I. Material:

Title: Joho no Dentatsu-Kiko ni kansuru Tokeiteki Kenkyu--Saigaiji ni okeru Johono Tsutawarikata (Matsushiro Jishin no Baai ni tsuite) (A Statistical Study on the Diffusion of Information--The Process through Which Rumors Originated and Spread in a Disaster Area--in the Case of the Matsushiro Earthquake)

Author: Taga, Yasushi et al

Publisher and Year: Tokei Suri Kenkyu-sho (Institute of Statistical Mathematics), Tokyo, 1967

II. Study:

(1) Agent and/or Event

Type of Disaster: Earthquake (a swarm type)

Date of Occurrence: August 1965

Location: Nagano Prefecture

Casualties and Damage:

Total Damages are not specified.
See the attached about the damages in several areas

(2) Method

Method in detail: The first fieldwork: Group interviews with 319 junior high and high school students.
September 26 - October 10, 1966

The second fieldwork: Interviews with all residents (96 residents) in five villages chosen on the basis of results from the first fieldwork.
October 13 - October 17, 1966.

Date of Study:

III. Hypothesis and Firdings.

I. Results of the first interviews

A. Damages

1. Percentage of households which had some damages — approximately 60.0%
2. Major damages
   a) falling-down of walls — 56.0%
   b) breaking-down of roof tiles — 12.0%
   c) collapse of stone fence or wall — 7.0%

B. Sources of information about the earthquake

1. T.V. — 98.0%
2. Newspaper — 70.0%
3. Radio — 50.0%
4. Cable broadcasting system — 48.0%

C. Rumors

1. As the swarm of earthquakes decreased, apathetic attitudes increased among residents and rumors about the causes of earthquakes decreased abruptly. Such topics as forecasts of earthquakes, damage predictions, and the like increased.

II. Results of the second interviews

Five villages investigated can be dichotomized according to the degree of countermeasures they instituted. The Matsushiro area, which includes three villages, had land slides recently, and is characterized by a relatively high degree of countermeasures. The Mori area, which includes two villages, can be characterized by a relatively low degree of countermeasures in spite of frequent earthquakes in the area.

A. In both areas, the percentage of households which had some damages — 80.0%

B. In both areas, the ratio of residents who predict a future great earthquake — 30.0%

C. There is no significant difference in the quantities of rumors in both areas.

1. The significant difference was found in the contents of rumors.
   a) The Matsushiro area
      (1) Major rumors were about the eruption of Mt. Minagami or about the land slides.
   b) The Mori area
      (1) Rumors about the eruption of Mt. Kyodaiyama were dominant, forming 60% of all rumors.
2. Judging from these results, it can be said that the content of rumors tend to be limited to the local topics which have something to do with people's own area or their own lives.

D. Degree of trust in rumors

1. Most people answered that they did not trust rumors.

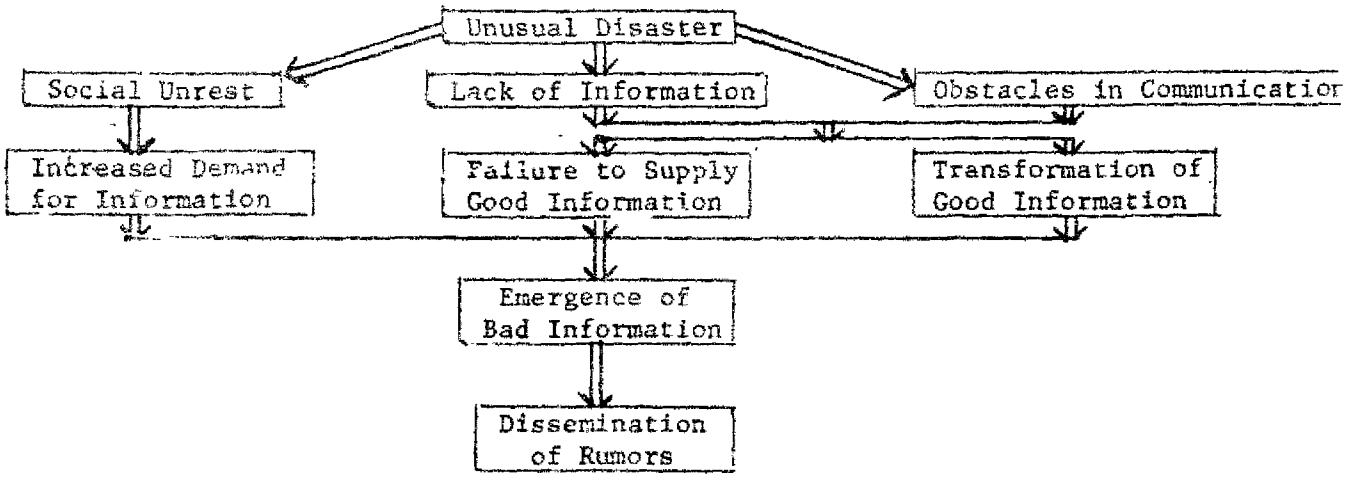
E. Classification of rumors according to the contents

