How Do We Save Our Lives? Discovery of Realistic Evacuation Issues and a Proposal of New Solution

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Applying lessons learned from the tremendous damage caused by the major earthquake in 2011, Kochi City is rapidly implementing measures such as evacuation drills in various areas to reduce loss of lives during the earthquake that is expected to occur in the near future and minimize the damage caused by major earthquakes. However, these drills only focus on whether people can evacuate within the expected tsunami arrival time, and ignore the effect of other damages on evacuation. Therefore, in this research, I investigated the impact of three secondary disasters: (i) collapsed buildings, (ii) Soil liquefaction, and (iii) collapse of steep hills, by the integration of statistical data (building maps, subsurface exploration data and hazard maps) and numerical calculation. The results indicate that even in areas where people can evacuate safely in the current drills, road blockages forced detours of routes, and reduced speed will significantly increase the distance and time. Based on them, the evacuation plan should be improved considerably by passing private land as a part of the evacuation route. Moreover, it is necessary to emphasize the evacuation of elderly people and infants who take a long time to evacuate, since it is unlikely that they will be able to evacuate safely in time. As well as for tsunamis, by evaluating the impact of secondary disasters and the evacuation behavior of people, this methodology can be applied to direct and secondary disasters caused by earthquakes in tectonically active areas in the world, for example, in the western USA.