Accident Analysis and Prevention 49 (2012) 520–524

Contents lists available at SciVerse ScienceDirect

Accident Analysis and Prevention

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

Reductions in transport mortality in Australia: Evidence of a public health success

Helen L. Walls*, Andrea J. Curtis, Christopher E. Stevenson, Haider R. Mannan, John J. McNeil, Rosanne Freak-Poli, Belinda Gabbe

Department of Epidemiology & Preventive Medicine, Monash University, The Alfred Centre, 99 Commercial Road, Victoria 3004, Australia

ARTICLE INFO

Article history:
Received 8 September 2011
Received in revised form 21 February 2012
Accepted 20 March 2012

Key words:
Transport
Mortality
Motor vehicle
Railway
Air and space
Australia

ABSTRACT

Objective: To describe trends in transport mortality for a range of common transport types in Australia over a 30-year period (1975–1977 to 2005–2007).
Methods: Mortality data on all-cause and transport-related causes of death were supplied by the Australian Institute of Health and Welfare (AIHW). Mortality rates, expected number of deaths and probabilities of death were compared for three time periods: 1975–1977, 1990–1992 and 2005–2007.
Results: There were significant decreasing trends between 1975–1977 and 2005–2007 in all-cause and most other transport mortality types for both men and women. There were significant reductions in the contribution of transport-related mortality to all-cause mortality; however the difference in mortality between men and women (higher for men) changed little over the evaluated period.
Conclusions: Between 1975–1977 and 2005–2007 there were marked reductions in key causes of transport-related mortality amongst Australian adults, and the reductions in transport-related mortality exceeded reductions in all-cause mortality. The reductions could be attributed to better preventive measures and improved medical treatment for people involved in transport crashes. Although there is scope for further improvement, the reductions are evidence of a success in the prevention of crashes and the medical treatment of crash victims.

1. Introduction

The United Nations has named 2011–2020 the global Decade of Action for Road Safety. The resolution was passed in March 2010 by the UN General Assembly, who described the toll of death and injury from road crashes as “a major public health burden... which, if unaddressed, may affect the sustainable development of countries and hinder progress towards the Millennium Development Goals” (WHO, 2010; FIA Foundation, 2010).

Worldwide, the number of people killed in road traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million (Peden et al., 2004). However these figures attract considerably less media attention than other less frequent but more unusual types of tragedy (Peden et al., 2004). Without increased efforts and new initiatives, the total number of road traffic deaths and injuries worldwide is forecast to rise by 65% between 2000 and 2020, and by as much as 80% in low- and middle-income countries (Peden et al., 2004).

In Australia, consistent with other countries belonging to the Organisation for Economic Cooperation and Development (OECD), the number of traffic fatalities peaked in the early 1970s, and has since declined (Elvik, 2010; WHO, 2009; Chen et al., 2010). However, death from external causes (considered as deaths from accident and injury) is still the leading cause of death amongst people aged under 55 years in Australia and transport crashes are the second most prevalent cause of fatal injury (after suicide), accounting for nearly 2000 deaths per year (ATSB, 2004). However, it is unclear to what extent transport-related fatalities have declined in Australia relative to reductions in all-cause mortality, and whether such declines have also taken place for other transport-related mortality – for rail and air transport fatalities.

In addition to providing a better understanding of past successes in public health, improved understanding of the types of transport-related mortality and the way in which these contribute to overall transport-related and all-cause mortality should help determine the most appropriate targets for public health and medical interventions to achieve further reductions in transport-related mortality, and assist our understanding of the likely future contributions to transport-related mortality from specific transport types.

* Corresponding author at: The Australian National University, Building 62, Cnr of Eggleston and Mills Roads, The Australian National University, Acton 2000, Australia. Tel.: +61 2 6125 9506.
E-mail addresses: Helen.walls@anu.edu.au (H.L. Walls), andrea.curtis@monash.edu (A.J. Curtis), Chris.stevenson@monash.edu (C.E. Stevenson), Haider.mannan@monash.edu (H.R. Mannan), John.mcneil@monash.edu (J.J. McNeil), Rosanne.freak-poli@monash.edu (R. Freak-Poli), Belinda.gabbe@monash.edu (B. Gabbe).

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http://dx.doi.org/10.1016/j.aap.2012.03.024

This study aimed to describe trends in transport-related mortality for a range of common transport types in Australia over a 30-year period (1975–1977 to 2005–2007). First, the probability of dying from key transport types over the 30-year period was calculated. Second, the contribution of transport-related mortality to all-cause mortality was examined.

2. Materials and methods

2.1. Data source

Mortality data for transport-related deaths, stratified by age and sex, for three time periods (1975–1977, 1990–1992 and 2005–2007) were compared. National death counts classified by age and sex for the top causes of death and for all deaths combined for these three periods were supplied by the Australian Institute of Health and Welfare (AIHW). These data were derived from the AIHW National Mortality Database comprising all deaths registered in Australia (AIHW, 2011). For each three-year period, the deaths from each year were aggregated and divided by the sum of the annual mid-year population to provide crude estimates of mortality rate.

Population data published by the Australian Bureau of Statistics were used in the calculation of age-standardised mortality rates (ABS, 2010).

