I. Material:

Title: Gunshu no Ryudo ni kansuru Jikkenteki Kenkyu. (Experiments on the Flow of Crowd)

Author: Abe, Kitao et al

Publisher and Year: Saigai Kodo Kagaku Kenkyukai (Society for the Behavioral Science of Disaster), 1976

II. Study:

(1) Agent and/or Event

Type of Disaster: Experiments

Date of Occurrence:

Location:

Casualties and Damage:

(2) Method

Method in detail: See the attached

Date of Study:

III. Hypothesis and Findings.

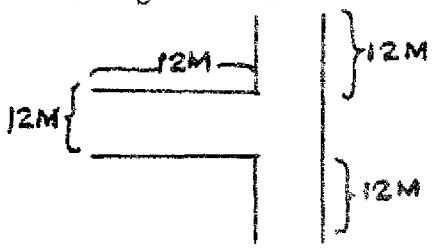
I. Experiment

A. Subjects: 150 fifth grade students of an elementary school

B. Design: subjects engage in a walking race in the following setting.

Three conditions:

1. a right-angled turn
2. a confluence toward the same direction
3. a convectional flow



Five experiments were done with various human densities per square meters (2 persons/m^2, 4 persons/m^2, 6 persons/m^2, and 8 persons/m^2). In every case, the density per square meters at a confluence point was held constant at 8 persons/m^2.

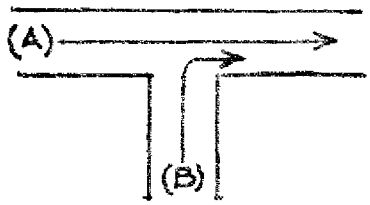
II. Findings

A. In the case of a right-angled turn with high density, they could not move in a proper manner. At the turning point, they turned the corner drawing a semicircular locus, with high density inside and low density outside.

B. In the case of a convectional flow, undulant curves were observed in both flows. The undulant curves were accompanied by different speeds at different points in the curve. This made for a flattening of the curve.

C. In the case of a convectional flow, movements at the middle created pressures to the edges of the group. These pressures caused many subjects to be crowded out.

D. In the case of a confluence toward the same direction, the movement of (A) did not draw a semicircular locus so that (B) could not smoothly join to (A) and began to weave to and fro. This failure of (B) to smoothly join and the resulting weaving caused many subjects to fall down.



I. Material:

Title: "Panic" in The Estimation of Damages in Tokyo Area by the Prospective Earthquake, pp. 426-461

Author: Abe, Kitao et al

Publisher and Year: Committee of Disaster Prevention, Tokyo Metropolitan Government, (Tokyo-To Bosai Kaigi), 1978

II. Study:

(1) Agent and/or Event

Type of Disaster: Hypothetical earthquake

Date of Occurrence:

Location: Tokyo, Japan

Casualties and Damage:

(2) Method

Method in detail: See the attached

Date of Study:

III. Hypothesis and Findings.

I. Method

A. No description of the method of collecting data

B. For developing a model of panic analysis, a questionnaire survey was conducted.

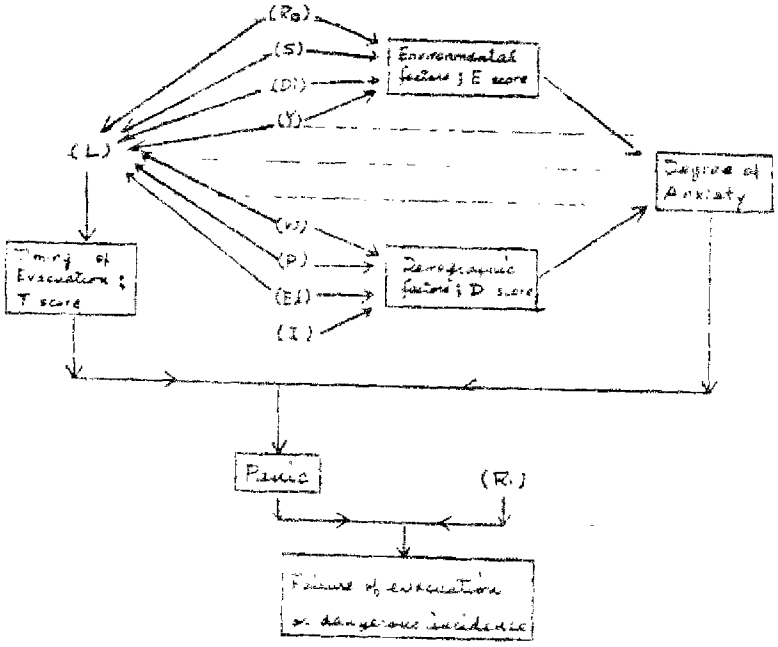
1. Questionnaires were delivered to and collected from students by teachers after questions were answered by students' parents.
2. Sample: 2,174 residents of Ohta Ward, Tokyo, chosen by two-stage sampling
3. Date of study: Feburary, 1975

