

Estimation of Medical-related Exposure based on Secondary Medical Care Areas Assuming Nankai Trough Earthquake

-Using Area Occupancy Rates by Seismic Intensity Level as Coefficients-

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The Nankai Trough Earthquake is predicted to occur within the next 30 years with an approximately 80% probability. While this probability is an estimate, it remains certain that the earthquake will strike in the near future, causing anticipated damage. Furthermore, there are grave concerns that the damage will be widespread. Damage to lifelines will sever socioeconomic functions and drastically alter daily life. Among these, disruption to the water supply poses particular difficulties for sustaining life. In medical facilities, water is used not only as drinking water but also for treatments like hemodialysis. Therefore, this study aims to establish an emergency water supply system for medical facilities during the Nankai Trough Mega-Earthquake by conducting a disaster risk analysis. This risk analysis will be conducted at the secondary medical care area level, using four scenarios with different epicenters: "Basic Scenario," "Western Scenario," "Eastern Scenario," and "Inland Scenario."

The risk analysis in this study is based on area occupancy rates. Therefore, after applying the dissolve operation to each secondary medical care area, the area was calculated using the geometry calculation function. Furthermore, for all four seismic intensity scenarios, the area within each secondary medical care area was calculated for each seismic intensity level. Note that while there are 335 secondary medical care areas nationwide, only 280 have assigned seismic intensity scenarios. The seismic intensity level-specific areas were calculated for these 280 secondary medical areas. Next, based on the seismic intensity level-specific areas, three exposure metrics were calculated: "number of medical institutions," "number of hospital beds," and "number of elderly people." The exposure metrics here are newly calculated values obtained by multiplying the seismic intensity level-specific area by each respective variable. Looking solely at area, as shown in the figure, the area decreases as the seismic intensity level increases in all cases. However, examining the exposure values reveals that in both the western and eastern cases, the exposure values for "number of medical institutions, number of hospital beds, and number of elderly residents" were higher for seismic intensity level 5-lower. In other words, by focusing not only on simple seismic intensity attenuation but also on exposure levels, it was inferred that the nature of responses might vary depending on the extent of damage at seismic intensity 5-lower, particularly in the western and eastern cases. Meanwhile, it was also confirmed that compared to the distribution of simple area occupancy rates, exposure levels at seismic intensity 7 were also relatively high. This indicates that disaster risks are not determined by simple area allocation but rather by differences in exposure levels, suggesting that scenario-based responses are required.

Keywords: Secondary Medical Care Areas, Exposure Volume, Nankai Trough Earthquake

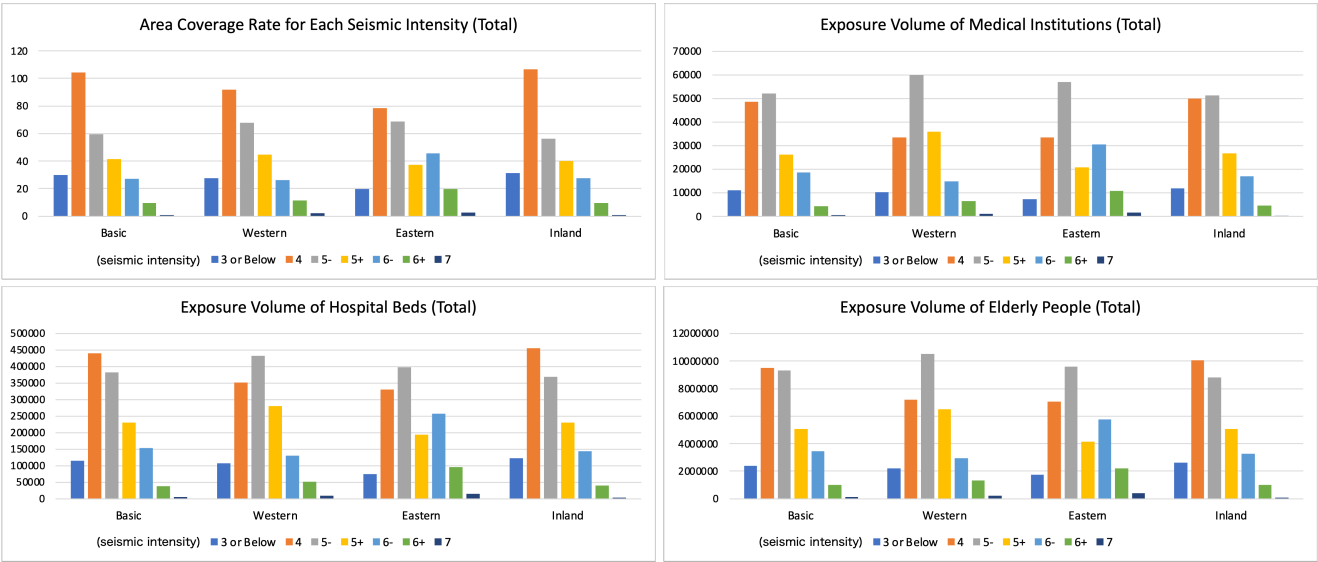


Figure: Estimated Exposure Volume based on Secondary Medical Care Areas in the Event of Nankai Trough earthquake