

Analysis of Tsunami Evacuation Process from
Combined Effects of Spatiotemporal and
Personal/ Social Characteristics

January 2022

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A Dissertation Submitted to
the Graduate School of Life and Environmental Sciences,
the University of Tsukuba
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy in Science
(Doctoral Program in Geoenvironmental Sciences)

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Abstract

Previous studies on tsunami disaster prevention have focused on evacuation initiation, and there was a lack of understanding of how the behavioral patterns after the initiation of evacuation are formed. In addition, the spatiotemporal, personal, and social characteristics that affect tsunami cognition and evacuation behavior have been analyzed in a single way. Therefore, it was unclear how each characteristic is related to each other and affects tsunami cognition and evacuation behavior. This study defined the “tsunami evacuation process” as the process from tsunami cognition to the behavioral pattern formation after the start of evacuation, and aimed to clarify the combined effects of spatiotemporal, personal, and social characteristics on the process.

To analyze each characteristic in a complex manner, this study proposed an analytical framework called "tsunami space" (Chapter II). In the tsunami space, tsunami cognition and evacuation behaviors at the same location were assumed to be different for each person because of the combined effects of personal and social characteristics as well as the spatiotemporal characteristics of the location. Specifically, the distance from the coastline, elevation, and elapsed time after the earthquake were taken as spatiotemporal characteristics, gender, age, and tsunami cognition as personal characteristics, employment status, availability of tsunami information, means of transportation, and presence of accompanying persons as social characteristics. To analyze the various characteristics in a complex manner, this study applied a qualitative GIS method that combines qualitative data such as tsunami cognition with quantitative data such as elevation.

Based on the above, in Chapter III, this study analyzed the combined effects of spatial and personal characteristics on people's tsunami cognition immediately after the earthquake. The results showed that the younger the age, the smaller the tendency to perceive that a tsunami would come, even if the distance from the coastline was close or the elevation was low. On the other hand, as the age of the respondents increased, they tended to believe that a tsunami would come when the distance from the coastline was

close or the elevation was low.

The combined effects of spatiotemporal characteristics and personal/social characteristics on evacuation behavior were analyzed (Chapter IV). As a result, the closer the activity location was to the sea, the more likely it was that evacuation (single trip) would be taken, and conversely, the further inland the location was, the more likely it was that no movement or multi-purpose movement would occur. It was found that women who were aware that a tsunami would come and who had children under elementary school age in the household tended to make multi-purpose movement.

This study concludes that there was an overall trend in the combined effects of spatiotemporal and personal/social characteristics on the tsunami evacuation process.

Keywords: tsunami evacuation process, spatiotemporal characteristics, personal characteristics, social characteristics, combined effects