II. A model of panic

A. Variables taken into account (abbreviations in parentheses)

1. Ratio of roads to the area (Ro)
2. Ratio of open spaces to the area (S)
3. Distance to evacuation place (Di)
4. Years of living at the present residence (Y)
5. Ratio of wooden houses (W)
6. Population density (P)
7. Ratio of the elderly or infants (El)
8. Information availability (I)
9. Evacuation lag (L)
10. Potential risks in the area (Ri)

B. A model



C. A weighing system

	(weighing point for E & D score)	(weighing point for T score)
(Ro)	1.5	2.0
(S)	1.0	1.5
(W)	3.0	1.5
(P)	2.0	1.0
(I)	1.0	-
(Di)	1.5	-
(Y)	1.0	2.0
(El)	1.0	1.0
(L)	-	2.0

D. Calculating a possibility of panic occurrence

1. E score = 1.5(Ro) + 1(S) + 1.5(Di) + 1(Y)
2. D score = 3(W) +2(P) + 1(El) + 1(I)
3. T score = 2(Ro) + 1.5(S) + 2(Y) + 1.5(W) + 1(P) + 1(El) + 2(L)
4. (E score + D score) = panic-potential
5. The greater the value of (E score + D score), the greater the panic potential.
6. The possibility that a dangerous panic situation (P) will be developed can be defined as follows

   a) (P) = (E + D) x (Ri) x (T)

7. By calculating P scores for all areas of Tokyo, the authors indicated 337 areas highly susceptible to panic incidences.

I. Material:

Title: Social Psychological Research on the Influence of the Prediction of the So-Called Kawasaki Earthquake. (Iwayuru Kawasaki Chokka-Gata Jishin Yochi Joho no Shakai-Shinrigakuteki Teii.)

Author: Abe, Kitao and Ryoichi Kazama

Publisher and Year: in Tokyo Gaikokugo Daigaku Ronshu, Vol. 28, pp. 168-19

II. Study:

(1) Agent and/or Event

Type of Disaster: Earthquake Prediction

Date of Occurrence: December, 1974

Location: Kawasaki, Kanagawa Prefecture, Japan

Casualties and Damage: Not mentioned

(2) Method

Method in detail: See the attached

Date of Study:

III. Hypothesis and Findings.

I. Method

A. Structured interviews with 1,066 persons

B. Samples: 1,066 persons chosen from three areas in Kawasaki city by two-stage sampling

C. Date of Study: April, 1976

II. Results

A. The research focused on five aspects of prediction information and its transmittance

1. Recognition of information
2. Attitudes toward information
3. Contacts with information
4. Responses to information
5. Evaluation of information

In December, 1974, the committee for earthquake prediction released information about unusual phenomena observed around Kawasaki city. The information was reported in newspapers, and was regarded as an earthquake prediction. This research was carried out about this event.

B. Recognition (how accurately people recognized the information?)

	⟨accurate recognition⟩
1. Who issued the information	50.6%
2. About a seismic center	56.4%
3. About the time of occurrence	32.7%

Generally speaking, people accurately recognized the information but modified its contents toward a more critical direction.

C. Attitudes (whether or not people believed; whether or not people had any anxiety)

1. People who believed	51.1%
2. People who did not	22.9%
3. People who had anxieties	64.8%
4. People who do not	21.4%

Women rather than men, people who thought that the information was issued by local governments, people who perceived a stronger magnitude and a higher probability than that indicated in the information circulated, and people who had lived at their present residence for a long period, tended to believe the prediction.

Women rather than men, people who have lower level of education, and people who had lived at the present residence for a longer period tended to have stronger anxiety.

The degree of anxiety was clearly associated with whether or not they believed the information. That is, people who believed had a stronger anxiety than people who did not.

