A 50 KM/H DEFAULT URBAN SPEED LIMIT FOR AUSTRALIA?

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Abstract

The National Road Transport Commission commissioned MUARC to prepare an evaluation report assessing the national impacts (costs and benefits) of reducing urban speed limits as part of a proposal to allow national reconsideration of a 50 km/h default urban speed limit in the Australian Road Rules.

This paper reviews available data from each of the separate Australian trials and proposals to reduce speed limits below the national default of 60 km/h on local urban roads. Based on these data, estimates of the national impacts of lower speed limits on urban local roads have been developed in terms of costs and benefits, road safety and community impacts of lower local speed limits. Estimates of the national impacts of extending lower speed limits to urban collector and arterial roads currently controlled by the default urban speed limit are also presented. The paper identifies and assesses options for the way in which lower speed limits are implemented, based on the range of approaches taken in the separate trials and proposals in individual jurisdictions.

Introduction

The subject of appropriate speed limits affects all road users, numerous road safety stakeholders, road safety and traffic authorities, and law enforcement agencies. The issue was widely discussed in the development of national road rules for Australia. The Australian Road Rules provide for 60 km/h as the default speed limit for built-up areas (Rule 25). In October 2000 the Council approved the development of a proposal to allow reconsideration of the adoption of a 50 km/h default limit. Part of this process was to include the preparation of an evaluation report in line with the requirements for the content of Regulatory Impact Statements. The results of the evaluation are to form part of comprehensive consultations with stakeholders throughout Australia to be undertaken by the National Road Transport Commission.

The main issue centres on the need to consider an appropriate default urban speed limit for inclusion in the Australian Road Rules in the interests of national uniformity of road laws. A 50 km/h speed limit now applies in practice to the majority of the Australian population when travelling on local streets - either by signing or as a default limit.

The evaluation includes estimates of the road safety benefits and other impacts of extending 50 km/h limits beyond local streets to those sections of urban collector and arterial roads currently subject to 60 km/h limits. The results provide an objective basis for considering the application of the limit to roads that are not primarily intended to serve an access function.

Research methods/process

Three lines of approach have been used to undertake the evaluation:

- review of local and overseas research on the link between speed and crashes and the impact of lowering speed limits in urban areas (not reported here, see 1)
- consolidation of available information from Australian States and Territories on the implementation and trials of 50 km/h limits
- analysis of benefits and costs using a modification of a computer spreadsheet developed as part of the European project MASTER - MAnaging Speeds of Traffic on European Roads.

Implementation and trials of 50 km/h limits in Australia

As at July 2001, 50 km/h limits on local roads in built-up areas had been introduced extensively in New South Wales and Queensland and across Victoria. The lower limits have been introduced for a trial period in the

Australian Capital Territory and their implementation has been announced in Western Australia and Tasmania. This section summarises the available information on these implementations and trials and their proven or likely effects.

New South Wales

A detailed evaluation of the crash savings resulting from the implementation of 50 km/h speed limits in residential streets in some areas of NSW has been undertaken (2). Over a 21 month period there were approximately 262 fewer crashes on those streets speed-zoned at 50 km/h than otherwise expected. The percentage reduction in crashes was greater in urban than rural areas. The cost saving to the community that has resulted from the crash reduction on the 50 km/h streets in the 22 Local Government Areas involved in the evaluation has been estimated to be $6.5 million for the 21-month period.

Queensland

The 50 km/h local street speed limit initiative was successful in reducing speeds on local streets in south east Queensland. Meers and Roth (3) concluded that over the period 1998-2000, this factor alone saved 19 fatal crashes each year in south-east Queensland (a decrease of 15% in fatal crashes). Travel in south east Queensland makes up 50 per cent of the total annual vehicle kilometres traveled in that state and approximately 10 per cent of that travel is on local streets. A 10 km/h speed reduction equates to a 5 per cent reduction in CO_2-equivalent at around 60 km/h. Based on those data, a saving of 33,000 tonnes CO_2-e per annum has resulted from the 50 km/h initiative.

Victoria

The likely benefits which were considered in the Regulatory Impact Statement (RIS) (4) for the introduction of a 50 km/h default urban speed limit in Victoria were reductions in crashes and reductions in fuel consumption (which consequently reduces vehicle operating costs and greenhouse gas emissions).