1. Causal inferences with a certain scientific basis
   a) This type of rumor was dominant between mid-September, 1965 and March, 1966
2. Predictions based on scientific or quasi-scientific observations.
   a) This type was dominant between the end of 1965 and the beginning of 1967.

3. Non-scientific predictions
   a) This type emerged in the areas in 1965.
   b) Fortune tellers played an important role.
4. Imaginary inferences
   a) "Japan will be divided into two-parts due to an earthquake" or "A monster lives beneath Mt. Minagami" is an example of this type of rumor.

F. In the dissemination of rumors, community leaders were more important than personal communication among residents.

G. Based on the investigations, the following model can be advanced for explaining the genesis of rumors.



I. Material:

Title: Research on Damages and Human Responses; the 1978 Miyagiken Oki Earthquake. ('78 Miyagiken Oki Jishin ni okeru Jumin no Taio oyobi Higai no Chosa Kenkyu.)

Author: Research Committee of the Miyagiken Oki Earthquakes, 1978, Tohoku University

Publisher and Year: 1980

II. Study:

(1) Agent and/or Event

Type of Disaster: Earthquake

Date of Occurrence: June 12, 1978, 5:14 p.m.

Location: Miyagi Prefecture, Japan

Casualties and Damage: Killed: 28; Injured: 10,247
Completely destroyed houses: 1,279; Partially destroye houses: 132,594; Flooded houses: 5
Destroyed portions of roads: 1,037
Land slides: 167
Fires: 12

(2) Method

Method in detail: See the attached

Date of Study: See the attached

III. Hypothesis and Findings.

This book consists of four reports of research carried out by Tohoku University.

Chapter 1 - Damages of Facilities and Problems

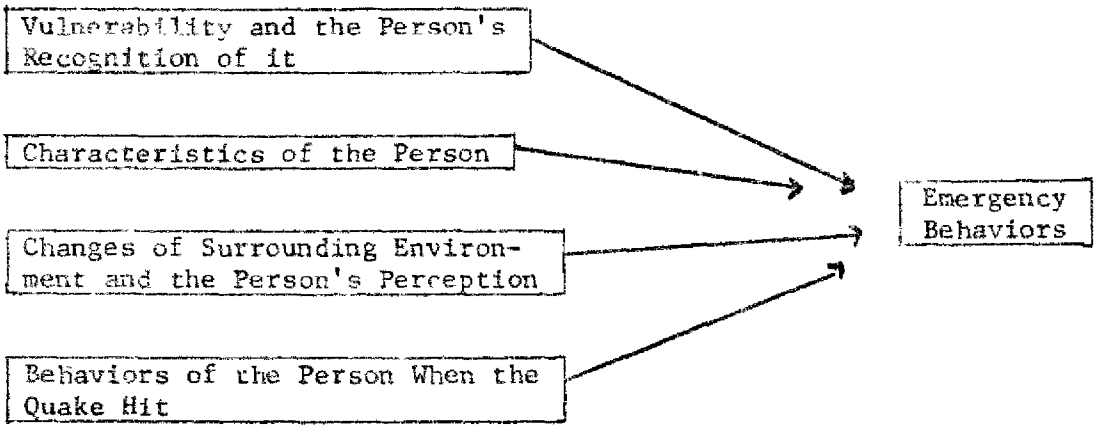
I. Medical facilities: 161 hospitals and clinics
   A. Breakdowns of water supply system, electric system, air conditioning system, sewage system, and communication system of medical facilities 65.0%
   B. Damages of medical equipment 39.0%
      1. Major damages were the loss of medicines, the breakdown of X-ray apparatus, the loss of microscopes)
   C. The injured 9.7%
      1. 1.8 persons per facility is average
   D. The following severely hindered medical activities in facilities:
      1. Interruption of electricity
      2. Breakdowns of several systems as indicated above
      3. Equipment damage
      4. Gas service interruption
      5. Water supply interruption
   E. Several problems
      1. Although most facilities had been equipped with emergency generators for private use, the generators did not work well because of unsuitable maintenance, insufficient generator size, failure of distributing, or water supply interruption.
      2. Hospitals which had patients in their facilities were especially troubled by the disruption of gas, electric, and water supply in their attempts to provide meals.
      3. We should carry out certain countermeasures not only for building structures, but also for equipment.

