集集地震震區民眾傷害型態及相關危險因素初探

Prime Research on Patterns of injuries in Chi-Chi earthquake

中文摘要

1999 年 9 月 21 日凌晨一點四十七分臺灣發生芮氏地震規模七點三級地震，震央在南投集集一帶即在日月潭西方 12.5 公里，強烈的地殼震動造成全台二千多人死亡，近萬人受傷，而靠近震央的南投縣其傷亡人數為全台最嚴重的地區之一。由衛生署 921 全國死亡診斷發現窒息死亡有 713 人爲最高，其次是顱內損傷有 639 人，非死亡外傷則以挫傷 31.4%爲最多，其次分別是撕裂傷 26.9%、擦傷 15.3%、骨折 11.8%。預防地震傷害最好的方法是能預先知道地震發生的時間、震度大小及地點，但以目前科技尚無法有效預測地震何時來臨，然而生命是無價，因此爲了減低地震對人類生命的傷害，需找出導致傷害的可能危險因子，並針對危險因子提供合適的防護方法，期望在未來相同災害發生時能減少受傷人數及減低傷害程度。

本研究是以集集地震傷亡災情較嚴重的南投縣爲研究地區，探討震區民眾死亡和非死亡外傷的傷害型態分佈情形以及人口學特徵，並藉由勝算比（Odds Ratio）來探討年齡別、性別、地震時的行爲、環境因素（房屋結構、房屋倒塌程度、房屋屋齡、地震時所在樓層）等變項是否爲民眾在地震中傷亡的危險因子。

研究結果顯示死亡外傷型態以頭部外傷（ICD-9 碼 851-869）43%爲最多，死亡外傷受傷的部位以頭頸部 69 ％ 爲最多，非死亡外傷型態以開放性傷口（ICD-9 碼 870-895）55.9 ％ 爲最多，非死亡外傷的受傷部位以肢體傷害爲最多。死亡外傷患者平均年齡爲 50.15 歲，非死亡外傷患者平均年齡爲 44.06 歲，未受傷患者平均年齡 45.29 歲，女性在地震中死亡的 Odd ratio 是男性的 1.448 倍 95% 信賴區間 1.226—1.709，年齡小於 10 歲在地震中死亡的 Odd ratio 是 20-29 歲的 4.267 倍，60-69 歲在地震中死亡的 Odd ratio 是 3.824 倍，年齡 70 歲以上的 Odd ratio 則爲 5.047 倍。由多變項羅輯斯回歸中發現地震發生時留在室內在地震中受傷的 Odds ratio 是立即向外逃離的 1.745 倍 95% 信賴區間 1.345-2.264，房屋損毀程度則是倒塌在地震中受傷 Odds ratio 是未倒塌的 13.617 倍 95% 信賴區間爲 11.302-16.405。綜合上述我們可知頭部外傷是造成人們在地震中死亡的主要原因之一，地震發生時立即離開室內可以減少在地震中受傷的機會，因此當地震發生時應立及向外逃離，在逃離過程中必需注意到頭部的保護避免頭部受傷，如無法即時逃出室外而困在室內時應注意到頭部的保護以減少在地震中死亡的機會，才能增加存活的時間增加被救出的機會。

關鍵字：集集地震，傷害型態，危險因素

英文摘要

The Earthquake, Magnitude (ML) 7.3, occurred in Taiwan at 1:47 a.m. on 21st. Sept.

1999, the epicenter of which is around Chichi, Nantu, that is, 12.5 kilos to the west of Sun-Moon Lake. The violent crustal shock caused more than 2,000 deaths and nearly 10,000 injuries throughout Taiwan. Nantu County, which is next to the epicenter, suffered the most serious casualties in Taiwan. 921 National Causing-death Diagnosis, carried out by the Department of Health, Taiwan, found out 713 deaths by suffocation, accounting for the largest proportion, 639 deaths by cranium injury is right next to it. While for the non-causing-death traumas, contusions occupies the largest proportion, which reaches 31.4%, next to it is laceration 26.9%, abrasion 15.3%, fracture 11.8% respectively. The best way to prevent earthquake is to know time, intensity and location of earthquake in advance, but modern science and technology can not forecast effectively when earthquake takes place. However, life is priceless, in order to reduce earthquake's damage to human life, we must find out possible dangerous factors leading to damage, provide suitable preventive methods targeting at these factors, and hope to reduce the casualties and damages to the minimum extent with future similar disasters.

This study focuses on Nantu County as the researching area where suffered most seriously in the Chi-Chi Earthquake. It studies the pattern distribution of causing-death and non-causing-death traumas and characters of demography, and whether the age, gender, behavior during the earthquake, environmental factors (house structure, house collapsing level, house's age, floor when earthquake) etc. might become dangerous factors for people's death and injury at earthquake through the Odds Ratio.

Researching result indicates that head injury (ICD-9 code, 851-869) occupies 43%, the largest proportion of causing-death traumas, whose injuring position is head and neck, 69%, the largest proportion. Open wound (ICD-9 code, 870-895) occupies 55.9%, the largest proportion of non-causing-death trauma, whose injuring position is limbs. People suffered from causing-death traumas with an average age of 50.15, while people suffered from non-causing-death traumas with an average age of 44.06. People who have no traumas average 45.29 years old. The odd ratio of female died in earthquake is 1.448 times more than that of male, 95% confidence interval 1.226—1.709; the odd ratio of children under 10 died in earthquake is 4.267 times more than that of people between 20—29, the odd ratio of people between 60—69 died in earthquake is 3.824 times, the odd ratio of people above 70 died in earthquake is 5.047 times. According to multiple logistic Regression we find the number of injured people who stay in house when earthquake and vibration take place is 1.745 times more than that of people who run out of house immediately, 95% confidence interval 1.345—2.264. For the damaging level, the odd ratio of injured people in collapsed

houses is 13.617 times more than that of people in non-collapsed houses, confidence interval 11.302—16.405. From above, we know head trauma is one of the main causes that kill people, and fleeing from the house may decrease injury opportunity in earthquake. Therefore, when earthquake takes place, people should flee from the house immediately. During the process of fleeing, attention must be paid to the protection of head from injury. If one cannot flee from the house immediately and be confined to the house, he should protect his head to reduce the death opportunity in earthquake, so as to increase time and opportunity of surviving and rescue.
Key Words: Chi-Chi Earthquake, Injury Patterns, Risk Factors