Based on the NSW results, the RIS chose a 7% reduction in casualty crashes and a 16% reduction in property-damage only (PDO) crashes as the lower limits of the possible crash reductions. Based on Kloeden et al.'s (5) work and assumptions of less than complete compliance, a figure of 15% was chosen as the likely upper limit of the possible reduction in casualty crashes. The upper limit for PDO crashes remained at 16%, given no other data. The estimated overall road safety benefits were estimated to range between $34.4 million and $48.2 million.

The RIS provides upper and lower estimates for reductions in fuel consumption and greenhouse gas savings resulting from the 50 km/h initiative. The upper bound estimates are based on figures in Austroads (6) and Roper and Thoresen (1996, cited in 4). This assumes that a reduction of 1 km/h in average speed will reduce fuel consumption by 0.3 per cent, translating into an annual fuel saving of 1.8 million litres. At a resource cost of 45 cents/litre, this means a cost saving of $812,000 per annum. If greenhouse gas reductions are valued at $82 per tonne, then the value of reduced emissions is $421,000 per year. The lower bound estimates assume no reductions in fuel consumption or greenhouse gas emissions. These estimates are based on the NSW Environmental Protection Agency's submission to the NSW Staysafe Inquiry (7).

Implementation and trials of 50 km/h limits in other countries

The general urban speed limit is 50 km/h in most developed countries. This includes Austria, Belgium, Canada, Denmark, Finland, France, Great Britain, Greece, Hong Kong, Hungary, Ireland, Israel, Italy, Korea, Luxembourg, New Zealand, Norway, Portugal, Spain, Switzerland and all States of the United States of America (6).

Preston (8) found that in countries in Europe and North America with an urban speed limit of 50 km/h or less, the average death rate of pedestrians aged 25-64 years was 30 per cent lower than countries with an urban speed limit of 60 km/h.

After Norway reduced its urban speed limit from 60 km/h to 50 km/h, the average speed fell by 3.5-4 km/h and the number of fatal accidents was reduced by 45 per cent (Norwegian Traffic Safety Handbook, cited in 9). Denmark reduced the general urban speed limit from 60 km/h to 50 km/h in 1985. On major roads, the average speed of 50 km/h fell by 2-5 km/h, whereas on minor roads, which had lower speed limits initially (45 km/h), the reductions experienced were only up to 1 km/h (10).

When the speed limit in Zurich was reduced from 60 km/h to 50 km/h, pedestrian collisions fell by 20 per cent and pedestrian deaths by 25 per cent (11). The general urban speed limit in France was reduced from 60 km/h to 50 km/h in 1990. In its first two years of operation, the 50 km/h speed limit was estimated to have prevented 14,500 injury accidents and 580 fatalities, or 3 per cent of the annual French road toll (12).

Community perceptions

During the 1990s there has been a significant degree of public support for lowering speed limits in local streets. The Community Attitudes to Road Safety Surveys commissioned by the Australian Transport Safety Bureau (formerly the Federal Office of Road Safety) have included questions about lower speed limits in residential areas since 1995. Approval to the question “How would you feel about a decision to lower the speed limit in residential areas to 50 km/h?” reached 68% in the 1999 survey (13). Approval in earlier years had ranged from 55% to 65%.

Females are more likely to approve of lowering the speed limit in residential areas than males, although support among males increased from 56% in 1998 to 67% in 1999. Approval is lowest among 15-24 year olds and increases with age. Approval is highest in Queensland (73%), followed by NSW (70%) and Victoria (70%).

In addition to the series of Australia-wide surveys, a number of other surveys have been conducted in one or more States (summarised in 1). These surveys have generally shown similar patterns of results to the Australia-wide surverys. The low level of support in a NSW newspaper survey (RTA, 1998, cited in 14) conflicts somewhat with other results and the survey may possibly have elicited more responses from those who were opposed to the measure than from those who favoured it.

Benefits and costs

The European Union research program entitled “MAnaging Speeds of Traffic on European Roads” (MASTER) developed a framework to estimate the impacts of speed management policies on vehicle operating costs, travel time, crashes, air pollution and noise (15). The MASTER framework was used to assess the benefits and costs of the implementation of a default 50 km/h urban speed limit. The MASTER framework was used in Cameron’s (16) earlier estimation of optimum travel speeds on urban residential streets.

Six scenarios were examined in each analysis, combining two values of the likely reduction in cruise speed associated with a reduction in the speed limit from 60 km/h to 50 km/h (5 km/h and 10 km/h) and three values of the cost of a casualty crash. The middle value of cost of a casualty crash was $152,270, a value derived by Cameron (16) from BTE (17) data. A lower value of $110,000 and a higher value of $250,000 were also used to assess the sensitivity of the overall outcomes to the value of crash costs used.