II. Schools
   A. Damages to school buildings were relatively large.
   B. Since the earthquake occurred after school hours, no casualties were reported.

III. Welfare institutions: interviews with staffs and inmates of 41 institutions, were conducted from June to August 1978.
   A. Relatively few damages were reported with regard to the structure of buildings.
   B. Few institutions had an elaborate evacuation plan for an earthquake.
   C. Institutions for the disabled and for the elderly responded to the quake in a haphazard way, and were problematic because of a high dependency of inmates upon the small number of personnel.

Chapter 2 - Behavior during and just after the quake

I. Framework for analyzing emergency behaviors



A. Preparation
   1. Although they had experienced a relatively great earthquake in February, 1978, the experience did not tend to make people prepare well for earthquakes.

B. Places they were in when the quake hit
   1. Men: mostly in their offices, workplaces, or schools
   2. Women and the elderly: at home

Many people indicated that being in a house or a building with which they were not familiar is more dangerous than being at home or in their own offices or workplaces.

C. Behaviors of people when the quake hit
   1. Men: most were working in their offices or workplaces, and some of them were drinking and chatting.
   2. Women: most were doing housework such as cooking, taking care of children, cleaning-up, and the like, and some of them were shopping.

D. Emergent responses
   1. Emergent responses seemed to significantly vary according to the places people were.
      a) at home: dominant behavior was to prevent secondary disasters such as fires, and to protect themselves or someone
      b) in offices or schools: wait-and-see attitude was dominant
      c) in an unfamiliar house or building: rushing-out behavior was dominant

E. Changes in surrounding environments and people's perception
   1. People who encountered a certain dangerous change 85%
   2. People who were dazed or perceived the situation as highly critical over 60%

F. Behaviors within 15 minutes after the quake
   1. Four major types of behavior were identified
      a) to assure whether or not their families were safe
      b) to accurately comprehend the situation
      c) to protect themselves
      d) to engage in recovery activities

G. Responses of residents in high-rise buildings
   1. To put fires out
   2. To open a door for evacuation
   3. To go shopping for batteries, flashlights, or candles
H. Responses of residents in newly developed areas
   1. People who are optimistic tended to respond with hasty and sometimes wrong judgement independent of official or other private information.
   2. In the area where residents had a greater fear and feeling of crises, the recovery problems were coped with in more cooperative fashion in comparison with areas where there was less.

Chapter 3 - Earthquake Disasters and Civil Life

I. After a discussion of responses to disruptions of water supply systems, gas, electric, and telephone services, they concluded that responses were relatively good in avoiding a panic situation, and that people recognized the vulnerability of urban structures and functions to an earthquake.

II. Injuries
   A. Rushing-in or -out of buildings proved highly dangerous
   B. Injuries from
      1. falling down
      2. falling downstairs
      3. broken glass
      could be avoided if people remained calm in an emergency
   C. Those injured by a fire or a collapsed ceiling, concrete block wall, or furniture, felt that it was unavoidable

III. Damages of Residences
   A. Damages were unevenly distributed among several residential areas.
      1. Old residential areas tended to have fewer damages than newly developed residential areas.
   B. Recovery processes in devastated residences were badly delayed.
      1. Major reasons
         a) financial problems
         b) legal procedures
         c) impossibility of suspending business or services (in case of stores of small businesses)
   C. People's consciousness about countermeasures
      1. After their quake experiences, positive measures such as strengthening house-structures, preparing against quakes, or allocating a specific role to family members decreased, and passive measures such as insuring a safe evacuation increased.

