

Childcare in the Midst of Radioactive Contaminated Environment

An Evaluation and Text-Mining Analysis of Parents' Response to a Questionnaire Survey Eight Months after the Fukushima Nuclear Power Plant Accident

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1. Introduction

(1) The East-Japan Great Earthquake Followed by the Nuclear-power Plant Accident

On March 11, 2011, a magnitude 9.0 earthquake, followed by an enormous tsunami caused the hydrogen explosion and melt down of Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant called "Ichi-F," leading to serious radioactive contamination of the surrounding area.

Mr. Yoshiro Konno, the previous director of Olive kindergarten situated 60 kilometers west of the power plant, presented a summary of questionnaire results answered by 68 parents, covering 98.5% of the kindergarten's parents, only eight months following the disaster. Mr. Haruo Ohta, the current director, authorized its usage, requiring anonymity for both parents and children while revealing the kindergarten's name and location.

(2) Complications with the Summary Information

- 1) The original questionnaire forms filled out by parents have been lost despite the effort to find out.
- 2) Multiple similar responses were summarized and counted as a single response.

(3) Value of the Survey

It was administered just 8 months after the earthquake, making it one of the earliest data sources after the disaster, because it was very difficult at that time for researchers to visit the devastated area to make such a survey.

2. Questionnaire Outline

The questionnaire comprised multiple-choice and seven free-writing questions. The following are the outlines of the latter:

- Q1. Initial challenges parents encountered after the disaster.
- Q2. Feelings of parents and their children were assessed during the first meeting after the earthquake.
- Q3. Special measures taken to facilitate interactions with their children or assist them in adapting to new daily routines (excluding radiation)
- Q4. The changes and concerns regarding the children's well-being (excluding radiation)
- Q5. Means used to respond to radiation exposure resulting from the Ichi-F nuclear accident.
- Q6. Physical and emotional effects of a lack of outdoor play on children in detail. Please provide specifics if possible.
- Q7. Impact of the earthquake, nuclear accident, or flood on their perspective on life and/or their family.

The wording intentionally excluded the term "radiation" except for question 5 to avoid defensive reactions from parents who work in the nuclear power plant industry.

3. Method

Seven plain text files of the free-writing questions were made. A free statistic software, R, RMeCab (a Japanese R package for text mining), R packages, wordcloud, RColorBrewer, and igraph were used to analyze the data.

4. Results

(1) Characteristic Words of Each Question

Using a function of RMeCab, docMatrix(), a contingency table of words by each question was created. The table was analyzed by Fisher's exact test (Fisher2) and Ryan's multiple comparison (p.multi.comp.) to find out