2.2. Mortality analysis

Deaths were categorised into one of four age groups: 0–14, 15–24, 25–64 and 65+ years.

Mortality for the three periods was expressed using annual age-standardised mortality rates, expected number of deaths per 1000 population, and associated five-year risks of death. The mortality rates were directly age-standardised (using five-year age groups) to the total Australian population at June 2010 (ABS, 2010). The five-year risks of death were derived from the corresponding age standardised annual mortality rate using the standard life table relationship between rates and probabilities (see, for example, Chiang, 1984).

Statistical significance was determined by the use of confidence intervals, calculated for the age standardised rates based on Breslow and Day's method modified to use a normal assumption for a binomial distribution for the crude age-standardised rates (Breslow and Day, 1987). These limits were also translated to five-year risks of death and used as 95% confidence intervals for the risk estimates.

For deaths registered from 1 January 1997, Australia adopted the use of the Automated Coding System (ACS) and introduced ICD-10 codes. Thus, deaths for the latest period included in this study were coded according to the 10th revision of the International Classification of Diseases (ICD-10). However in periods 1975–1977 and 1990–1992, ICD-7 and ICD-9 coding applied. In order to make deaths information comparable over time, the AIHW mapped all deaths to ICD-10 codes using the methodology described by Taylor (1992) (AIHW and Taylor, 1992), and more recently ICD-9 to ICD-10 mapping tables released by the World Health Organization. As a result of the change in the coding of deaths between 1996 and 1997, comparability factors given by the AIHW provide the link between the two data series, based on a direct comparison of double-coded deaths. For comparability with data post 1997, an estimate of the number of deaths attributed to a particular cause for the 1979–1996 data can be produced by multiplying the number of deaths attributed to that cause by its corresponding comparability factor (AIHW, 2010). The comparability factor to adjust 1979–1996 data for transport accidents to post-1997 standards is 1.03. However comparability factors were unable to be estimated for railway, air and space and other road vehicle mortality due to small numbers of these crashes (AIHW, 2010), so we used the unadjusted counts for the earlier periods for these causes.

Table 1
ICD-codes for conditions of interest.

Condition	ICD-10 code
Transport accidents	V01–V99
Motor vehicle accidents	V02–V04
Other road vehicle accidents[a]	V01
Railway accidents[b]	V05, V15, and V81
Air and space transport accidents	V95–V97

[a] 'Other road vehicle accidents' includes collisions between pedestrians and bicycles, pedestrians, animals and fixed/stationary objects.
[b] 'Railway accidents' includes collisions between pedestrians and cyclists with railway trains/vehicles, and injury to occupants of railway trains/vehicles.

Table 1 lists the ICD-10 codes for the conditions described in this paper. The system of groupings of causes of death developed by Becker et al. (2006), and recommended by the AIHW, for deriving leading causes of transport-related death was used.

3. Results

Transport-related deaths contributed to all-cause mortality by approximately 0.6–3.2% during the evaluated period. There were reductions in the contribution of transport-related mortality to all-cause mortality for both men and women (Fig. 1). The reduction in transport-related deaths for women was from a contribution of 1.4–0.6% between 1975–1977 and 2005–2007 and for men from 3.2% to 1.6%.

There was a decrease in all-cause and all other transport-related mortality types for both men and women between 1975–1977 and 2005–2007, with the exception of 'air and space' mortality in men (Table 2). However, the apparent increase from 1975–1977 to 1990–1992 in 'air and space' mortality in men was not statistically significant and there was a statistically significant reduction to 2005–2007.

Transport-related mortality rates and the number of deaths expected in the Australian population were higher for men than

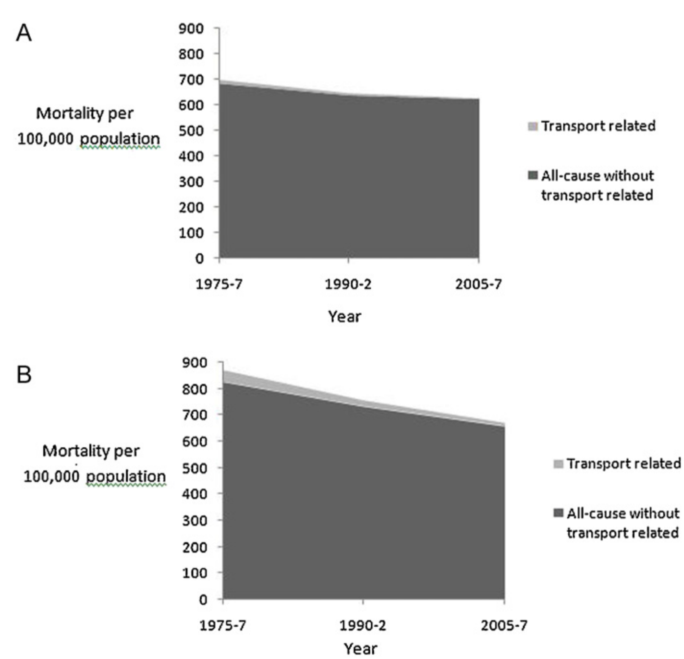

Fig. 1. Burden of age-standardised transport-related mortality rates compared to other-cause mortality per 100,000 population in 1975–1977, 1990–1992 and 2005–2007.