D. Contacts

	contacts	people who believed
1. newspaper	82.9%	49.3%
2. T.V.	72.7%	26.1%
3. P.R. by local government	36.6%	16.1%

Men are more likely to believe a newspaper report, while women are more likely to believe a T.V. report.

E. Responses to prediction

1. Preparing a flashlight	53.4%
2. Having a talk with family members at home	48.1%
3. Packing valuables	37.4%
4. Preparing a transistor radio	35.0%
5. Preparing foods and water	32.1%

People who experienced a disaster in the past are more likely to prepare something for the predicted earthquake than people who did not.

F. Evaluation

1. How people thought of the prediction information

a) a significant experience	58.9%
b) some merits and some demerits	13.6%
c) was a nuisance	11.3%

People who felt a stronger anxiety were more likely to perceive the predication information as significant than people who felt a weaker anxiety.

G. The prediction information was quickly clarified by the committee for earthquake prediction, and caused little troubles and confusions among people. However, it should be noted that in spite or because of their inaccurate understandings of the information, some people believed the information and felt a great anxiety. In addition to their inaccurate understandings and their great anxiety, the low degree of responsive measures among people observed here will facilitate the emergence of a panic situation.

I. Material:

Title: KIKI BAMEN NI OKERU NINGEN NO HANNO--Izu-Oshima Kinkai Jishin narabini Yoshin-Joho Dema no Shakai Shinrigakuteki Bunseki. (Human Responses in Crises--A Social Psychologi Analysis of the Izu-Oshima Kinkai Earthquake and Rumor.)

Author: Kitao Abe and Ryoichi Kazama

Publisher and Year: Tokyo Gaikokugo Daigaku Ronshu, V-29, pp. 211-234, 1979

II. Study:

(1) Agent and/or Event

Type of Disaster: Earthquake (the Izu Oshima Kinkai Earthquake)

Date of Occurrence: January 14, 1978, 12:24 p.m.

Location: Izu Peninsula, Shizuoka Pref., Japan

Casualties and Damage:

Not mentioned

(2) Method

Method in detail:

1) Telephone survey
2) Sample: 806 persons
3) Men and women between the ages of 20 to 59 drawn from the telephone directory by Stratified Random Sampling
4) Valid responses: 352 (43.7%)

Date of Study: February 1, 1978

III. Hypothesis and Findings.

I. The Analysis of Emergency Responses

A. The degree of shaking perceived is almost completely correlated with the degree of fear people had. ($r = -.923$)

B. People who were on the second floor when the quake occurred perceived the greatest degree of shaking, and people who were outside at that time perceived the least.

C. Women rather than men, and the elderly rather than youth are likely to have the greater degree of fear.

D. As the degree of perceived shaking increased, the ratio of people who took action increased. However, beyond the medium degree of perceived shaking, the ratio of people who did something decreased with the degree of perceived increased shaking.

E. Information-search behaviors after a quake

1. Most people tried to obtain information through television rather than radio.
2. People in their 20s are more likely to rely on radios.
3. Women are more likely than men to rely on T.V.

F. Extinguishing behavior after a quake.

(Sources of fire)	(Extinguished)
1. Gas range	90.7%
2. Boiler	91.7%
3. Oilstove	73.2%
4. Others (e.g., briquette brazier)	60.0%

5. The extinguishing behaviors occurred most frequently when people perceived a medium degree of shaking. As people perceived a greater or smaller degree of shaking, their extinguishing behaviors decreased.
6. The extinguishing behaviors occurred most frequently among people who were in their 30s. The older people are less frequently the ones to help extinguish a fire.

II. The Analysis of Rumor

A. People who heard the rumor that another great earthquake would occur soon 87.5%

B. As the degree of fear increased, the number of people who heard and/or believed the rumor increased.

C. People who gave credence to the rumor 29.6%

D. People who doubted the rumor 39.0%

E. Women were more likely to have believed the rumor than men.

F. The more education people have, the less they believed the rumor.

I. Material.

Title: Kasai Panic Ko (On Panics in Fires)

Author: Abe, Kitao and Ryoichi Kazama

Publisher and Year: Knowledge in Architecture (Kenchiku Chishiki)
February 1981

II. Agent and/or Event.

Type of Disaster Discussed: Fire

III. Table of Contents.

IV. Abstract (Major ideas and suggestions).

1. Emergencies should be regarded as part of our routine everyday lives, and we should therefore be prepared.
2. There is a lag between cultural or technological development and our mental and physical adaptations to the development. We should be aware of the effects of new building materials on evacuation possibilit: (For example, new building materials such as plastic boards in a room can easily kill us in fires by producing toxic gas.)
3. Be aware of "flash-over effect." (A fire is abruptly spread by opening windows or doors.)
4. Anti-fire structures in buildings are similar to a furnace: although they defend the inside against externally derived fires, they facilitat the internally started fires. We should be aware that "anti-fire materials in buildings easily burn away."

