Health & Place 24 (2013) 165–172

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Socioeconomic inequalities in injury mortality in small areas of 15 European cities

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ARTICLE INFO

Article history:
Received 10 April 2013
Received in revised form
30 August 2013
Accepted 10 September 2013
Available online 17 September 2013

Keywords:
Injuries
Mortality
Europe
Socioeconomic inequalities
Urban areas
Small areas

ABSTRACT

This study analysed socioeconomic inequalities in mortality due to injuries in small areas of 15 European cities, by sex, at the beginning of this century.

A cross-sectional ecological study with units of analysis being small areas within 15 European cities was conducted. Relative risks of injury mortality associated with the socioeconomic deprivation index were estimated using hierarchical Bayesian model.

The number of small areas varies from 17 in Bratislava to 2666 in Turin. The median population per small area varies by city (e.g. Turin had 274 inhabitants per area while Budapest had 76,970). Socioeconomic inequalities in all injury mortality are observed in the majority of cities and are more pronounced in men. In the cities of northern and western Europe, socioeconomic inequalities in injury mortality are found for most types of injuries. These inequalities are not significant in the majority of cities in southern Europe among women and in the majority of central eastern European cities for both sexes.

The results confirm the existence of socioeconomic inequalities in injury related mortality and reveal variations in their magnitude between different European cities.

1. Introduction

Injuries due to external causes, whether intentional or unintentional, are one of the leading causes of death worldwide.

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http://dx.doi.org/10.1016/j.healthplace.2013.09.003

In Europe injuries account for 7% of all deaths every year, with traffic injuries (16%), poisonings (13%) and falls (10%) being the main causes of death related with unintentional injuries, and suicides (19%) and homicides (7%) the leading causes of intentional injuries (WHO, 2012).

In recent decades injury mortality rates have fallen in most European countries (EUROSTAT, 2012), however, there are still differences between countries in mortality due to these causes. In concrete, people living in low and middle income countries are more likely to die from injuries than those living in high income countries. These differences have been observed for all specific causes of injuries, except for falls in women (Sethi et al., 2006). In addition, individuals of less favourable socioeconomic positions present higher risks of dying due to the leading specific causes of death by injuries (Cubbin and Smith, 2002; Laflamme et al., 2009).

In recent years there has been an increase in the number of studies of mortality inequalities in geographical areas, since area of residence has been recognised as a factor affecting health independently of individual determinants (Diez Roux, 2001). In the case of injury related mortality, some studies have found that areas with worse socioeconomic indicators present higher risks of dying, in particular for homicides (Leyland and Dundas, 2010; Krueger et al., 2004) and drug overdose (Gotsens et al., 2011a; Michelozzi et al., 1999). In the case of suicides and traffic injuries the findings are inconclusive. Some studies have found associations, both positive (Gotsens et al., 2011a; Burrows et al., 2010; Esnaola et al., 2006; Chang et al., 2011; Middleton et al., 2006) and negative (Middleton et al., 2004; Page et al., 2002) in the case of suicides, while others have found no association (Esnaola et al., 2006; Middleton et al., 2004). In the case of falls, few studies have analysed socioeconomic inequalities for this cause at area level, these studies have not found any association with socioeconomic deprivation of residence area (Gotsens et al., 2011a). Finally, it is important to note that the socioeconomic inequalities in mortality due to injuries are more pronounced among men for the majority of causes (Gotsens et al., 2011a).

In Europe, socioeconomic inequalities in injury related mortality at small area level have hardly been analysed, and the majority of studies have focused on comparisons between countries. Focus to urban population was rarely given, while, on one side, the majority of Europe's population lives in cities (United Nations, 2011), on the other it is in the urban areas where certain external causes, such as traffic injuries involving pedestrians, homicides, or substance abuse are more common (Vlahov and Galea, 2002). Thus, the objective of the present study was to analyse socioeconomic inequalities in mortality due to the leading injury related causes of death in small areas of 15 European cities by sex, at the beginning of the 21st century.

