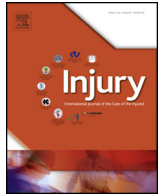




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## Inequalities in the risk of disability due to traffic injuries in the Spanish adult population, 2009–2010

Rocío Palmera-Suárez<sup>a,b,\*</sup>, Teresa López-Cuadrado<sup>a,d</sup>, Rafael Fernández-Cuenca<sup>a,b</sup>, Enrique Alcalde-Cabero<sup>c</sup>, Iñaki Galán<sup>c,d</sup>

<sup>a</sup> Department of Epidemiological Analysis and Health Status, National Centre for Epidemiology, Carlos III Institute of Health, Calle Monforte de Lemos 5, Pabellón 12, PC 28029, Madrid, Spain

<sup>b</sup> Consortium for Biomedical Research in Epidemiology and Public Health (CIBER en Epidemiología y Salud Pública – CIBERESP), National Centre for Epidemiology, Carlos III Institute of Health, Calle Monforte de Lemos 5, Pabellón 12, PC 28029, Madrid, Spain

<sup>c</sup> Department of Applied Epidemiology, National Centre for Epidemiology, Carlos III Institute of Health, Calle Monforte de Lemos 5, Pabellón 12, PC 28029, Madrid, Spain

<sup>d</sup> Department of Preventive Medicine and Public Health, School of Medicine, Autonomous University of Madrid/IdiPAZ (Instituto de Investigación del Hospital Universitario La Paz/La Paz University Teaching Hospital Research Institute), Calle del Arzobispo Morcillo 4, PC 28029, Madrid, Spain

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### ABSTRACT

**Background:** Although traffic injuries (TIs) are an important cause of disability the related factors are little known. We aimed to estimate the differences in risk of TI-related disability according to individual characteristics that might generate health inequalities.

**Methods:** Cross-sectional study using a representative Spanish population sample drawn from the European Health Interview Survey 2009/2010. We calculated traffic crashes in the preceding year which resulted in injuries. Disability was measured using the Global Activity Limitation Indicator and four indicators of limitations (sensory, physical functional, self-care and domestic activities). Principal socio-demographic and behavioural/lifestyle variables were studied. We used multivariate logistic regression to estimate the risk (ORs) of TI-related disability in the sample as whole and disability-related factors in persons who had experienced TIs.

**Results:** Persons with TIs had a higher risk of global disability (OR = 1.61; 95%CI:1.17–2.20), physical functional limitations (OR = 1.96; 95%CI:1.33–2.89) and self-care limitations (OR = 1.73; 95%CI:0.98–3.05). Among persons with TIs, GALI-related risk was higher in women (OR = 3.06,  $p = 0.002$ ) and persons aged over 30 years (OR<sub>31–45years</sub> = 6.81,  $p < 0.001$ ; OR<sub>46–64years</sub> = 5.96,  $p = 0.011$ ; OR<sub>>64years</sub> = 4.54,  $p = 0.047$ ). Lower risk was observed among persons with a higher educational level (OR = 0.22,  $p = 0.003$ ). The risk of disability among persons with TIs who consumed illegal drugs was OR = 3.9 ( $p = 0.023$ ).

**Conclusions:** Traffic injuries in the preceding year are associated with higher risk of disability, which is unevenly distributed. Individual (women and persons over 30 years), socio-economic (lower educational level) and behavioural (illegal drug use) factors are involved. Actions aimed at changing the unequal risk among vulnerable subgroups and providing health, social and protective services should be implemented.

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\* Corresponding author at: Department of Epidemiological Analysis and Health Status, National Centre for Epidemiology, Carlos III Institute of Health, Calle Monforte de Lemos 5, Pabellón 12, PC 28029, Madrid, Spain.

E-mail addresses: [rpalmera@externos.msssi.es](mailto:rpalmera@externos.msssi.es) (R. Palmera-Suárez), [teresalc@isciii.es](mailto:teresalc@isciii.es) (T. López-Cuadrado), [rfcuenca@isciii.es](mailto:rfcuenca@isciii.es) (R. Fernández-Cuenca), [ealcalde@isciii.es](mailto:ealcalde@isciii.es) (E. Alcalde-Cabero), [igalan@isciii.es](mailto:igalan@isciii.es) (I. Galán).

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### Introduction

Traffic injuries (TIs) are an important public health problem worldwide, due to their high morbidity and mortality burden and high social and economic cost [1]. It is estimated that for every death, there are 20 injured persons, and that approximately 50 million persons suffer a considerable impact on their health and quality of life [1]. In Spain, despite the reduction in TIs seen in recent years, the number of non-fatal victims generated by this cause continues to be high, and is estimated to be over 130,000

injured, 20,500 admitted to hospital and close on 7000 severely injured (Maximum Abbreviated Injury Scale -MAIS 3+) in 2016, an increase of 19,000 injured more compared to 2009 [2].

Health inequalities can be attributed to biological and behavioural variations, and/or to environmental and external conditions which are beyond the control of persons and whose distribution is unequal, unnecessary and avoidable [3].

In modern society, disability is an event which is especially influenced by these social health determinants and which principally affects women, persons aged over 65 years, and those with a lower educational level and low income [4–6]. These conditions increase the vulnerability of people, by rendering them more susceptible to suffer potentially disabling events and/or exposing disabled persons to an increased risk of more severe limitations and restrictions [4–6].