Chapter 4 - Views of the Disasters

I. Most people perceived the disaster as extremely severe.

II. Characteristics of the disaster identified by

A. Ordinary citizens (multiple choice)

1. Breakdowns of life-line functions	70%
2. Collapses of concrete block walls	30%
3. Uneven distribution of damages	30%

B. Citizens whose houses were devastated (multiple choice)

1. Uneven distribution of damages	60%
2. Breakdown of life-line functions	50%
3. Damages in newly developed areas	30%

C. The injured

1. Breakdown of life-line functions	60%
2. Uneven distribution of damages	40%
3. Casualties due to collapses of walls	33%

D. Most people perceived the disaster as an act of God rather than as an inevitable result of social and technological failures 80%

E. Lessons which people learned

1. To fix furniture to walls or pillars
2. To strengthen the structures of houses
3. To set up communication systems among family members

The significant difference was in the nature of lessons learned by ordinary citizens and by people who suffered certain damages. That is, ordinary citizens who did not have any damage tended to passively prepare against an earthquake.

F. Citizens' demands to the government

1. To set up an effective prediction system
2. To set up a more effective and convenient system of compensating for losses

G. The division of labor for coping with a disaster should be brought about among the public administrations, the public and the private business firms, and the neighborhood organizations or individual citizens.

I. Material:

Title: An Animal Experiments on Evacuation Behavior in Disasters. (Saigaiji no Hinan Kodo ni kansuru Dobutsu Jikken)

Author: Committee of Disaster Prevention, Tokyo Metropolitan Government (Tokyo-To Bosai Kaigi)

Publisher and Year: 1973

II. Study:

(1) Agent and/or Event

Type of Disaster: Experiment

Date of Occurrence:

Location:

Casualties and Damage:

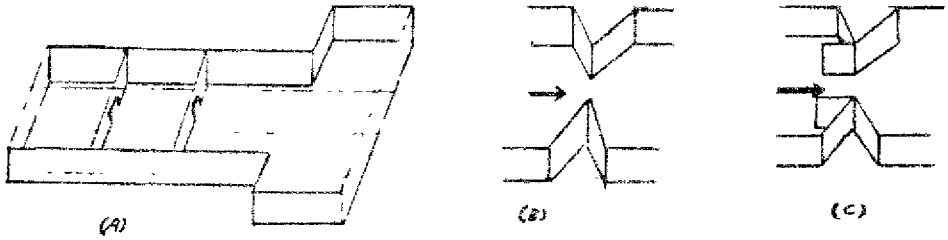
(2) Method

Method in detail: See the attached

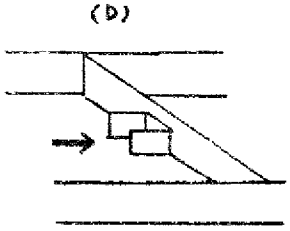
Date of Study: See the attached

III. Hypothesis and Findings.

I. Method
   A. Subjects: mice
   B. Design
      1. Mice are put in the box as shown below.
      2. Very weak and very strong electric shocks are given to them.
      3. Experimental conditions
         a) structure of building (box)
         b) training or drills (weak shocks are given for training)
         c) size of group (the number of mice)



II. Experiment 1
   A. Purpose
      1. To clarify the effects of structures of emergency exits
      2. To clarify the effects of the number of exits
   B. Design; (A), (B), (C), (D)
   C. Results
      1. Several types of partition walls in a box did not affect the required time of evacuation in the cases of training (weak electric shocks), but did affect in the cases of panic (strong electric shocks).



      2. That is in panic situations, the partition walls delayed the evacuation. Therefore, even in the actual situation, setting up the partition walls for guiding people is inappropriate for evacuation.
      3. As the exits increase, the required time of evacuation decreases.

III. Experiment 2
   A. Purpose
      1. To clarify the effects of training
   B. Design; (A), (B), (C), (D)
   C. Results
      1. Hypothese
         a) mice which had training would evacuate faster than ones which had no training
      2. No clear result was obtained on the interactional effects between mice with and without training.

IV. Experiment 3

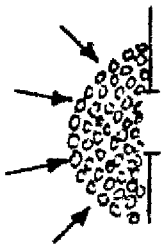
A. Purpose

1. To clarify the difference between group behavior in ordinary situations and in panic situations.
2. To clarify the characteristics of group behavior in panic situations.