5. Be aware of threats caused by toxic gas. (In the case of fire in Niigata, the carpet made of chemical fibers generated hydrocyanic-acid gas, and the "fire-balls" which were made from the carpet dropped over the heads of evacuees.)
6. We should be aware that a corridor is a fire path. Two emergency exits in opposite directions are desirable.
7. Ducts for air conditioning usually act as a chimney. In addition, fire can spread through a building by ducts without it being known by the people inside. We should reconsider the dysfunctional aspect of the central-air-conditioning system.
8. Stairways also function as a fire path or chimney. Therefore, in order to safely escape, we need two stairways in a building in opposite directions.
9. Emergency exits have a conflicting problem, i.e., for safe evacuation they should always be open or be easily unlocked; but for crime prevention they should be securely locked.
10. Fire-doors (doors which separate the area from the fire) should always be closed. Otherwise, they don't work. For example, all of the dead were found only on the fourth floor in the fire of Kushiro Orietal Hotel (Hokkaido), because the fire-door was open only on the fourth floor.

I. Material.

Title: Toshi to Saigai (City in Disaster)

Author: Akimoto, Ritsuo and Hideaki Ohta

Publisher and Year: Gakubunsha, Tokyo, 1980

II. Agent and/or Event.

Type of Disaster Discussed: Not specified

III. Table of Contents.

IV. Abstract (Major ideas and suggestions).

This volume is the first textbook in Japan on disaster studies for college students, written by a sociologist and a social psychologist. The author pigeon-holed some basic theories and findings in disaster studies in the past, focusing on two levels; (1) human behavioral and (2) organizational.

Contents

I. Material:

Title: Sennichi Departo Kasai Kenkyu Chosa Hokoku-sho. (Report of Research on the Sennichi Department Store F

Author: Bosai Toshi Keikaku Kenkyusho and MANU Toshi Kenchiku (Laboratory of Urban Safety Planning) (MANU Institute of Urban Architecture)

Publisher and Year: 1972

II. Study:

(1) Agent and/or Event

Type of Disaster: Fire

Date of Occurrence: May 13, 1972, about 10:40 p.m.

Location: Osaka

Casualties and Damage: See the attached

(2) Method

Two field works

Method in detail:

(1) May 14; photos, hearing and interview with firemen, collection of local newspapers
(2) May 25; supplementary investigations

Date of Study:

III. Hypothesis and Findings.

The report consists of 13 chapters. Six chapters in the first half of the report are devoted to the description of a disaster. Some human and spatial factors and problems are indicated in the 7th and 8th chapters. Five chapters in the latter half of the report consist of further considerations and a summary and should be regarded as independent articles.

I. Disasters
   A. On May 13, 1972, approximately 10:40 p.m., the seven-story Sennichi Department Store Building burned. The fire, caused by the careless discard of a lighted cigarette on the third floor, broke out while there were still 197 people in the building.
   B. Major tenants of the building
      1. Sennichi Department Store
      2. Nichii Super Market
      3. A Cabaret "Play Town"
      4. Mexican Consulate
      5. Game Corner
      6. Bowling Lanes (under construction)
   C. The precise count follows

1. The Cabaret "Play Town" (7th floor)	179 persons
2. Nightwatch-men and maintenance men (1st floor and ground floor)	6 persons
3. Workers for electric repair (3rd floor)	6 persons
4. Workers for the Bowling Lanes (6th floor)	6 persons

   D. The total area devastated by the fire was 8,800 square meters (approximately 10,455 square yards).
   E. Casualties due to fire were as follows

	Men	Women	Total
1. Slight injury	54	11	65
2. Serious injury	1	3	4
3. Killed	48	70	118

*The figures include those injured among fire-fighters.

