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Review

# The effect of socio-economic status on non-fatal outcome after injury: A systematic review

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ABSTRACT

*Background:* Over the past decades, the number of survivors of injuries has rapidly grown. It has become important to focus more on the determinants of non-fatal outcome. Although socio-economic status (SES) is considered to be a fundamental determinant of health in general, the role of SES as a determinant of non-fatal outcome after injury is largely unknown.
*Methods:* An online search was conducted in November 2015 using Embase, Medline, Web of Science, Cinahl, Cochrane, Google scholar and PubMed. Studies examining the relation between SES and a physical or psychological outcome measure, or using SES as a confounder in a general trauma population were included. There were no restrictions regarding study design. The 'Quality in Prognostic Studies tool' was used to assess the methodological quality of the included studies.
*Results:* The 24 included studies showed large variations in methodological quality. The number of participants ranged from 56 to 4639, and assessments of the measures ranged from immediately to 6 year post-injury. Studies used a large number of variables as indicators of SES. Participant's educational level was used most frequently. The majority of the studies used a multivariable technique to analyse the relation between SES and non-fatal outcome after injury. All studies found a positive association (80% of studies significant, n = 19) between increased SES and better non-fatal outcome after injury.
*Conclusion:* Although an adequate and valid measure of SES is lacking, the results of this review showed that SES is an important determinant of non-fatal outcome after injury. Future research should focus on the definition and measurement of SES and should further underpin the effect of SES on non-fatal outcome after injury.



**Contents**



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## Introduction

Injuries continue to be a tremendous burden on public health and disproportionately affects poor, young and older populations [1]. Over the past decades, the number of survivors of injuries has rapidly grown due to major advances of modern injury care [2,3], resulting in a shift in attention from fatal towards non-fatal injury survivors. Disability due to injuries has not reduced, leading to a growing number of injury patients with long-term disabilities [4–8].

The majority of the injury survivors experience short-term or long-term impairments or disability, which affects their health-related quality of life (HRQoL) [9] and inhibits them to return to full employment [10]. Furthermore, functional outcome more than one year post-injury, is often far below population norms [8,11]. Therefore, it has become important to focus on the determinants of non-fatal outcome after injury [12]. According to the literature there is a wide range of possible parameters to determine patients' physical and psychological functioning after injury. These determinants include injury-related factors (e.g. mechanism, type of injury or injury severity), comorbidity, social support, self-efficacy or demographic characteristics (e.g. age or gender) [3,8,13–20].

Socio-economic status (SES) is considered to be a fundamental determinant of health and an important characteristic of both human and environmental factors. SES is defined as *'a hierarchical continuum according to prestige, lifestyle, attitudes and values, which define a person's position in society*' [21]. Previous studies indicated that people with a low level of SES are overrepresented in the injured population [22,23]. Currently, educational level and income are often used to determine SES in medical research [24,25]. Despite its fundamental role, the effect of SES inequalities on non-fatal outcome after injury are considered complex. Both individual and environmental factors play an important role [26]; for instance psychological factors (e.g. poverty-related stressors), material resources (e.g. decent housing), health behavior (e.g. smoking) or work and occupational exposure (e.g. working condition) might contribute to physical and psychological outcome after injury.

In 2002, Cubbin et al. [1] aimed to critically examine the methods that were used to measure and interpret SES in studies of fatal and non-fatal outcome after injury. Cubbin et al. reviewed 53 studies on SES and injury risk. The authors concluded that increasing SES has a strong inverse association with the risk of homicide and fatal unintentional injuries although the results for suicide were mixed. The effect of SES on non-fatal injuries was less consistent than for fatal injuries. However many of the included studies utilized arbitrary measures of SES and measures were often inadequately defined. The interpretation of the role of SES was lacking in the included studies.

Although SES is a fundamental determinant of outcome after injury [27–30], little attention has been paid to SES in the public health literature focusing on injury control and prevention. Studies are often restricted to specific types of injuries (e.g. traffic injuries or traumatic brain injury [31,32]) or particular age groups (e.g. children or adolescents [33,34]), so definite conclusions about the effect of SES on non-fatal outcome for the general trauma population are difficult to draw.

A growing number of patients have to deal with long-term consequences after injury. Knowledge of the role of SES may influence psychological and physical outcome of injury survivors. To our knowledge this is the first systematic review that examined the effect of SES on non-fatal outcome after injury for the general injured population. The main objective is to summarize the current knowledge of the effect of SES on non-fatal outcome after injury. Another aim is to critically examine the measurements and interpretations of SES of the included studies.

## Materials and methods

### *Data sources*

Peer-reviewed studies that were published until November 2015 were included: Embase (4752 hits), Medline Ovid (1036 hits), Web of Science (713 hits), Cochrane (20 hits), PubMed (316 hits) and Google Scholar (248 hits). All selected studies were downloaded to RefWorks [35] and duplicates were removed. The following key words were used: 'injury'; 'trauma'; 'socio-economic status'; 'social class'; 'income'; 'education'; 'recovery'; 'outcome'; 'disability'; '(health-related) quality of life' and 'health status'. See Appendix A in Supplementary material for an overview of all search terms.

### *Study selection*

Studies were included in the review if they were published in English in a peer-reviewed journal up to November 3rd 2015. This review focused on 'all injury' studies (i.e. representing a general trauma population) irrespective of injury severity. Studies with a mixed age population (e.g. adolescents and adults) were included as well. Injury was defined according to the World Health Organization (WHO) as *'relatively sudden discernible effects due to body tissue damage from energy exchanges or ingestion of toxic substances but not due to medical adverse events, and obtained from health care settings'*. Only patients with an injury seen on the emergency department (ED) of a hospital were included. SES was based on individual level (e.g. educational level or income) or based on area level (e.g. deprivation of an area). Studies were included if patients' post-injury physical and/or physiological functioning was measured. To meet the inclusion criteria, analyses of SES with the outcome measure had to be performed. Studies that examined fatal and non-fatal outcome were only included if data of the non-fatal outcome was analysed separately. We excluded studies that focused on specific types of injuries (e.g. traumatic brain injury or burns) or studies that included only children or adolescents. There were no restrictions regarding the type or design of the study.

If more than one article was written based on the same study data (i.e. multiple publications), one main article was selected based on the following criteria: (1) the study that described the effect of SES on a physical of physiological outcome measure; (2) the study with the largest number of included patients. Any other

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