2. Methods

2.1. Design, unit of analysis and study population

This was a cross-sectional ecological study which forms part of the INEQ-CITIES project (https://www.ucl.ac.uk/ineqcities/). The units of analysis were the small areas of 15 European cities. The selected cities of the study are the ones participating in this project. These cities were located in a variety of regions of Europe: north: Helsinki (Finland) and Stockholm (Sweden); west: London (UK), Amsterdam and Rotterdam (the Netherlands), Zurich (Switzerland) and Brussels (Belgium); south: Turin (Italy), Madrid and Barcelona (Spain), and Lisbon (Portugal); and central east: Budapest (Hungry), Kosice and Bratislava (Slovakia), and Prague (Czechia). The study population consisted of the individuals residents in the 15 cities during a period around 2000–2008.

2.2. Information sources

The majority of cities had mortality data for the years 2000–2008 and socioeconomic indicators for 2001. Mortality data were obtained from the mortality registers of the cities or countries. Due to technical problems, georeferencing of place of residence could not be done for several deaths in eight cities (percentage varying from 0.24% in Brussels to 2.75% in Helsinki). The population data stratified by age (in five-year groups), sex and small area were obtained from census data or from the Register of Inhabitants for each city. Socioeconomic indicators were also obtained from census data in the majority of cities except in Amsterdam and Rotterdam which were obtained from the Annual Labour Force Survey for the years 1996–2008 and Helsinki and Stockholm which were obtained from the Register for 2001.

2.3. Mortality and socioeconomic deprivation index

The present study has analysed all deaths due to injuries (International Classification of Diseases 9th edition ICD9: E800–E999, 304, 305 (and the 4th digits of ICD9: .2, .3, .4, .5, .6, .7, .8), International Classification of Diseases 10th edition ICD10: V01–V89, F11–F16, F19) and from five specific causes of death due to injuries: transport injuries (ICD9: E800–E848, ICD10: V01–Y99), drug overdoses (ICD9: E850 (.0, .9), E851–E855, E858 (.8, .9), 304, 305 (.2, .3, .4, .5, .6, .7, .8), ICD10: X41–X44, F11–F16, F19), falls (ICD9: E880–E888, ICD10: W00–W19), suicides (ICD9: E950–E959, ICD10: X60–X84) and homicides (ICD9: E960–E969, ICD10: X85–Y09).

We included as a covariate an index of socioeconomic deprivation available for each small area of each city. The socioeconomic indicators included in the index were (a) unemployment: percentage of people aged 16 years or over unemployed or actively seeking job in relation to the total economically active population; (b) manual workers: percentage of people aged 16 or over, employed, who are manual workers, in relation to the total employed population aged 16 or over; (c) low education in young people (16–25 years): percentage of 16–25 years old population with primary education or lower level in relation to the total population aged 16–25 years; (d) university qualifications in young people (25–34 years): percentage of 25–34 years old population with university education in relation to the total population aged 25–64 years; and (e) foreigners from low income countries: percentage of foreigners from low income countries in relation to the total population. Although the INEQ-CITIES project collected information on other socioeconomic indicators, the socioeconomic indicators that were used to create this index were the most comparable indicators across the cities. The index of socioeconomic deprivation was constructed by the DP2 method. DP2 is an iterative procedure that weights partial indicators depending on their correlation with the global index. This construction overcomes several limitations of the standard Principal Component Analysis method, for instance, aggregating variables expressed in different units of measurement, arbitrary weights, the treatment of missing values and duplicate information. In addition, the DP2 method allows a joint analysis of the data from all the cities in order to obtain a single index of deprivation. Consequently, this deprivation index is comparable across all the cities studied (Pena Trapero, 1977; Salcedo et al., 2012).

2.4. Data analysis

The mortality indicator used for the analysis is the Standardized Mortality Ratio (SMR). The SMR is dependent on population size since its variance is inversely proportional to the expected values, thus, areas with low population tend to present estimates