   F. Among 118 persons killed, 96 of the deaths resulted from smoke inhalation and 22 persons jumped to their death. All killed were (at the time of the fire) on the 7th floor (in the Cabaret "Play Town.")

II. Some observed problems
   A. Cause of the fire: carelessness in discarding a lighted cigarette.
      1. Problem: lack of "anti-disaster consciousness"
   B. Spread of the fire: failure to use fire extinguisher, absence of automatic sprinklers, and all functioning anti-fire doors.
      1. Problem: inadequate disaster-education and disaster-management.
   C. Inhalation of poisonous gas: a large amount of sythetic fiber in the department store.
      1. Problem: no regulations about management of those materials in a building.

D. Spread of smoke: spreads by air-circulation ducts, stairways, and elevator-shafts.
   1. Problems
      a) non functioning anti-fire damper in the ducts
      b) inadequate anti-disaster management
      c) flaws in construction
E. Detection of the fire: insufficient information was provided by fire alarm, and there was a delay of six minutes in sounding an alarm.
   1. Problems
      a) delay in notifying the fire department
      b) lack of a cooperative anti-disaster management system among tenants
      c) no information given to the Cabaret "Play Town"
F. Evacuation
   1. Problems
      a) failure to appropriately use evacuation equipment
      b) structural defects of the building
      c) emergency exits to the roof were locked
      d) Fire Department equipment inappropriate for mass evacuation
      e) no efficient way to save a large number of people from a high-rise building

III. Three types of human behavior in an emergency situation
   A. Perception of unusualness
      1. Confirmation of the nature of the unusualness
   B. Perception of danger
      1. Evacuation
   C. Perception of hopelessness
      1. Desperate or drastic responses such as jumping out of windows
   D. In the Sennichi Department Store Fire, the spatial or structural defects of the building made the situation worse for each type of human behavior.
   E. Confirmation
      1. Delay in detection of fire on the 7th floor because of the isolation of that floor.
   F. Evacuation
      1. Inappropriate location of emergency exits and outside-stairways
   G. Desperate response
      1. The lack of places such as evacuation balconies on which the evacuees could wait to be saved, caused many falling deaths.

IV. Factors which should be examined for insuring safety
   A. Preparedness
      1. Physical, structural, and human preparedness for fire (anti-fire structure, fire-fighting ability at the early stage of a fire, etc.)
   B. Avoidability
      1. Preventive measures such as training, drilling, anti-fire doors, etc.
   C. Escapability
      1. Escapable space, evacuation route, evacuation equipment, etc.
   D. Communication
      1. Detection system, confirmation of abnormalcy, notification system, etc.

V. The items which should be improved
   A. Spacious or structural clearness or simplicity of the building
   B. Emergency stairways attached to the external wall of the building
   C. Emergency balcony
   D. Developing a way to quickly rescue a large number of people from a disaster in a high-rise building

VI. Human responses in an unusual situation
   A. Psychological response
      1. Mental readiness for emergencies
   B. Technical response
      1. The uses of emergency equipment
   C. Spatial responses
      1. Spatial movement or evacuation
   D. Psychological and technical responses aim at efficiently improving the spatial response. In the case of the fire discussed here, the worst factor was the space. That is, people were packed into a smokey building. Technically, they failed to effectively use equipment such as extinguishers, evacuation tubes, anti-fire shutters, emergency stairways, and so on. Mental readiness was lacking especially among managers and employees of Cabaret "Play Town."

VII. Public administrative problem
   A. Although the present fire and construction regulations (Shobo-ho and Kenchiku Kijun Ho) mention the structural frame of buildings, they do not refer to internal spaces in the buildings. Since the internal spatia arrangement of buildings creates problems which cannot be controlled by present regulations, a system of supervision, responsibility, and contro will be necessary.