The MASTER spreadsheet allows the form of the speed-crash relationship to be specified. In the analyses reported here, the Andersson and Nilsson (18) relationship between changes in mean speed and number of crashes was used:

$$\mathbf{n_A = (v_A/v_B)^2 * n_B}$$

where $\mathbf{n_A}$ = number of injury crashes after speed change

$\mathbf{n_B}$ = number of injury crashes before speed change

$\mathbf{v_A}$ = mean speed after speed change

$\mathbf{v_B}$ = mean speed before speed change

This relationship was chosen in preference to the relationship developed by Kloeden et al. (5) because Cameron (16) found that the risk estimates from Kloeden et al.’s relationship were not sufficiently stable for speeds below 60 km/h.

The Andersson and Nilsson (18) relationship between changes in mean speed and crash costs was also used:

$$\mathbf{C_A = [k*((v_A/v_B)^2\text{-}1)+1]*C_B}$$

where $\mathbf{C_A}$ = crashes costs after speed change

$\mathbf{C_B}$ = crashes costs before speed change

$\mathbf{v_A}$ = mean speed after speed change

$\mathbf{v_B}$ = mean speed before speed change

$\mathbf{k}$ = a constant depending on the actual unit costs of fatal, serious and minor injuries and the average number of each in casualty crashes of various severities. A value of k=2 was used in the analyses since Kallberg and Toivanen found that this applied in most European countries

In the analyses, values of carbon dioxide and noise were omitted, following the practice of Cameron (16). Noise values were omitted because relevant Australian data were not available. The likely effect of these omissions would be to underestimate the net benefits of the reduction in the default urban speed limit.

The MASTER framework does not include benefits arising from reductions in non-injury crashes. In the analysis, it was assumed that there are four times as many non-injury crashes (property damage crashes) as injury crashes (following the approach taken in the Victorian RIS (4)). It was assumed that the percentage change in the number and cost of property damage crashes was double the percentage change in average speed. This assumption is conservative when compared with the reported 16% reduction in casualty and property damage only crashes reported in the NSW evaluation (2). The costs of a non-injury crash used in the current analyses were the BTE (17) value of $6,000, a lower value of $4,500 and a higher value of $10,000.

In the analyses, the base case was considered to be a reduction in cruise speed of 5 km/h measured according to BTE (2000) based crash cost values and values of travel time that were adjusted to be comparable with the method of calculating crash costs. Other scenarios that were examined included a 10 km/h reduction in travel speed, higher and lower values of crash costs and unadjusted values of travel time.

The analyses predicted a net benefit if the default 50 km/h urban speed limit was implemented on urban arterial roads currently zoned 60 km/h. From the baseline condition of 60 km/h on local streets throughout Australia, implementation of the lower urban speed limit on local streets, collector roads and arterial roads currently zoned 60 km/h, is predicted to result in a net disbenefit of about $21 million per year. Compared to the baseline of the current state of implementation of 50 km/h speed limits on urban local streets, the overall outcome would be a net benefit of about $1.7 million per year.

This outcome is sensitive to the value of crash costs selected: a net disbenefit of $203 million per year is predicted if the lower value of crash costs is used but a net benefit of $476 million per year is predicted if the higher value of crash costs is used. Using unadjusted values of travel time leads to net disbenefits except for urban arterial roads currently zoned 60 km/h.

The outcome is also sensitive to the size of the reduction in cruise speed. In the unlikely event that the 50 km/h default speed limit led to a 10 km/h reduction in cruise speed, the outcome would be a net disbenefit unless the highest value of crash costs was used. Using the highest value of crash costs and adjusted travel time costs, the net benefit is estimated to exceed $1 billion per year. For the lower value of crash costs and the adjusted travel time costs, the disbenefit is estimated at over $700 million per year.

The bulk of the casualty crash benefit relates to implementation of 50 km/h default speed limits on urban arterials currently zoned 60 km/h. Extending the default 50 km/h urban speed limit to all residential streets across Australia contributes about 6% of the total saving in casualty crashes.

Implementing a 50 km/h default urban speed limit on residential streets, collector roads and arterials currently zoned 60 km/h is predicted to result in an average increase in travel time of about nine seconds per trip (averaged across the Australian population) given a reduction in cruise speed of 5 km/h. This small increase in travel time would prevent about 3,000 casualty crashes and 12,000 property damage crashes per year.