B. Design: (A), (B), (C), (D)

C. Results

1. For the first purpose, nothing was clarified.
2. In panic situation, "arch actions" around exits were observed.
3. In panic situation, mice became more aggressive toward each other as time passed.



(Arch Actions)

I. Material:

Title: Research on Obstructive Factors to the Fire Fighting Activities In Underground Shopping Malls. (Jishinji Chikagai no Shobo Katsudo Sogai Yoin ni kansuru Kenkyu Hokokusho)

Author: Tokyo Shobo-Cho (Tokyo Fire Department)

Publisher and Year: Tokyo Shobo-Cho (Tokyo Fire Department), 1980

II. Study:

(1) Agent and/or Event

Type of Disaster: Hypothetical fire in an underground shopping mall

Date of Occurrence:

Location: Tokyo

Casualties and Damage:

(2) Method

Method in detail:

Questionnaire, delivered and collected by officials of Tokyo Fire Department
Sample size: 1,736 firemen at ten fire brigade stations in Tokyo
155 firemen in their first year

Date of Study:

III. Hypothesis and Findings.

I. Firemen have relatively strong anxiety about their fire-fighting activities in an underground mall.
   A. Percentages of reasons for anxiety are:
      1. Difficulty of communication 82.3%
      2. Limited knowledge about the geographical setting of an underground shopping mall 81.0%
      3. Limited knowledge about the nature of fire in an underground shopping mall 73.7%
      4. Inappropriateness of their equipment 72.6%
      5. Limited experiences in fighting against fire in an underground shopping mall 70.2%
      6. Vague anxiety about an underground shopping mall 65.9%
      7. Limited training or drills 61.4%
      8. Inappropriateness of the present fire-fighting system 54.5%

II. Sources of the anxiety can be classified into the following four factors:
   A. Limited knowledge about fire and appropriate responses to it in an underground shopping mall
   B. Inappropriate organizational system, including the difficulty of communication
   C. Inappropriate equipment
   D. Inappropriate individual ability due to limited training or drills, or experience in fighting fires in an underground shopping mall

III. Percentages of information and materials firemen wish to have in fighting against fires in an underground shopping mall:
   A. Appropriate information 70.9%
   B. Cooperation among themselves 58.4%
   C. High quality equipment 45.6%
   D. Effective leaders 30.2%
   E. More experience 24.4%

IV. Percentages of what firemen feel may be obstacles in fighting fires in an underground shopping mall:
   A. Smoke 23.8%
   B. Heat 11.7%
   C. Collapse 9.8%
   D. Falling objects 9.0%
   E. Darkness 6.3%

1. Firemen have relatively strong anxiety about their fire-fighting activities in an underground shopping mall. Percentages of reasons for anxiety are:
   a) difficulty of communication 82.3%
   b) limited knwoledge about the geographical setting of an underground shopping mall 81.0%
   c) limited knowledge about the nature of fire in an underground shopping mall 73.7%
   d) inappropriateness of their equipment 72.6%
   e) limited experiences in fighting against fire in an underground shopping mall 70.2%
   f) vague anxiety about an underground shopping mall 65.9%
   g) limited training or drills 61.4%
   h) inappropriateness of the present fire-fighting system 54.5%

2. Sources of the anxiety can be classified into the following four factors:
   a) limited knowledge about fire and appropriate responses to it in an underground shopping mall
   b) inappropriate organizational system, including the difficulty of communication
   c) inappropriate equipment
   d) inappropriate individual ability due to limited training or drills, or experience in fighting fires in an underground shopping mall

3. Percentages of information and materials firemen wish to have in fighting against fires in an underground shopping mall:
   a) appropriate information 70.9%
   b) cooperation among themselves 58.4%
   c) high quality equipment 45.6%
   d) effective leaders 30.2%
   e) more experience 24.4%

4. Percentages of what firemen feel may be obstacles in fighting fires in an underground shopping mall:
   a) smoke 23.8%
   b) heat 11.7%
   c) collapse 9.8%
   d) falling objects 9.0%
   e) darkness 6.3%

I. Material:

Title: Some Problems of the Damages of Residential Lans-Houses and in its Repairing Process--After-Research on Disaste caus d by the 1978 Miyagiken Oki Earthquake. (Takuchi Kaok Higai to Sono Fukkyu Katei ni okeru Shomondai)

Author: Yasuda, Takashi and Yasuyuki Sato

Publisher and Year: The Study of Sociology (Shakaigaku Kenkyu) V-38, pp. 12 174, 1979 Tohoku Sociological Association

II. Study:

(1) Agent and/or Event

Type of Disaster: Earthquake

Date of Occurrence: June 12, 1978, 5:14 p.m.

