Available online at www.sciencedirect.com

Public Health

journal homepage: www.elsevier.com/puhe

Short Communication

Possible doubling of road traffic injury burden in Pakistan: findings from a population-based survey in 2013–2014

J.A. Bhatti [a,b,c,*], I. Rafique [d], A. Azad [e], M.A. Hamid [f,g], M.A.N. Saqib [d], H. Qureshi [d]

[a] Sunnybrook Research Institute, Evaluative Clinical Science, Toronto, Canada
[b] University of Toronto, Department of Surgery, Toronto, Canada
[c] Institute for Clinical Evaluative Sciences, Toronto, Canada
[d] Pakistan Health Research Council, Islamabad, Pakistan
[e] Hamad Medical Corporation, Department of Emergency Medicine, Doha, Qatar
[f] Scarborough and Rouge Hospital, Toronto, Canada
[g] University of Toronto, Department of Pediatrics, Toronto, Canada

ARTICLE INFO

Article history:
Received 7 February 2017
Received in revised form
29 June 2017
Accepted 6 July 2017
Available online 12 August 2017

Introduction

Road traffic injuries (RTIs) are the leading cause of death globally.[1] Estimating the actual burden of RTI remains a challenge globally, especially in low- and middle-income countries.[2] For example, several studies from Karachi, Pakistan showed that only half of the road deaths were accounted for in official statistics.[3–5] These studies also showed that only 4%–10% of non-fatal injuries were officially reported.[3,4] Estimates like these were based on findings from single setting–based studies, and therefore, might not be able to inform decision-making at the national level.[6]

Several resource-limited countries have attempted to address knowledge gaps about the RTI burden by adding questionnaires in the omnibus, population-based household surveys.[2,7] These surveys are often rare and not repeated at regular intervals. For instance, in Pakistan, to date, only two nationwide surveys, the National Injury Survey of Pakistan (NISP) in 1997 and the National Health Survey of Pakistan (NHSP) in 1994, included specific questionnaires on RTI.[2,8] Despite the fact that NHSP was a general survey, its findings were consistent with the NISP, estimating rates of 15–17 RTIs per 1000 population annually. These statistics indicated a high RTI burden in Pakistan. An extrapolation of findings from the NISP for 2006 population estimates suggested that nearly 2 million RTIs might have been occurring annually in Pakistan.[9]

Notwithstanding, the unavailability of current population-level RTI estimates could be a barrier in advocating future RTI preventive measures.[6] For example, despite an overall increase in the Pakistani population, the police-reported statistics show a decrease in road fatalities and injuries.[10,11] Similarly, over the same period, the number of registered vehicles tripled in Pakistan along with addition and upgradation of highways.[11] Numerous investigations suggested that these changes had increased RTI risks in Pakistan, yet the national statistics on road fatalities remained unchanged.[10] It is

* *Corresponding author*. Sunnybrook Research Institute. 2075 Bayview Avenue, G1 06, Toronto, ON M4N 3M5, Canada. Tel.: +1 (416) 480 4055; fax: +1 (416) 480 6048.
E-mail address: junaid.bhatti@ices.on.ca (J.A. Bhatti).
http://dx.doi.org/10.1016/j.puhe.2017.07.017

possible that improvement in healthcare resources and safer roads had an offsetting effect on fatalities, but no reliable information on RTI incidence was available to confirm such interpretations. Recently, a population-wide survey, STEPS Survey 2013–2014, was conducted in Pakistan to estimate the burden of non-communicable diseases in Pakistan.[12] This survey also included a supplementary questionnaire about any RTI event over the last 12 months. As this survey was conducted in the two most populous provinces of Pakistan, it presented an opportunity to compare the recent RTI estimates with previously reported rates.[2] We, therefore, report here estimates of RTI in Pakistan in 2012–2013 by analyzing the STEPS Survey 2013–2014.

Methods

The population-based cross-sectional STEPS Survey was conducted in the two most populous provinces of Pakistan, Punjab and Sindh, accounting for about 75% of the population.[11,12] The survey was conducted between November 2013 and April 2014. The target population was those who were aged 18 years or older and who were usually living in the selected household. Those living in military cantonments and boarding houses were excluded from the study. The study methods were approved by the National Bioethics Committee of Pakistan. The Pakistan Health Research Council had ownership of the data and it approved the methods for this analysis.

