

EPIDEMIOLOGICAL PATTERN OF NON-FATAL INJURIES IN IRAN

Soori H¹, Akbari ME², Ainy E³,
Zali AR⁴, Naghavi M⁵, Shiva N⁶

ABSTRACT

Objectives: To present the incidence rate and distribution of non-fatal injuries in Iran.

Methodology: A one- year study was carried out in all 28 provinces of Iran in 2002-3. Overall, 53,6624 individuals (1,11626 households) from all provinces of the country were randomly selected for the study. In each province about 2000 households in urban and 2000 families in rural areas were included in the study. The guardians or heads of the households were interviewed by using a questionnaire that included information about any accidental injuries taken medical cares within the year prior to the date of data collection and some other demographic information.

Results: It is estimated that more than 9.2 million injuries with about 8286 deaths and 74379 hospitalizations occurred in Iran each year. The incidence rate of all types of non-fatal injuries was (444.3 per 100,000). The top three causes of non-fatal injuries were transport accidents (237 per 100,000), falls (106.2 per 100,000) and struck by thrown, projected of falling object (69.8 per 100,000). The non-fatal injuries were more common among males than females (8039.6 vs. 2021.7 per 100,000) and nearly equivalent among residence of urban areas compared to those from rural areas (5024.1 vs. 5075.5 per 100,000).

Conclusion: In Iran injuries are one of the main leading causes of diseases and hospital admissions in both rural and urban areas, and this figure for transport accidents is quite high in the world.

KEY WORDS: Injury pattern, Non-fatal, intentional, Unintentional, Iran, sex.

Pak J Med Sci January - March 2010 Vol. 26 No. 1 206-211

How to cite this article:

Soori H, Akbari ME, Ainy E, Zali AR, Naghavi M, Shiva N. Epidemiological pattern of non-fatal Injuries in Iran. Pak J Med Sci 2010;26(1):206-211

Correspondence:

Dr. Hamid Soori,
Prof. of Epidemiology,
Director of Safety Promotion and Injury
Prevention Research Center,
Shahid Beheshti University of Medical Sciences,
Tehran, Iran.
Address: Research Manager Part, 6th floor,
Shahid Beheshti University of Medical Sciences,
Parvaneh Street, Evin, Chamran High Way,
Tehran, Iran.
E-mail: ainy.elaheh@gmail.com
hsoori@yahoo.com

- * Received for Publication: July 15, 2009
- * Revision Received: December 26, 2009
- * Revision Accepted: January 2, 2010

INTRODUCTION

Injuries are a major cause of avoidable ill-health and death in many countries of the world. Road traffic injuries are a leading cause of death, hospitalization, disability and socio-economic loss and account for approximately 300,000 child deaths annually with more than half of these occurring in South East Asia and Africa.¹ In 2002, nearly 1.2 million people were killed in road crashes, while more than 50 million were injured and hospitalized; with 85% of these occurring in low-and middle-income countries.² By 2020, South East Asia, Sub-Saharan Africa, Pacific, India and China are

expected to witness significant increases in road deaths to the extent of 144%, 80%, 79%, 147% and 97% respectively.³

Injuries are also the most important cause of hospital admissions and emergency department attendance, and the direct cost to the national health service of accidental injuries is estimated to be a high proportion of the total budget each year.⁴ They are a threat to health in every country and in Iran they are the commonest cause of hospitalization in different age groups.^{5,6} Most injuries are preventable and in many developed countries injury prevention has been established as a key area or national priority and death rates from injuries have been falling steadily for many years. The collection of more data on injury and ill-health caused by accidental injuries is a priority.⁷

In Iran like many other developing countries due to lack of a data collection system on injuries, the epidemiological pattern of injuries is not available and the police and national information registration is inadequate. In rural areas data on injuries are mainly collected in "health houses". Their main function is to offer primary health care services to rural areas of the country and their data exclude details about intentional and unintentional injuries. Therefore, no previous study in Iran has attempted to present a full epidemiological picture of intentional and unintentional non-fatal injuries. This study was conducted to ascertain epidemiological pattern of non-fatal injuries in Iran.

METHODOLOGY

A prospective study was conducted at national level in Iran during 2002-2003 (from 21 March 2002 to 20 March 2003, 21 March is the first day of the year in the Persian calendar). Iran is composed of 28 provinces which make up a population of more than sixty million people (Iran national census 1996). Ten provinces were selected randomly according to their geographical distribution. The urban and rural areas were defined according to the criteria from the Ministry of interior of the Islamic Republic of Iran.

A multi stage stratified cluster random sampling technique was used to select subjects. 95% confidence intervals for the differences proportions were used. Average population (households) for each province was 125000. At least samples for each province were 2000 households. Each health center covered 400 households, so ten center were selected in each provinces and totally 280 health center were followed up during study.