With respect to TIs, the disease burden is likewise distributed unequally, affecting regions with lower development indices in economic, social and health-service terms [1,7]. Differences in risk exposure are likewise explained by social health determinants, with sex, age, educational level and social class being the main factors implicated [1,8–11]. In terms of individual socio-demographic determinants, the highest-risk groups are young men with a lower educational level and limited economic resources [1,7–9].

TI-related disability (TID) is associated with important limitations and restrictions, not only on mobility, but also on complex self-care and domestic activities in an economically active population group [12–16]. The development of these limitations is influenced by a series of social health determinants, which increase both the susceptible population's risk of exposure to more serious and potentially more incapacitating TIs, and the vulnerability of traffic crash victims, thereby generating higher levels of disability in the short and long term [12–14]. Although few studies have assessed this topic, previous results have indicated that a low educational level and worse socio-economic position are associated with a higher prevalence of TID and more severe TID, something that particularly affects work capacity and, by extension, increases vulnerability and socio-economic disadvantage in this population sector [12–14]. Further research is, however, needed to evaluate this issue.

With respect to age, despite the fact that younger adults have a higher probability of having a TI, it seems that the risk of TID particularly affects persons in the middle adulthood age range [9,12,13]. Greater variability is observed in the distribution of TID by sex, with some studies reporting a higher risk among men [12,17,18], and others reporting a higher risk among women [19], or alternatively, that distribution depends on the type of TI [10,20], with TID resulting from a motorcycle crash being more frequent in men, TID in car occupants being similar as between the sexes, and pedestrian-related TID being greater in women [9].

Accordingly, the aim of this study was to estimate the risk of disability in the population that had experienced a TI during the 12 months preceding the survey, and to identify the related socio-demographic and behavioural determinants.

## Methods

### Study design and population

Cross-sectional study with population data drawn from the European Health Interview Survey in Spain 2009/2010 (EHIS 2009/2010) (*Encuesta Europea de Salud en España*), a nationwide survey conducted from April 2009 to March 2010, targeting the population segment residing in main family dwellings (i.e., a given household's usual place of abode). Although there is a more recent wave of the EHIS, most of the disability indicators were

measured in the last survey only in people over 65 years instead of all ages as in the EHIS 2009/2010.

The survey relied on three-stage sampling with first-stage unit stratification. The stratification criterion was the size of the municipality to which the section belonged (7 strata), with the first-stage units being census sections and the second-stage units being main family dwellings. Lastly, an adult person (aged 16 years or over) was selected in each household [21]. Selection of first-stage units was performed with probability proportional to the size of the census section; in the second-stage, family dwellings were selected by systematic sampling with random start; and in the third-stage, an adult was chosen with equal probability to complete the individual questionnaire [21].

With respect to the total number of dwellings surveyed, the response rate was 73% [22]. For study purposes, data were obtained from 21,015 persons over the age of 15 years with information on the variables of analysis. Data were collected by means of computer-assisted personal interviewing, using an electronic questionnaire that contained the following four major blocks: socio-demographic; health status; health care; and health determinants [21].

This study was approved by the Institutional Review Board of the Carlos III Institute of Health.

### Variables

TI was evaluated on the basis of the question, "During the past twelve months have you had a road traffic accident resulting in injury (internal or external)?"

Disability/limitations, the primary outcome of interest in the population with road traffic crashes, were measured using a set of indicators. These were a global disability indicator and four specific indicators grouped under two heads, i.e., basic limitations (sensory, physical functional) and complex limitations (activities of daily living – ADL – relating to self-care; and instrumental activities of daily living – IADL – relating to domestic activities); the latter two form part of the International Classification of Functioning, Disability and Health (ICF) [23], the current framework for measurement of disability. These indicators are complementary and assess disability both overall and specifically.

The Global Activity Limitation Indicator (GALI) ([http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Activity\\_limitation](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Activity_limitation)) measured chronic health-related activity restrictions in the performance of ADL during a minimum of six months immediately preceding the interview. The generic question is the following: *for at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do?* Sensory limitations evaluated difficulties in seeing and hearing with and without the use of aids, including blindness and deafness respectively (i.e. *¿Can you see newspaper print? ¿Can you hear what is said in a conversation with several people? ¿Do you wear a hearing aid?*, etc.). The physical functional limitations measured difficulties in walking, ascending and descending a flight of stairs, bending and kneeling, lifting and carrying items, performing fine hand movements, and biting and/or chewing, without any aids (i.e. *¿Can you walk 500 m on a flat terrain without a stick or other walking aid or assistance? ¿Using your arms, can you carry a shopping bag weighing 5 kg for at least 10 m without any aid or assistance?*, etc.). Limitations in performing basic ADL evaluated difficulties in performing tasks of everyday life, such as feeding (eating and drinking), getting in and out of bed, getting into and out of a chair, dressing and undressing, using the toilet, and showering or bathing (washing the entire body) (i.e. *¿Do you usually have difficulty feeding yourself? ¿Do you usually have difficulty dressing and undressing? Do you usually have difficulty using toilets?*, etc.). Limitations in performing IADL evaluated health-related difficulties in performing domestic

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