Previous analyses of travel time effects of reduced speed limits have questioned the meaningfulness of valuing very small amounts of travel time across large numbers of vehicles (4, 6). The Austroads report on Urban Speed Management in Australia (6) concludes that

> *Economic theory requires that travel time increases must adversely impact productive activity before it is appropriate to assign monetary values to them. As it is implausible that the small daily increases in travel time resulting from lower speeds on urban local streets have any measurable impact on productive activity, and as it is unlikely that any individuals will ever be faced with long delays as a result of the lower speeds, calculation of monetary costs of increased travel time would be inappropriate.* (Austroads, 1996, p.21)

Furthermore, because the average increase in travel time is of the order of 4-10%, such impacts fall within the normal range of variability of urban trips and, therefore, are unlikely to be noticed by vehicle occupants. The NSW preliminary evaluation found that 25% of persons interviewed did not perceive an increase in travel time and 41% considered it to be slight (ARRB Transport Research 1999, cited in 4). Given this, vehicle occupants are unlikely to place a high value on travel time increases of this order.

The organisational costs of implementing a lower limit depend on the extent of signing undertaken, and the resources committed to community consultation and education, promotion of awareness of change, the intensity of enforcement and post-implementation monitoring and evaluation. Significant investment in these areas to ensure the maximum impact of a lower limit is justified on the basis of the expected benefits.

In general, the cost of signage for implementing a 50 km/h urban speed limit by the default approach is less than the cost of implementation by signage in speed limited areas. However, the real cost of implementation by the default approach would depend on whether those States and Territories that have already adopted an area-wide approach would change. There is no strong evidence of any additional road safety benefits of a uniform approach to implementation of 50 km/h urban speed limits (although attention to key aspects of planning, coordination and implementation can contribute to how effectively the change to a lower limit is introduced).

Guidelines for implementation

It is not possible to conclude on the basis of existing information whether there is a specific preferred implementation model. There are both similarities and differences in the approaches taken to date. An evaluation of the Victorian approach - which unlike some other jurisdictions relies predominantly on regulation without major expenditure on signing - is not yet available. This precludes an objective comparison. Nevertheless, the experience so far points to a number of important, and in some cases fundamental, steps that should accompany any future decision by a jurisdiction to adopt a 50 km/h limit.

The successful implementation of a 50 km/h speed limit regime is reinforced by managing the process in a coordinated and integrated manner, with an emphasis on:

- ensuring that appropriate planning takes place among the responsible central agencies and local government from an early stage

- collaboration between the central road agency and local government in the selection of roads to which a 50 km/h limit should apply, along with the signing of those roads that need to retain a 60 km/h limit; sufficient time should be allowed for the effective completion of this process to enable a smooth transition to the new speed limit structure

- giving priority to a structured and managed approach to help achieve public acceptance of change and the retention of community support for any future speed management initiatives

- planning and conducting a range of media and public education activities on a statewide and local basis, and directed to relevant groups in the community to ensure community awareness of the intended change in speed limits

- conducting enforcement as a necessary part of ensuring compliance with a lower speed limit, undertaken with sufficient intensity to achieve the desired change in road user behaviour

- providing promotional support for enforcement using appropriate mass media to maximise its impact on road user behaviour.

Conclusions

The major factor determining the effect of a reduction in the speed limit is the size of the actual reduction in travel speed. The values adopted to estimate the economic worth of both savings in crash costs and increases in travel times can have a crucial effect on the results of the evaluation and, hence, the conclusions that are reached.

The estimated net outcome depends on the extent to which it is meaningful to value very small increases in travel times. If these are valued, then a reduction in the default urban speed limit to 50 km/h is economically justified only for urban arterial roads currently zoned 60 km/h. If the small travel time increases are not valued, then a reduction in the default urban speed limit is clearly justified, in economic terms alone, for all classes of road considered (local streets, collector roads and urban arterial roads currently zoned 60 km/h).

Implementing the lower urban speed limit on local streets, collectors and arterial roads currently zoned 60 km/h, is predicted to result in an average increase in travel time per head of population in Australia of about nine seconds per trip (assuming a 5 km/h reduction in cruise speed). If Australians were to accept travel time impacts of this order, it is estimated that about 2,900 casualty crashes would be prevented each year.

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It is recommended that national consideration be given to the adoption of a 50 km/h default urban speed limit in the Australian Road Rules.

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