Subjects were 536624 who were interviewed individually, face to face. Interviews were conducted by 280 trained staffs (they were trained by researcher during one week workshop) using pre tested questionnaire. Content validity was used for Questionnaire. Its reliability was controlled by test-re-test. Initially, information on age, sex, kinds of injuries (Transport accidents, falls, struck by thrown, projected of falling object, contact with venomous animals and plants, burns from heat and hot substance, and fire and flames, accidental poisoning, exposure to electrical currents, accidental suffocation and strangulation, accidental drowning and submersion), hospitalization, death, urban and rural areas were collected. Filling of each questionnaire took about 20 minutes. Included in this study were all samples which were covered by health center from 2002-2003. Excluded were congenital disability and unspecified codes as per ICD10. Systematic error which may be due to the differences in accuracy or completeness of recall to memory of past events or experiences was tolerated, because this error was equal in all samples. This indicates that the data collected accurately reflects the views of the population interviewed. Health workers are respectable and trustworthy among households and their response rate was (68%) acceptable in this study.

The study protocol was approved by the independent ethics committee and was conducted in accordance with the declaration of Helsinki guideline. All subjects were provided with a consent letter before screening. The guardians or heads of the households were interviewed by using a questionnaire that included information about any accidental

injuries that required medical cares within the year prior to the date of data collection and some other demographic information. Non-fatal causes were classified according to 3-digit coding system of the international classification of diseases (ICD-10).⁸

External causes of morbidity followed codes V01 to Y98 for example, transport accident were coded as V01 to V99, falls as W00- W19, and exposure to forces of nature codes from X30 to X39. To ensure the completeness and accuracy of the data, all data obtained from the above study were compared and validated with other sources of health registry information, including: the national registry system for hospitalization and death information data. All confirmed data were referred to the Ministry of health every month and entered into a computer for statistical analysis. Data reliability for second time was controlled by double check. All analyses were conducted using SPSS for Windows (Version 10.0). Incidence rate of non-fatal injuries and its causes is presented per hundred thousand.

RESULTS

During the year of study, more than 9.2 million accidental injuries and (49.5 per 100,000) deaths resulted from injuries which occurred in Iran. Non-fatal injuries were 444.3 per hundred

thousand of all injuries. There were 80% males and 20% females. Non-fatal injuries were significantly greater among males compared to females (8039.6 vs. 2021.7 per 100,000). Patients ranged in age < 1 years to >50 years (mean= 32.7 years). The most frequent injuries originated from transport accidents (237 per 100,000) and falls (106.2 per 100,000) and struck by thrown, projected of falling object (69.8 per 100,000), 55.5, 22.3 and 14.3 percent of non-fatal injuries respectively. The other injuries were: 7.9% (contact with venomous animals and plants 11, burns from heat and hot substance, and fire and flames 10.9, accidental poisoning 6.9, exposure to electrical currents 2.1, accidental suffocation and strangulation 0.4 and accidental drowning and submersion 0 per 100,000) (Table-I).

Many fractures involved lower limb, head and upper limb 32, 27 and 21 percent respectively. The distribution of study subject according to the age and sex is depicted in (Table-II). Majority of injuries was in the age groups 20-24 years (male: female ratio of 9:1). Unintentional injuries were totally 57 (urban 49 and rural 51 per percent). The distribution of study subject according to the urban and rural is depicted in (Table-III). Majority of injuries in urban and rural region was in the same age groups too (20-24 years).

Table-I: Incidence rate of death and hospitalization among 16740637 study subjects (per 100,000)

<i>Causes</i>	<i>Hospitalization</i>	<i>Death</i>	<i>Total</i>
Transport accidents	39675(237) *	6361(38)	46037(275)
Falls	17779(106.2)	670(4)	18448(110.2)
Struck by thrown, projected of falling object	11685(69.8)	167(1)	11852(70.8)
Contact with venomous animals and plans	1841(11)	67(0.4)	1908(11.4)
Burns from heat and hot substance, and fire and flames	1825(10.9)	167(1)	1992(11.9)
Accidental poisoning	1155(6.9)	100(0.6)	1256(7.5)
Exposure to electrical currents	352(2.1)	167(1)	519(3.1)
Accidental suffocation and strangulation	67(0.4)	51(0.3)	117(0.7)
Accidental drowning and submersion	0(0)	536(3.2)	536(3.2)
Total	74379(444.3)	8286(49.5)	82665(493.8)

* Numbers in parenthesis represent incidence rate per 100,000 study subjects.

