

Comparison of risk perception towards food radiation contamination and COVID-19

Thirteen-wave panel survey after the Fukushima nuclear accident

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Poster References



Abstract

This study compared the changes in risk perception regarding food radiation contamination after the Fukushima nuclear accident and the COVID-19 pandemic in Japan. Over 12 years post-accident and 3 years into the pandemic, panel surveys were conducted with 1,000 Japanese citizens. Results from structural equation modeling revealed that anxiety about radioactive contamination and infection influenced the avoidance of foods from affected areas, as well as avoiding COVID-19 recovered patients (System 1). On the other hand, critical thinking attitudes inhibit these avoidance behaviors (System 2). The study emphasizes the significance of risk literacy, encompassing scientific and media literacy, and critical thinking skills.

Introduction

- We investigate the decline in risk perception associated with radiation-affected foods following the Fukushima nuclear disaster on March 11, 2011, using a ten-wave panel survey spanning nine years (Kusumi et al., 2023, *Journal of Risk Research*).
- Nine years later, in 2020, the world was faced with the COVID-19 outbreak, which brought to the forefront the significance of risk perception in relation to both food radiation contamination and infectious diseases. This study aims to explore attitudes toward avoiding possible radiation-affected foods of affected areas and individuals who have recovered from COVID-19, considering unwarranted avoidance as a form of stigma and an intense response to perceived risk (Walker, 2013).
- To analyze the stigmatization, we adopt a dual-process model (Schulze & Wansink, 2012), in which **System 1 reflects intuitive judgments based on radiation and COVID-19 anxiety, and System 2 involves logical judgments stemming from critical thinking and media literacy** (see Figure 1).



Research Questions:

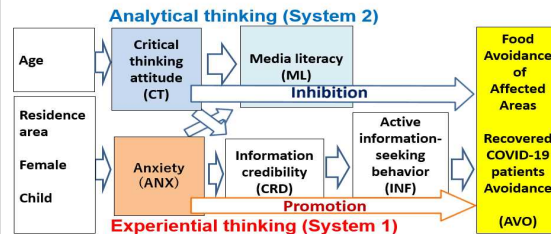
- What are the similarities and differences in risk perception between food radiation contamination and COVID-19.
 - RQ1: Are there time-series changes and regional differences in anxiety levels, information-seeking behavior, avoidance behaviors, information credibility, and sources of information gathering (e.g., web, TV, conversation) for both radiation and COVID-19?
 - RQ2: To what extent do anxiety about radioactive contamination and infection influence avoidance behaviors (System 1)? And how do critical thinking attitudes and media literacy act as inhibitors of these avoidance behaviors (System 2)?

Method

Participants

- Japanese adults ($N = 1,752$, 876 men and 876 women, age $M = 40.1$ years, $SD = 10.4$) participated in this study.
 - We conducted the first web-based survey in September 2011 and from March 2012 to 2023.
- | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|-----------|--------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Radiation | 6m | 1y | 2y | 3y | 4y | 5y | 6y | 7y | 8y | 9y | 10y | 11y | 12y |
| COVID-19 | 1y | 2y | 3y | | | | | | | | | | |
| | $N=1752$ | 1477 | 1059 | 877 | 707 | 515 | 468 | 472 | 451 | 429 | 384 | 342 | 348 |
| | $(N=1000 \text{ } 900 \text{ } 700)$ | | | | | | | | | | | | |
- The study included three areas ($ns = 584 \times 3$): Disaster-Affected areas (e.g., Fukushima), and the Tokyo Metropolitan area, and the Kansai area (far from the affected area: e.g., Osaka City)
 - Participants included married men and women aged 20–50 years, 73% of them had children, and 14% were affected by the disaster.
 - Occupational categories: Office workers (41%), housewives/ husbands (28%), part-time workers (16%), self-employed workers (6%), civil servants (5%), and executive officers (2%).

Fig. 1. A Dual Process Model for Avoiding Food from Affected Areas and Recovered COVID-19 Patients



Questionnaire Items

- The participants evaluated the items (a) to (e) below using a 5-point scale.
- Anxiety about food radiation contamination and COVID-19 (2 items each)
 - Active Information seeking about food radiation contamination and COVID-19 (3 items each).
 - Avoidance of foods from affected areas and recovered COVID-19 infected patients, and the location of the infected patient's outbreak (2 items each).
 - Critical thinking attitude (12 items) and media literacy (5 items).
 - Credibility of information about food radiation contamination and COVID-19 (16 items); 3 subscales assessed information from the government, mass media, word of mouth and citizen's websites)
 - Activities conducted to gather information about radiation contamination and COVID-19 during one week: (a) time spent using the Internet, (b) watching TV news, (c) talking with the partner (7-point scales).

Results Fig. 2. Time-series changes and regional differences in indices of food radiation contamination and COVID-19

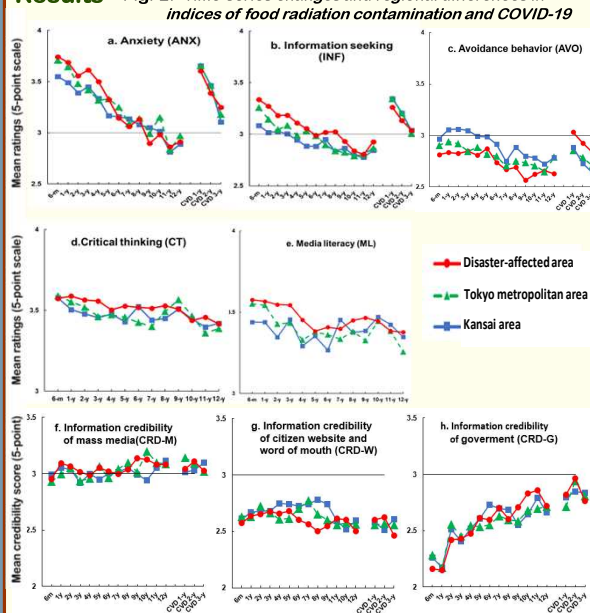


Fig. 3. Structural Equation Modeling of Factors in Avoiding Food and COVID-19 Patients in 2023

