

Figure 5: Conceptual diagram of restoration curves derived from typical tasks in the building work subsector and probability of labor accident occurrence (Itoh et al., 2011)

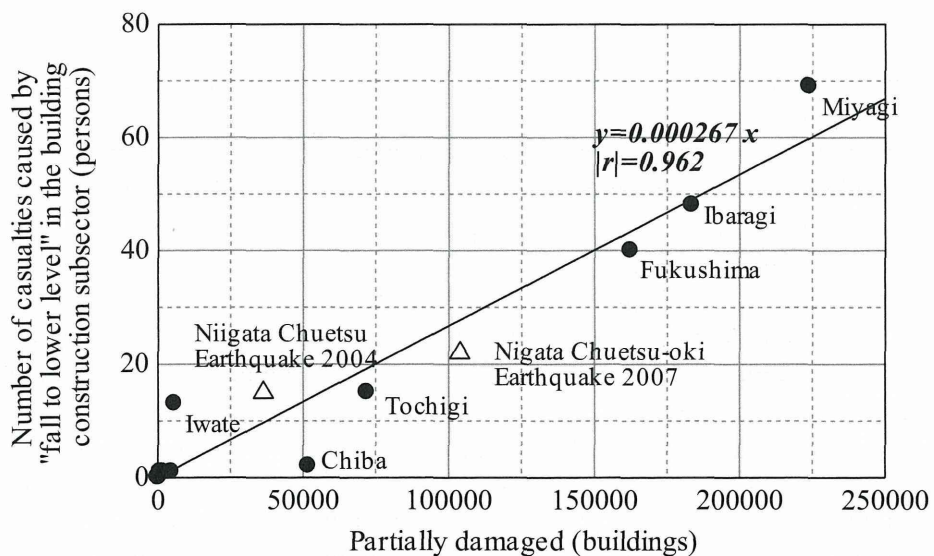


Figure 7: Relationship between damage to buildings (partially damaged) and the number of casualties caused by “fall to lower level” in the building construction work subsector

Here, x denotes the damage to buildings (number of partially damaged buildings) and y denotes the number of casualties caused by “fall to lower level” accidents in the building construction work subsector (number of individuals). The correlation coefficient of Equation (1), even with the data for Iwate and Chiba included, is 0.962, which indicates a high correlation. In terms of outliers, the data of Chiba prefecture were affected by the fact that partially damaged houses included those damaged by liquefaction in coastal and marshy areas including the cities of Urayasu and Katori, and many of them had nothing to do with “fall to lower level” accidents. In Chiba prefecture, the earthquake caused varying degrees of ground uplift, slumping, and liquefaction. A significant number of buildings need to be lifted to allow their foundations to be replaced following the earthquake. During building repair work jacking up foundations, many labor accidents, in which feet were caught or compressed by the foundations or jacks, etc., occurred. On the other hand, in the case of Iwate prefecture, half of the damaged buildings were hotels and fishery facilities, and the data did not fit well with the number of partially damaged buildings which otherwise represent damaged houses.

With regard to damage to buildings, the Central Disaster Prevention Council of the Cabinet Office is making predictions of damage which may be caused by future major earthquakes (URL: <http://www.bousai.go.jp/jishin/index.html>). The insight gained by this study can be used to understand, broadly and in advance, which areas are likely to have more labor accidents after an earthquake, and to focus labor accident prevention efforts on those areas following a mega earthquake.

Conclusions

This paper found the occurrences of labor accidents following the Great East Japan Earthquake by examining the data of death or injury accidents during a roughly 44-month period following the earthquake, and analyzed the characteristics of labor accidents in earthquake restoration work and the relationship between regional earthquake damage and accidents. The main results of this paper are described as follows.

1. It was confirmed that most labor accidents in earthquake restoration work following the Great East Japan Earthquake occurred in the construction industry, which had already been known. However, when damage is severe, attention needs to be paid to accidents in manufacturing and other industries within four months following the earthquake.
2. From the analysis of death or injury accidents sequenced by months elapsed in units of two months, it was found that the building construction work subsector had the largest number of death or injury accidents occurring immediately after the earthquake, while in the civil engineering work subsector 6 to 24 accidents have been continually occurring every two months.
3. With regard to the number of casualties caused by “fall to lower level” accidents and the number of partially damaged buildings, the data of prefectures affected by the Great East Japan Earthquake and the data of past earthquakes was plotted, and a correlation was found between them. This shows that, by using damage predictions for a major earthquake, one can understand, broadly and in advance, which areas are likely to have more labor accidents after an earthquake, and this insight can be used to focus labor accident prevention efforts on such areas.

This report presents the results of detailed analyses of labor accidents that occurred during earthquake restoration work in the 44-month period following the earthquake. As we can see from these figures, the recovery and restoration from the earthquake is far from complete, and earthquake restoration work in severely damaged areas is just beginning. Moving forward, we will continue to study the characteristics of labor accidents during earthquake restoration work in the affected areas. In addition, several accidents (including fall to lower level from roofs) during decontamination work associated with the radioactive fallout of TEPCO's Fukushima Daiichi Nuclear Power Plant have been reported, and we plan to look into these accidents from a different perspective than those for past disasters.

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References

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