Table-II: The distribution of study subject according to the age and sex (per 100,000)

Age group	Sex		
	Female n=3348127	Male n=13392510	Total n=16740637
0-4	191.5(36) *	335.5(64)	527(5)
5-9	164.7(32)	357.4(68)	522.1(5)
10-14	121.7(21)	461.4(79)	583.1(6)
15-19	118.4(10)	1032.4(90)	1150.8(12)
20-24	169.1(11)	1368.8(89)	1537.9(16)
25-29	168.8(15)	954.2(85)	1123(11)
30-34	149.5(16)	806.6(84)	965.1(10)
35-39	163.3(21)	612.7(79)	776(8)
40-44	196.5(23)	669.7(77)	866.2(7)
45-49	220.5(26)	615.4(74)	835.9(8)
>50	357(30)	825.5(70)	1183.2(12)
Total	2021.7(20)	8039.6(80)	10061.3(100)

* Numbers in parenthesis represent percent.

DISCUSSION

Iran has one of the greatest non-fatal injuries rates unintentional accidental injuries compared with many countries. Non-fatal injuries incidence was 444.3 per 100,000 is the greatest one in the world. The most frequent injuries originated from traffic accidents followed by fall and struck by thrown, projected of falling object. Our study demonstrated a surprisingly high incidence of transport accidents. Road traffic death rates have decreased in high income Countries since the 1960s and 1970s, although injury rates vary greatly even within the same region. For example, in North America, from 1975 to 1998, the road traffic fatality rate per 100,000 population declined by 27% in the United States but by 63% in Canada. Meanwhile, rates in low-income and middle income countries have increased substantially.⁹⁻¹¹

A recent study in Bangladesh¹² found that 21% of road traffic deaths occurred to household heads among non-poor people versus 32% among poor people. Three quarters of all poor families who had lost a member to road traffic death reported a decrease in their standard of living, and 61% reported that they had had to borrow money to cover expenses following their

loss. Families who lose the earning capacity of members disabled by road traffic injuries and who are burdened with the added cost of caring for these members may end up selling most of their assets and getting trapped in long-term indebtedness.

In Iran the road traffic fatality rate per 100,000 was 49.5 and hospitalization rate per 100,000 was 74379. The present study revealed that most of the injuries occur in the age groups 20-24 years of population (male: female ratio of 9:1). The same finding is observed in these age groups in rural and urban population. Some studies have also reported a higher road traffic injury in similar age groups.¹³⁻¹⁵ In the United Kingdom, the rate of crash involvement for young drivers is 2.5 times higher than for older drivers Clarke DD et al.¹⁶⁻¹⁸ Strict licensing procedure should be followed and minimum level of education regarding road safety should be imposed especially to the young age groups while giving them the license.¹⁷ According to a new report published by WHO Road traffic crashes are the leading cause of disability among young people between 10 and 24 years. Young males are at higher risk for road traffic injuries than females in every age group under 25 years.¹⁸ The same finding is reported in

Table-III: The distribution of 16740637 study subject according to the urban and rural area (per 100,000)

Age group	Urban n =8202912	Rural n =8537725	Total n =16740637	Hospitalization n =74379
0-4	252.7(46) *	291.4(54)	544.1(5)	17.8(4)
5-9	267.9(50)	267.9(50)	535.8(5)	22.2(5)
10-14	288.9(48)	311.8(52)	600.7(6)	26.7(6)
15-19	584.5(52)	550.8(48)	1135.3(11)	53.4(12)
20-24	847.8(57)	628.5(43)	1476.3(15)	71.0(16)
25-29	597.2(53)	535.6(47)	1132.8(11)	48.9(11)
30-34	468.6(48)	500.4(52)	969(10)	44.4(10)
35-39	377.9(49)	400.3(51)	778.2(8)	35.5(8)
40-44	403.2(44)	512.7(56)	915.9(9)	40.0(9)
45-49	388(46)	462.9(54)	850.9(8)	35.5(8)
>50	547.4(47)	613.2(53)	1160.6(12)	48.9(11)
Total	5024.1(49)	5075.5(51)	10099.6(100)	444.3(100)

* Numbers in parenthesis represent percent

another study.¹⁹ It looks that males are the bread earners for their family and outdoor activities such as commercial, attending the colleges, offices and so on, exposed them to accident. These productive age groups lost productive man days by injury.²⁰⁻²¹ On the other hand it is probably because of the mass production of automobiles within the past two decades while other components of injury prevention such as environmental and behavioral modifications which have not adequately improved. In Iran any preventive strategy should be directed to the young particularly males.

