

## A preliminary simulation of water demand of the people walking home after Tokyo epicentral earthquake

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Because of the Great East Japan Earthquake, over 5 million people could not return home in the day of the earthquake around the Tokyo Metropolitan Area. The Tokyo Metropolitan epicentral earthquake in the future will probably cause much more people to stay in the city center and traffic jams by the people returning home by walking in many streets. To avoid serious lack of necessities such as potable water, it is important to prepare enough stockpiles. On September in 2012, the final report of the council of countermeasure for the people unable to return home showed the action guidelines, such as preparation of the temporary shelters to stay and support facilities. However, the spatial distribution and its temporal change of the water demand due to the movement of people have not been clear. To achieve effective and enough preparation, it is important to consider the flows of the victims.

In this research, we conducted a multi-agent based simulation of people walking home after the earthquake in the Tokyo Metropolitan Area. The population distribution when the earthquake occurs and their home were estimated from the person trip data by the Planning Association of Traffic in the Tokyo Metropolitan Area. We assumed the agent walks the shortest path to home through national roads and major prefectural roads. Also, the speed of agents depends on the density of population in the road. The agents consume carrying water with them at the specified rate, and they search shelters and obtain new water after they drink it up. For the geographical information for roads and shelters, digital road map by Sumitomo Denko was used.

The simulated results showed that the water demand was concentrated within the specific period. This is caused by the following reasons. The initial amount of carrying water is constrained by the standard of the bottle size. Then, almost all agents demand new water when the amount of water consumption reaches common multiple of bottle sizes if all agents consume waters at the same rate. In that period, the walking population was dense at 10-20km away from the city center while the traffic jams at the city center ceased. These results imply that enhancing the preparation in these areas or controlling time lags of the start of walking are necessary.

Keywords: people unable to return home, water stockpile, returning home by walking, Tokyo epicentral earthquake