I. Material:

Title: The Behaviors of Injured Persons in Earthquake Emergenc; A Research on the Behaviors of Injured Persons in the 1978 Miyagiken-Oki Earthquake Emergency (Jishinji ni okeru Fushosha no Kodo)

Author: Fujiyama, Yoshio et al

Publisher and Year: The Study of Sociology(Shakaigaku Kenkyu), Vol. 38, pp 120, 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:

Casualties and Damage: Killed: 28 Injuired: 10,247
Completely destroyed houses: 1,279
Partially destroyed houses: 132,594
Flooded houses: 5
Destroyed portions of roads: 1,037
Landslides: 167
Fires: 12

(2) Method

Method in detail:

See the attached

Date of Study:

III. Hypothesis and Findings.

I. Method

A. Structured interviews with 626 persons who were injured and went to a medical facility.

B. Samples were chosen from the list of the injured made by NHK (the Japan Broadcasting Corporation).

C. Samples were purposely chosen by areas.

1. Four areas were taken into account.

a) central part of Sendai city (Area 1)	11.0%
b) residential areas which were formed right after World War II (Area 2)	35.1%
c) residential areas which were formed after 1950s (Area 3)	19.7%
d) farming or fishing villages (Area 4)	34.2%

D. Date of study: September 30-October 4, 1978

II. Results

A. The degree of injury according to the areas

	(hospitalized)	(treated in a hospital)	(treated at home)
Area 1	2.9(%)	92.8(%)	4.3(%)
Area 2	10.5	83.2	6.4
Area 3	9.8	84.6	5.7
Area 4	7.0	87.9	5.1
(Total)	8.3	86.1	5.6

B. The time of injury

	(during the quake)	(just after the quake)	(after the quake)	(Total)
men	26.8(%)	1.6(%)	3.4(%)	31.8(%)
women	59.4	3.5	5.3	68.2
(Total)	86.3	5.1	8.6	100.0

C. The place of injury

1. Inside 78.1%

	men	women
a) in one's own house	46.1%	58.9%
b) at workplace or school	27.0%	11.4%

2. Outside 21.9%

a) within one's own garden	8.4%	14.5%
b) in someone else's garden	5.1%	1.0%
c) on street	2.8%	4.8%
d) on sidewalks	1.7%	4.6%

3. Injuries in one's own house were relatively slight, while injuries at workplace, schools, or outside (although not large in number) were relatively severe.

D. The kinds of injury

	(during the quake)	(just after the quake)	(after the quake)	(Total)
bruise	31.9(%)	9.4(%)	3.7(%)	28.3(%)
cut	45.4	75.0	79.6	49.8
abrasion	2.6	0	1.9	2.4
burn	4.1	0	3.7	3.8
sprain	3.7	0	3.7	3.5
fracture	11.9	9.4	1.9	10.9
other	0.6	6.3	5.6	1.3

5. What persons were doing when they were injured.

a) going into or out of houses	32.0%
b) attempting to hide somewhere	8.8%
c) sitting or standing	22.2%
d) attempting to prevent a fire or falling objects	9.5%

6. With what were persons injured

	(inside)	(outside)
a) falling objects	27.0%	17.9%
b) broken pieces of glass	10.6%	4.3%
c) falling persons	11.3%	42.7%
d) furniture which fell	24.3%	20.5%
e) collapse of the house	9.0%	-

Most injuries of infants were due to falling furniture or fallen concrete block walls.

7. What the injured learned

a) not to be upset; to behave prudently	26.3%
b) to set up a safety corner	19.2%
c) to make everyday preparations	17.7%
d) not to rush out	16.0%

8. Behavior just after injured

a) could not move	14.7%
b) moved away from the danger	12.3%
c) called someone for help	10.9%
d) gave first aid to themselves and went to a hospital	29.3%
e) prevented secondary disasters such as fire	5.3%
f) called the attentions of those who were around him	10.1%

9. Who helped the injured

	(Total)	(Area 1)	(Area 3)	(Area 4)
a) a family member	32.7%	41.5%	53.8%	52.1%
b) no one	28.8	-	-	-
c) a neighbor	18.1	31.7	16.7	15.4
d) a co-worker	11.7	-	-	-

10. How the injured came into contact with their families

a) a family member phoned or came to him	42.1%
b) went home for himself	20.8%
c) phones for himself	14.2%
d) asked someone to phone his family	12.6%

11. How long it took for the injured to come into contact with their families

a) within one hour after they were injured	47.4%
b) from one to two hours after they were injured	24.1%

12. Ratios of the injured who could come into contact with their families within two hours, according to areas

a) Area 1	85.2%
b) Area 2	61.2%
c) Area 3	70.0%
d) Area 4	77.7%

I. Material:

Title: Panic--The Day of Rebirth of the Aesop's Fables (Panic--Aesop no Guwa ga Yomigaeru Hi)

Author: Hirose, Hirotada et al

Publisher and Year: in Ushio, pp. 82-119, September, 1978

II. Study:

(1) Agent and/or Event

Type of Disaster: Volcanic eruption

Date of Occurrence: August 7, 1977, 9:14 a.m.