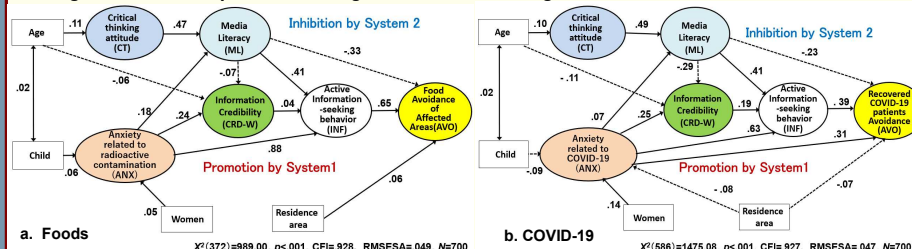


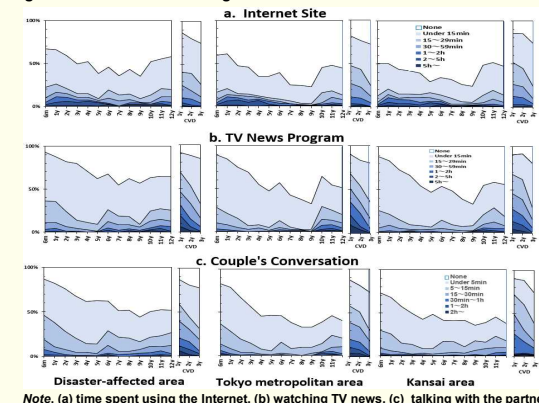
Table 1. 12-Year Regression Analysis for Predicting Food Avoidance: Standardized Partial Correlation

Predictor variables	6m	1y	2y	3y	4y	5y	6y	7y	8y	9y	10y	11y	12y
Age													
Child (0=none, 1=1 or more)													
Area of residence													
Anxiety(ANX)	.57	.53	.51	.54	.51	.49	.49	.53	.47	.43	.50	.41	.48
Critical thinking attitude(CT)	-.05	-.07	-.14	-.12	-.15	-.10	-.17	-.19	-.21	-.17	-.15	-.17	-.21
Anxiety(ANX) × Critical thinking attitude(CT)	.07	.07	.05	.05	.06	.13	.04	.06	.07	.01	.04	.03	.15
Adjusted R ²	.33	.30	.28	.31	.28	.29	.30	.31	.29	.23	.26	.21	.28

Table 2. Correlations between Radiation Contamination of Food and COVID-19 in 2023 (N=700)

Food radiation contamination	COVID-19							M	SD
	ANX	INF	MEI	CT	Credibility(CRD)		AVO		
	M	W	G	AVO	M	W	G	AVO	
Anxiety(ANX)	.43	.43	.20	.14	-.04	.06	.17	.39	2.9 (.87)
Information seeking (INF)	.30	.60	.44	.31	-.01	-.04	.21	.29	2.9 (.73)
Media literacy(MEL)	.16	.40	.44		-.14	-.20	.02	.04	3.3 (.75)
Critical thinking attitude(CT)	.21	.35	.44		.06	.09	.04	.06	3.4 (.63)
Credibility of information									
Mass media (CRD-M)	.11	-.02	-.14	.05	.86	.66	.18	.09	2.7 (.88)
Word of mouth/citizen websites (CRD-W)	.24	.06	-.20	.09	.58	.83	.17	.15	3.1 (.77)
Government (CRD-G)	.16	.22	.02	.05	.15	.14	.84	.16	2.6 (.75)
Avoidance behavior (AVO)	.09	.06	-.15	-.12	-.12	-.02	.10	.32	2.7 (.79)
	M	3.2	3.0	3.3	3.4	2.8	3.1	2.5	2.7
	(SD)	(.74)	(.72)	(.75)	(.63)	(.90)	(.80)	(.77)	(.89)

Fig. 4. Activities for Gathering Information about Radiation and COVID-19



Discussion

- The ratings of anxiety, info seeking, and avoidance behavior decreased over the 12 years of radiation contamination and 3 years of COVID-19 (Fig. 2a, 2b, 2c) [RQ.1].
 - The decrease in avoidance of COVID-19 was steeper than that of radiation.
 - The decrease in time spent gathering info about radiation over the 12 years from the Internet, TV, and conversations was similar but shorter in the Kansai region.
 - The decrease in time spent gathering info about COVID-19 over the last 3 years was similar to that of radiation, but the time was longer with no regional differences (Fig. 4).
- SEM and multiple regression analysis indicated that avoidance of foods from affected areas was promoted by anxiety (System 1) and inhibited by critical thinking attitudes and media literacy (System 2) (Fig. 3a, Table 1) [RQ.2].
 - SEM indicated similar results for avoidance of recovered COVID-19 patients (Fig. 3b).
- Table 2 shows that there were positive correlations between radiation and COVID-19 for anxiety, info seeking, avoidance behavior, and credibility of information sources.
- The credibility of government info about radiation increased from a low level but did not reach the midpoint (Fig. 2f, 2g, 2h).
 - The credibility of government info about COVID-19 was constant at the same level for 3 years.

References

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