Hospital Accessibility of Istanbul Following an Earthquake

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SUMMARY

Geographic Information System takes major part on decision-making processes for disaster management cycle. One of the usage areas of GIS in disaster management is to create hazard scenarios and simulate the risk through the related analysis algorithms. Istanbul is one of the major earthquake prone cities of the earth and experts are expecting an earthquake with a magnitude of more than 7.0 occurring in the following 30 years with a probability between 29 and 66 % (Parsons, 2004). Managing the transportation systems with GIS is a widely used method during the normal days; however, GIS can also be used to manage the disasters and the effects of the disasters on transportation systems. Transportation networks gain importance for the accessibility to the collapsed area and for the evacuation of the dead and injured people to the emergency facilities following an earthquake. Previous experiences demonstrate that roads are vulnerable to earthquake, so efficient emergency plans and risk mitigation strategies were developed in order to decrease the impact of disasters on buildings, bridges and networks (Basöz and Kiremidjian 1996, Chang, Shinozuka et al. 2000, Werner, Taylor et al. 2000). To take substantial precautions before the earthquake and to manage the disaster in a suitable way, analyses not only for structural damage but also for the accessibility of the road network is required. In this context, this study focused on the road blockages of the Istanbul due to the bridge damages to evaluate the accessibility to hospitals. In this study, accessibility of hospitals following the expected earthquake based on the damage possibilities of bridges are determined by using HAZTURK software (Karaman et al., 2008). The analyses of this study was performed following the phases of emergency management so that the study could be beneficial to emergency managers and transportation planners to develop essential strategies and policies before, during and after an earthquake. The road network data, bridge data and hospital location data were used for the study to determine the accessibility and the blockage results. Debris of collapsed bridges lead to road blockages and reduce the road functionality after an earthquake. Therefore, emergency and rescue service cannot reach that area. In this context, firstly

the bridges with the high collapse probabilities were determined by using HAZTURK software and the intersected road network data were determine to highlight the road blockages on the roads to the hospitals. This study is one of the first studies on the road blockage estimation on the accessibility to the hospitals based on bridge damage analyses for Istanbul following an earthquake. The previous road blockage study was performed on 2009 by taking into account the building debris areas as a buffer analysis on each building.