), Room condition at the time of death, etc.

9) Newly-developed urban areas in Suma Ward and Tarumi Ward are regarded as "Suburbs", artificial islands (including HAT Kobe) are "waterfront" and other urban areas are "Built-up area".

10) Tanaka, Shiozaki, and Horita (2007) clarify through the analysis of recovery housing that if the building scale is composed of about 30 units or less, formation of human relations of residents in the housing can be adequately achieved. In Shiozaki and Tanaka et al. (2007), it is pointed out that building scale of over 50 units contributes to residents' social isolation. And Suemura et al. (2000) described that building scale of about 10 units is preferable for the formation of human relations in the case of planning of public community housing in high densely built-up area.

11) This opportunity is the first chance to lead to the discovery. For instance, in the case that "Because there was no answer of the phone, he/she visited a victim's home, then there was a unpleasant smell. The door was unlocked and victim was discovered", "no phone answer" is an opportunity.

12) References 1) 2) 5)

13) There were 46 cases of "isolated deaths" in recovery housing in Hyogo prefecture in 2008. It is said that there was a case discovered after 5 months had passed after death. Refer to the Asahi Shinmbun (January 15, 2009), etc.

14) References 1) 2) 5)

References

1) Shiozaki Y., Tanaka M. et al. (2007), Study on the Change of Characteristics of Residential Space and the Social "Isolation" of Residents of the Disaster Restoration Public Housing: Case of the Great Hanshin-Awaji Earthquake, Journal of architecture and planning (611) pp.109-116

2) Shiozaki Y., Tanaka M. et al. (2006), Study on the Change of Characteristics of Houses/Urban Districts and the "Isolation" of Residents in the Devastated Urban Area: Based on the reconstruction project at the Tsukiji district, Amagasaki city, Journal of architecture and planning (605) pp.119-126

3) Suemura T. et al. (2000), A Study on Effects of supplying Community Houses in Built-up Area densely crowded with Wooden Building on a Neighborhood, Papers on city planning, City planning review 35 pp.19-24

4) Tanaka M. et al. (2007), Change in Housing and Neighborhood Planning Characteristics and the Effects on Preservation of Neighborhood Relationships in an Urban Area Devastated by an Earthquake: A Case Study of the Wakamiya District, Ashiya City, Memoirs of graduate school of science and technology Kobe University, No.25-B

5) Tanaka M. (2007), Decomposition and Recovery of Community in the Restoration Process of Devastated Urban Area: Through the Analysis of the Factor of "Social isolation", Doctoral thesis, Kobe Univ.

6) Nukata I. (1999), *Isolated Death: Thinking of Human Restoration in the Disaster-stricken Area, Kobe*, Iwanami Shoten

7) Nukata I. (2005), From the site of the life: From the Great Hanshin Earthquake to the Niigata Chuetsu earthquake, Sekai No.736, Iwanami Shoten

8) Ueno Y. et al. (1998), Cause of death analysis of Earthquake Death and Isolated Death and Its Examination from Forensics Medicine, Report of Research Center for Urban Safety and Security Kobe University pp.35-42