Location: Miyagi Prefecture, Japan

Casualties and Damage:
Killed: 28; Injured: 10,247
Completely destroyed houses: 1,279 Land slides: 167
Partially destroyed houses: 132,594 Fires: 12
Flooded houses: 5
Destroyed portion of roads: 1,037

(2) Method

Method in detail: See the attached

Date of Study:

III. Hypothesis and Findings.

I. Method

A. Questionnaire delivered by mail and collected by researchers

B. Sample: 1,414 households which had a certain degree of damage in five severely damaged areas

C. Date of Study: December 8-11, 1978

	Totally collapsed	Half collapsed	Partially collapsed
Residences in hill area developed before 1964 (Area 1)	18.8% (79)	53.4% (224)	27.9% (117)
Residential areas developed in the late 50s and the first half of 60s Area 2)	15.5 (31)	41.3 (83)	43.3 (87)
Shopping districts which include residences developed before World War II (Area 3)	24.8 (47)	35.8 (68)	39.7 (75)
Mixed areas of small factories and residences (Area 4)	16.7 (31)	43.8 (81)	39.4 (73)
Farming villages (Area 5)	24.9 (104)	51.9 (217)	23.2 (97)
Total	20.6 (292)	47.6 (673)	31.8 (449)

The figures inparentheses show the actual number of cases.

〈Years after it was built〉

	(less than 5)	(5-10)	(11-15)	(16-20)	(more than 20)
Area 1	11.4%	27.4%	27.1%	21.4%	12.6%
Area 2	7.5	10.4	23.9	20.4	37.8
Area 3	6.8	6.3	6.8	14.7	62.1
Area 4	8.1	18.4	29.7	22.2	21.6
Area 5	13.9	15.3	20.6	11.2	37.6
(Total)	10.5	17.4	22.3	17.5	31.4
	(149)	(248)	(316)	(247)	(444)

II. Results

A. Status Quo of Recovery

	(Total)	(Area 1)	(Area 2)	(Area 3)	(Area 4)	(Area 5
completely recovered	37.8%	32.4%	48.8%	35.3%	41.6%	35.4
under construction	24.1	19.0	19.9	22.6	18.9	33.0
beginning to be repaired	6.0	7.1	3.5	4.7	5.4	6.7
stopped repairing	15.9	9.8	17.4	17.4	20.0	17.9
nothing done	15.5	26.7	9.0	17.9	13.5	6.2
other	0.6	1.4	0.5	0.5	0	0.2

1. Reasons they stopped repairing
   a) trouble with a construction company 35.1%
   b) a shortage of money 21.6%
   c) not urgent 20.4%

B. Whether or not people paid attention to anti-earthquake measures of a house when they bought it
   1. Did not pay attention 85.8%

C. Reasons they chose their houses
   1. Reasonable price 17.0%
   2. Convenient to work place 15.1%
   3. Good natural enviornment 12.9%

D. Whether or not they asked the original builder to repair earthquake damage
   1. Same builder 20.0%
   2. Different builder 70.0%

E. Why they asked a different builder
   1. Because they could start quicker 33.6%
   2. Because they would be better than the original builder 16.8%
   3. Because the original builder could not be reached 16.5%
   4. Because the original builder introduced them to the other builder 15.1%

F. Relationship of owner's occupation to the change of builder
   1. People who judged the new builder would be better than the original one for certain reasons
      a) teachers or engineers 29.4%
      b) managers of business firms 22.1%
      c) workers for public services such as police, fire fighers, or so on 25.0%
      d) skilled workers 19.4%
   2. People who had trouble with the original builder
      a) salesmen 25.0%
      b) teachers or engineers 13.6%
      c) managers of business firms 10.0%

G. Emergency evacuation
   1. People who voluntarily evacuated (201) 14.9%
   2. People who evacuated in accordance with an order (48) 3.4%
   3. People who did not evacuate. (1,156) 81.8%
   4. Where they evacuated
      a) their parent's house or relative's house 30.6%
      b) another house on their own land 25.6%
      c) apartment or rented house 24.4%
      d) temporary houses for evacuees built by the city government 5.8%
   5. Duration of evacuation
      a) 1-3 months 15.1%
      b) 3-6 months 20.5%
      c) 6 months 39.5%
      d) less than 1 month 24.9%

