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Prospective study of predictors of poor self-rated health in a 23-year cohort of earthquake survivors in Armenia

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Abstract Long-term prospective studies exploring general health outcomes among disaster survivors are rare. Self-rated health (SRH) — a proven correlate of morbidity and mortality prognosis — was used to investigate predictors of perceived health status among a 23-year cohort of survivors of 1988 Spitak earthquake in Armenia. A geographically-stratified subsample of 725 adults from a larger initial cohort was followed during the period of 1990—2012. A logistic regression model identified predictors of SRH. Adjusted relative risks for the long-term predictors of SRH were calculated. The rate of poor SRH among the survivors was 18.8%, fair 56.5%, and good/excellent 24.7%. In the fitted model, long-term risk factors of poor SRH included baseline body mass index, baseline multi-morbidity, number of experienced stressful life events, and perceived poor living standards during the post-earthquake decade, while participation in sports in the early 1990s was a protective factor. Short-term protective factors included socio-economic status score, social support, employment and dignity, while current household size was a risk factor for poor SRH. No association was found between earthquake exposure severity and SRH after 23 years. However, the identified predictors included a number of modifiable life-

Abbreviations: SRH; self-rated health; PTSD; post-traumatic stress disorder; SES; socio-economic status; BMI; body mass index; QOL; quality of life; DSM; Diagnostic and Statistical Manual of Mental Disorders; CES-D; Center for Epidemiologic Studies Depression Scale; PCL-C; Post-traumatic Stress Disorder Checklist-Civilian Version; VIF; Variance Inflation Factor; ROC; Receiver Operating Characteristic.

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style, material and psychological factors. Thus, interventions targeting these factors could have a long-lasting impact on disaster victims' health status.

1. Introduction

According to general population studies, every fifth person experiences a natural disaster during his/her life [1,2]. Psychological consequences of disasters have been extensively investigated, with post-traumatic stress disorder (PTSD) being the most frequently studied condition followed by depression and anxiety [3]. A substantial body of research has investigated factors associated with psychopathologies in the aftermath of disasters [4—6]. Fewer studies have explored long-term effects of disasters on survivors' mental health and have found that disasters could lead to enduring psychological distress [7,8].

There are very few studies on the longer-term influence of disasters on victims' quality of life showing that long-lasting psychological and environmental consequences of disasters could have an adverse impact on survivors' quality of life [9—11]. Considerable evidence suggests poorer general health outcomes among survivors of disasters and traumatized subjects in terms of increased physical morbidity and mortality several years after the trauma [11—15]. Nevertheless, studies of self-rated health (SRH) among disaster victims many years after the exposure are very rare [16,17].

On December 7, 1988, a devastating earthquake struck the northern regions of Armenia and left half a million people — one-sixth of the country's population — without shelter. Over 100,000 people were injured and 25,000 died. Rehabilitation after the earthquake was delayed because its timing coincided with a difficult transition of the country from the soviet system to a market economy aggravated by a number of cataclysms, including an economic blockade, an energy crisis and a war [18]. Thus, survivors had to cope with very difficult conditions for many years following the disaster. In 1990, a large-scale cohort study was initiated in the earthquake zone to prospectively measure the health outcomes of survivors [19]. The exceptional opportunity provided by this cohort study was used to explore the association between factors assessed at the baseline waves of the study in the early 1990s and SRH of the earthquake survivors over 23 years after the exposure.

SRH was used in this long-term follow-up study as a general measure of physical and mental health status due to its proven strong correlation with objective measures of health status and subsequent mortality [20—25]. This measure was considered particularly valuable for the study purposes as it reflects not only measurable aspects of health, but also subjective feelings and future expectations of well-being [26,27]. It presumably covers also medically unexplained symptoms, a phenomenon frequently detected among disaster survivors [13,28].

The prevalence and predictors of poor SRH have been extensively investigated in different countries and population groups, as this outcome measure is frequently used in health disparities research [29—31]. Two prior cross-sectional studies of SRH conducted among the general population in Armenia found high rates of perceived poor health and an independent relation between health and older age, poverty, lower education, unemployment, depression, and lack of social support [32,33]. The aim of this prospective study was to investigate the prevalence of poor SRH in a long-term cohort of survivors of the 1988 earthquake, to find out whether the severity of the earthquake exposure was related to this outcome after 23 years, and to identify long- and short-term determinants of poor SRH in this disadvantaged population group.

2. Methods

2.1. Participants

A subsample of participants from a large-scale cohort study of earthquake survivors initiated in 1990 was targeted for the recent follow-up study in 2012. This subsample, geographically-stratified to include participants from the most severely damaged areas, consisted of 1785 adults who, in addition to the assessment of earthquake-related experiences, living conditions, physical health status and health behavior at the first waves of the cohort study, underwent mental health assessment [34,35]. In 2012, 83.3% ($n = 1487$) of this sample was traced and 40.6% ($n = 725$) participated in face-to-face interviews. The rest of those traced were either dead (17.3%, $n = 309$), incapable to participate due to ailments (5.0%, $n = 89$), unwilling to participate (3.6%, $n = 64$), or moved out of