Fall was the second common cause of non fatal injuries in this study. In Hardeman study falls were the most common injuries among women aged 64 years and older. They suggested that emergency strategies for prevention of unintentional falls among older women might be initiated.¹⁹

The strength of the present study is the large sample size. The main limitation of this study is self reported data collection. It might be the weakness of community based studies.²² A broad context of social, behavioural, regulation and environmental research and land use policies is rarely addressed in relation to unintentional injuries in this community. It is essential to develop good quality measures for injury

prevention. There is great potential for further research in this field.

In conclusion, the epidemiology of injuries particularly for transport accident injuries has a completely different pattern of non fatal compared to the past decades and these are good lessons for the countries becoming more affluent. Injury-related policies must therefore be considered as key element of health promotion and as a priority for the health-related organizations in this country. Participating in local multi-agency schemes and international support as well as national efforts may enhance the chances of prevention and control of injuries in Iran.

ACKNOWLEDGMENTS

We express our appreciation to our health ministry colleagues for their help and cooperation.

REFERENCES

1. World Health Organization. Youth and road safety (eds). Toroyan T and Pedon M. Geneva 2007.
2. World Health Organization. World report on road traffic injury prevention (eds) Peden M, Scurifield R, Sleet D, Mohan D, Hyder A A, Jarawane and Mathers C. Geneva, 2004a.
3. Koptise E, Cropper M. Traffic fatalities and income growth. Accident Analysis and Prevention 2005; 1:169-178.

4. Christofer J, Murray L, Lopez D. The Global burden of disease. World Bank Report. Year is missing
5. Soori H, Naghavi M. Deaths from unintentional injuries in rural areas of the Islamic Republic of Iran. *East Meditr H J* 1999;5(1):55-60.
6. Soori H. Children's falls from heights in Ahwaz, Iran. *Neuroscience* 2003;8(4):237-40.
7. Naghavi M, Jafaree N, Alaedini F, Akbari ME. Epidemiology of external causes of injury and accident. Islamic Republic of Iran, Ministry of Health 2004.
8. International statistical classification of diseases and related health problems. 10th ed. Geneva. World Health Organization.1992.
9. Nantulya VM, Reich MR. Equity dimensions of road traffic injuries in low- and middle-income countries. *Injury Control and Safety Promotion* 2003;10:13-20.
10. Bener A. Strategy to improve road safety in developing countries. *Saudi Med J* 2003;24:447-452.
11. Vasconcellos E. Urban development and traffic accidents in Brazil. *Accident Analysis and Prevention* 1999;31:319-328
12. Babbie Ross Silcock, Transport Research Laboratory. Guidelines for estimating the cost of road crashes in developing countries. London, Department for International Development, 2003 (project R7780).
13. Dhingra N, Khan MY, Zaheer SNS, Khan A, Dhingra M. Road traffic management- A national strategy 1991. Proceeding of the international conference on traffic safety, 27-3- January 1991, New Delhi, India.
14. Ghosh PK. Epidemiological study of the victims of vehicular accident in Delhi. *J Indian Med Assoc* 1992;90:309-12.
15. Zhao z, Svanstrom L. Injury status and perspectives on developing country safety promotion in China. *Health promotion international* 2003;3:247-53.
16. Clarke DD, Ward P, Truman W. Voluntry risk taking and skills deficits in young driver accidents in the UK. *Accid Anal Prev* 2005;3:523-529.
17. Gunjan B, Ganveer, Rajnrayan R, Tiwari. Injury pattern among non fatal road traffic accident cases: A cross sectional study in Central India. *Indian J Med Sci* 2005; 59:9-12.
18. New WHO report marks First UN Global Road Safety Week. Road traffic crashes leading cause of death among young people. 19 APRIL 2007 GENEVA.
19. Hardeman V E, Rocha J, Arcas C C, Dahlberg L , Mercy J A , Eastman AC. Characteristics of non-fatal injuries in Leon, Nicaragua - 2004 *International J Injury Control and Safety Promotion* 2007;14:69.
20. Odero W, Polsky S, Urbane D, Carel R, Tierney WM. Characteristics of injuries presenting to a rural health centre in western Kenya. *East Afr Med J* 2007;8:367- 73.
21. Left M, Stallones L, Keefe TJ, Rosenblatt R, Reeds M. Comparison of urban and rural non- fatal injury: the result of a state wide survey. *BMJ* 2003; 9:332-337.
22. Reed Jr DN, Wolf B, Barber KR, Montanez M, Saxe A. The stages of change questionnaire as a predictor of trauma patients most likely to decrease alcohol use. *J Am Coll Surg* 2005;200:179-85.

 Authors:

1. Soori H,
2. Akbari ME,
3. Ainy E,
4. Zali A,
5. Naghavi M,
6. Shiva N
- 1-6: Safety Promotion and Injury Prevention Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.