Location: Mt. Usu, Hokkaido, Japan

Casualties and Damage:

Direct damages: approximately 138 million U.S. dollars
Indirect damages: approximately 44.3 million U.S. dolla

(2) Method

Method in detail: Interviews with community leaders and residents

Date of Study: Not mentioned

III. Hypothesis and Findings.

The content overlaps with "A Study of Evacuation Behavior in the Case of the Volcanic Eruption of Mt. Usu." See the summary of that article. English edition of this article was written by Hirose, Hirotada. See "Volcanic Eruption and Local Politics in Japan," Mass Emergencies, 4, 1979.

I. Material:

Title: Saigai to Jumin no Hinau Kodo--Hokkaido Usu San Funka no Baai (A Study of Evacuation Behavior in the Case of the Volcanic Eruption of Mt. Usu)

Author: Hirose, Hirotada et al

Publisher and Year: in Shimbun Kenkysho (Institute of Journalism and Communication) ed., Jishin Yochi to Shakaiteki Hanno (The Earthquake Prediction and the Social Responses), The University of Tokyo Press, pp. 307-365, 1979.

II. Study:

(1) Agent and/or Event

Type of Disaster: Volcano eruption

Date of Occurrence: August 17, 1977

Location: Hokkaido, Mt. Usu

Casualties and Damage:

Casualties: 3
Damages: see the attached

(2) Method

Method in detail: Unstructured Interviews and questionnaires answered by mail

Sample for Quasi-Survey Research: 300
Return Ratio: (91) 30.3%

Date of Study: December 11-15, 1977 (interviews with city officials, police, and fire departments)
June 11-14, 1978 (interviews with residents)
June 30-July 1, 1978 (interviews with and questionnaire deliveries to community leaders)

III. Hypothesis and Findings.

I. Evacuation Process
   A. August 7, 1977
      1. 9:12 a.m. - the first eruption
      2. 11:00 a.m. - evacuation orders by local governments were issued for 6,423 residents in seven areas; 4,296 evacuated
   B. August 8, 1977
      1. 3:30 p.m. - the second eruption
         a) by evening, most residents in Abuta-cho voluntarily evacuated leaving about 2,000 residents in the town who did not evacuate
   C. August 9, 1977
      1. 6;20 a.m. - the evacuation order by the local government was issued for the residents who still were in town (2,000); of these 1,700 persons evacuated by trucks provided by the Self-Defense Force or by buses of a private bus company.
      2. Evacuees were sheltered in public facilities.
   D. August 12, 1977
      1. Permission for temporarily visiting their own houses was granted (1 hour).
   E. August 15, 1977
      1. Permission for temporarily visiting their own houses was granted (3 hours).
   F. August 18, 1977
      1. The association of the tourist industry of the town demanded the town headman to rescind the evacuation order.
         a) this demand reflected the evacuees' wishes to go home and the association's interests
   G. September 7, 1977
      1. The rescission of the evacuation order
      2. Traffic was still restricted by police to official or resident use only.
   H. September 23, 1977
      1. The rescission of the emergency traffic control

II. Socio-Economic Effects
   A. Direct effects
      1. Damages to houses, roads, agriculture, fishery, and so on, caused by ash
         a) loss of ¥31,700,000,000 (138 million U.S. dollars)
   B. Indirect effects
      1. Decrease in the number of sightseers caused the loss of expected incomes.
         a) loss of ¥ 10,200,000,000 (44 million U.S. dollars)
      2. Since the eruption occurred in the best sightseeing season of the year, the damages were serious
   C. Financial support
      1. Farmers or fishermen were supported by the farmers union or the mutual benefit association.
      2. Since the tourist industry and other related small business firms had no supporting organization or system, the town, the prefecture (Hokkaido), and the national government enacted remedial measures to give them special emergency loans.

III. Results of Survey Research

A Ratio of evacuation 81.3%

B Where they evacuated

(Name of Town)	Sahbetsu & Date	Abuta
1. Houses of their friends or relatives	47.9%	27.5%
2. Designated evacuation places	29.2%	33.3%

C. Duration of evacuation

1. Less than 10 days	52.1%	31.4%
2. 21-30 days	25.0%	25.4%
3. More than 30 days	-	23.5%