H. How they raised money for repairing earthquake damage
   1. Own savings 47.4%
   2. Loans from governmental banking facilities 21.5%

3. Loans from commercial banks, farmer's unions, or mutual benefit association 20.4%
4. Emergency loans from the prefectural or the city government 4.4%
5. Private loans from relatives or friends 3.2%

I. Major troubles in repairing process
1. Difficulties in negotiating with builders 18.5%
2. Difficulties in meeting financing conditions 23.0%
3. Insufficient amount of loan from governmental banking facilities 7.8%
4. Complicated procedures to get loans from governmental banking facilities 9.8%

J. Damages and Earthquake Insurance
1. Generally speaking, earthquake insurance did not play an important role in recovering process.
2. The ratio of the insured 6.0%
3. Major types of their earthquake insurance
   a) earthquake insurance as a part of fire insurance 31.6%
   b) house repair insurance of mutual benefit association or farmer's union 16.7%
   c) comprehensive house insurance 6.4%
   d) other 2.7%
4. Payment of insurance money by insurance company
   a) no money was paid 60.6%
   b) the amount of insurance moeny paid by insurance companies
      (1) less than ¥500,000 (U.S. $2,174) 59.9%
      (2) ¥500,000 - ¥1,000,000 (U.S. $4,348) 19.4%
      (3) ¥1,000,000 - ¥2,000,000 (U.S. $8,696) 14.4%
5. The ratio of unpaid claims according to the type of insurance.
   a) The unpaid claims were found more in the ordinary insurance of private insurance companies rather than in insurance of mutual benefit associations or farmer's unions.
   b) The percentages show the ratio of unpaid claims.
      (1) fire insurance 87.2%
      (2) comprehensive house insurance 81.1%
      (3) comprehensive store insurance 100.0%
      (4) insurance of farmer's union 5.1%
      (5) insurance of mutual benefit insurance 12.5%

K. Case description of three neighborhood movements
1. Tsurugaya Risaisha no Kai (Sufferers' Association of Tsurugaya area)
   a) A letter to the readers column of a newspaper from one suffever motivated them to become organized. Although the organization had 150 members, it did not have any committeemen. Since the impacted area was developed by the city government, many city government personnel lived in the area. However, no city personnel became members of the organization. Three demands of the organization on the city government were
      (1)The city government should take the responsibility of compensating for the loss.

(2) The city government should adopt some remedial measures to stop housing lots from sliding away.
(3) The city government should re-investigate the degree of damages in the area since they underestimated it.

b) The city government's answers to each demand were
(1) (not mentioned in this article)
(2) There is no possibility of further lot slides.
(3) They will compile damage estiamtes again.

2. Kitaneichinenbo Risaisha no Kai (Sufferers' Association of Kitaneichinenbo area)

a) The organization was established in July, 1978 with 70 members including one chairman and five committee members. The member's fee was 1000 yen (US.S. $4.40). The impacted area developed by the prefectural housing corporation. Although the organization was very active in 1978 demanding that the corporation compensate for the loss, the organization is stagnant at the present time. No committee meeting or conference has taken place since the chairman was appointed to be a committeeman of the prefectural board of education. This shows how the role of a leader is important for an organization.

3. Midorigaoka Risaisha no Kai (Sufferers' Association of Midorigaoka area)

a) The organization was organized by a city council member on July 9, 1978. The organization has one president, two vice presidents, one head official, six committeemen, and 960 members. The organization is highly integrated and very active in demanding the prefectural or city government to compensate for the loss, as well as doing their own research on the degree of damages. The association obtained the voluntary help of lawyers and 46 members of the movement organization took legal proceedings against the developer of the area, the city government, the prefectural and the national governments in claiming damages on June 11, 1979. Two major problems are:
(1) Since the organizer was a member of a certain political party, the political party intervened-in the movement. Some members of the organization expressed a strong reaction against this intervention, and changed the operations to a self-governing system.
(2) There are conflicts among members' interests, especially regarding the repairing process of roads in the area or the amount of temporary tax for repairing the roads.