The study universe consisted of households in the two provinces. A two-stage stratified sampling method was used to select these households. The primary sampling units were union councils (UCs), the population-based jurisdictions were defined as urban and rural UCs. A total of 257 UCs were selected in both provinces, 110 were urban and 147 were rural.[12] The secondary sampling units were households. These households were randomly selected in each UC. The information of all the eligible adult persons in the selected household was collected and then one of the adults was selected randomly by using the Kish method involving a pre-assigned random number table on a personal digital assistant device.[13] The final sample included 7710 households—3300 were urban and 4410 were rural.[12] This sample size met the assumptions for estimating the rate of an outcome to be around 50% with a precision of 5%, alpha set at 5%, and study power at 80%.

The study questionnaire was implemented in Urdu language, the national language of Pakistan. The final version of the questionnaire was developed from back translation in English and piloting in 10 Pakistani residents. The data collection team underwent three days of training. Main study measures included information about: age, sex, education, marital status, education, occupation, average household income, lifestyle factors (e.g. smoking, physical exercise, physician-diagnosed hypertension, diabetes), physical measures (e.g. height, weight), and involvement in an RTI over the last 12-month period. The data were directly entered into the personal digital assistant device during interview at each household. The data were extracted into Excel spreadsheets and sample weights were included in the spreadsheet.

While the STEPS Survey design was similar to the ones in the NHSP in 1994 and the NISP in 1997, there were differences in sample size and questionnaires.[2,8] For example, NISP had a two-stage stratified sampling design and included 28,926 participants from approximately 4500 households in the four provinces. The NISP used a 3-month recall period instead of one year, which was used in the STEPS Survey.

Statistical analysis

For this study, we only analyzed the data from the 2013–2014 survey.[2] Quantitative variables such as age, education, and household income were coded as per the subgroups defined in the reference NISP, for e.g. four subgroups for education. Marital status was coded as being single or married. Obesity was defined as the body mass index $\geq$30 kg/m^2. We estimated the weighted RTI rate per 1000 population annually with 95% confidence interval (CI) for the full sample and for different subgroups. We assessed factors-associated RTI involvement using logistic regression analyses. These analyses accounted for survey design. All analyses were performed using SAS statistical software package version 9.3.1. In the discussion section, we present a descriptive comparison between estimates from this survey with those from the NISP 1997 published in *Public Health*.[2]

Results

We estimated that the rate of RTI in the STEPS Survey was more than twice as high as compared with the NISP from 1997 (34 vs 15 per 1000 per year; 95% CI = 28–39; Table 1). The STEPS Survey showed that RTI rates were high in men (60 per 1000 per year), in those aged 18–44 years (39 per 1000 per year), being working (44–77 per 1000 per year), being single (marital status; 48 per 1000 per year), current smokers (58 per 1000 per year), and in those who walked regularly (40 per 1000 per year). Compared with other participants of STEPS Survey, risks of RTI were higher in men (Odds ratio [OR] = 3.99, 95% CI = 2.88–5.53), in those with schooling of 6–12 years (OR = 1.61; 95% CI = 1.04–2.48), being single (OR = 1.59; 95% CI = 1.13–2.26), being working (1.9 $\leq$ OR $\leq$3.37, $P < 0.05$), current smoker (OR = 1.99; 95% CI = 1.38–2.87), and in those who walked regularly (OR = 2.00, 95% CI = 1.35–2.97).

Discussion

This population-based survey indicated that rates of RTI might have doubled in Pakistan since 1997.[2] Consistent with previous literature, men who were employed, and possibly the sole bread winners of a household, were at a significantly higher risk of RTI than other population subgroups.[2,8] These findings, if extrapolated to the Pakistani population, estimated at 177 million at the time of the survey, indicated that over 6 million injuries might have occurred in Pakistan in 2012–2013.

An inadequate response to a high burden of road fatalities in low- and middle-income countries has prompted the World Health Organization to declare the Decade of Action for Road