nzier
Independent, authoritative analysis

Insight

Fix flawed values of statistical life and life years to get better policy outcomes

When taxpayers' money is spent on health and safety measures in transport and healthcare services, the decisions made implicitly or explicitly place values on saving lives and casualties. In recent years there has been a move towards using standard measures of these values so that there is some consistency in decisions. This is to be welcomed, but if the measures are flawed then decision-makers can unwittingly pick the wrong projects that do not deliver maximum value for money.

Given the billions of dollars of taxpayers' money at stake in health and transport services, the return on fixing such flaws is high. Such a fix could start with a review of how these estimates are made and used in different policy areas.

What is the value of statistical life?

To make sensible decisions about what costs society is willing to incur to improve road or workplace safety, or to provide a new drug or health technology in the public health sector, policymakers need robust estimates of benefits.

The benefits of health and safety improvements can be measured by lives saved, the improvement in quality of life or life years, savings in costs of medical treatment and rehabilitation, savings in property damage and legal costs, and avoiding the loss of paid and unpaid production.

Turning these benefits into monetary values is tricky. Medical treatment costs or the value of lost production might be relatively easy to count. But it is both contentious and difficult to put a monetary value on the worth of avoiding premature death or disability.

One of the approaches used in the transport sector is to ask New Zealanders what they would be willing to pay to reduce the risk of premature death due to road crashes. In 1991, this Value of Statistical Life (VOSL) was estimated to be $2 million.[1]

[1] Miller, T. R and Guria, J. (1991). The Value of Statistical Life in New Zealand: Market Research on Road Safety. Wellington, Land Transport Division, Ministry of Transport.

Method to update the VOSL is flawed

The 1991 VOSL has been updated, and is $3.5 million at June 2009 prices. However, there is evidence that points to flaws in the method used to update the VOSL over a long period of time.

The VOSL has been indexed to the ordinary time wage rate. But a study carried out in New Zealand in 1997/98 indicated this is not the most suitable approach over such a long period. The main reason for this could be that with better awareness, people's willingness to pay for further improvement increases over and above some measure of inflation. This was evidenced in the 1997/98 study which suggested the VOSL should now be over $5 million, rather than the $3.5 million used.[2]

The implications are major: in practice it means that we are not investing in some projects where health and safety benefits dominate when as a society we would want to, because the benefit cost ratios are relatively understated.

Even though the benefit cost ratio is not the main criterion nowadays for prioritising road infrastructure projects, due to the importance attached to strategic transport policy objectives, there is a need for strongly evidence-based cost-benefit appraisals to better inform overall investment decisions. Given that such projects account for over $2 billion a year, this is an important issue. Besides, to achieve the objectives of New Zealand's Road Safety Strategy 2010-2020, contributions to safety improvements need to be more appropriately valued and given their due weight in the selection of projects and initiatives.

Can we apply a single VOSL to all types of risk?

The VOSL is an extremely useful tool for policymakers, and has applications well beyond transport projects. It is thus very tempting to borrow the road transport VOSL and apply it elsewhere.

For example, in the UK the same value is used by Department for Transport, the Rail Industry, the Department for the Environment, Food and Rural Affairs and other government agencies[3].

But there are big questions about whether this is appropriate. The VOSL is an estimate based on what people were prepared to pay for a reduction of a reasonably specific risk. And there is evidence that what people are prepared to pay for a risk reduction may differ by the type of risk.

For example, the Health and Safety Executive in the UK recommends a higher VOSL for prevention of cancer death than the transport VOSL, to take into account 'the protracted period of pain and suffering' associated with the disease[3].

[2] Guria, J., Jones, W., Jones-Lee, M. W., Keall, M., Leung, J. and Loomes, G. (2003). The New Zealand Values of Statistical Life and of Prevention of Injuries. Wellington, Land Transport Safety Authority.

[3] Mason, H., Jones-Lee, M. and Donaldson, C. (2009). Modelling the monetary value of a QALY: a new approach based on UK data. *Health Economics*, 18(8), 933-950. Baker, R., Chilton, S. M., Jones-Lee, M. W. and Metcalf, H. R. T. (2009). Valuing lives equally in a benefit-coast analysis of safety projects: A method to reconcile theory and practice. *Safety Science* 47, 813–816.

A New Zealand study related to house fire safety suggests a value lower than the New Zealand transport VOSL[4]. Should there be such differences? While such a possibility cannot be ruled out prima facie, this difference may simply be due to the methodology used. Some studies show people's willingness to pay for a reduction in risk of death from house fire exceeds that for transport[5].

To make sure government funds are used to best effect, the VOSLs need to be right. This would best be achieved by developing an appropriate and common methodology for estimating VOSLs for different risks in different areas and establishing the relativities between them.

From VOSL to value per life year…

Another practice that policy advisors adopt is using the VOSL to calculate the monetary value of increasing a person's expected lifespan by a year.

It is common for the benefits of medical treatment or some health programme to be measured in terms of their impact in life years or, more appropriately, quality adjusted life years (QALYs) or disability adjusted life years (DALYs).

Since the VOSL in New Zealand is based on a survey using road transport risks of deaths, it is tempting to take the difference between life expectancy and the average age at death from traffic accidents, to estimate the value of a statistical life year (VOSLY).

But there are many problems with this approach, most importantly that it assumes the value of a life year is the same for all – it does not vary by age.

This assumption is highly questionable. If the value per life year is constant then VOSL should be a monotonically declining function of age (i.e. as age increases, VOSL decreases). No empirical study supports this view. On the contrary, the two New Zealand transport studies did not show any such relationship with age, and nor does a recent OECD report.[6] A recent American study demonstrates that the VOSLY does vary with age.[7] Although some studies have found the VOSL increasing with age up to a certain level and then gradually declining, no research supports the view of a constant value per life year.

---

[4] Sanderson, K., Goodchild, M., Nana, G., and Slack, A. (2007). The Value of Statistical Life for Fire Regulatory Impact Statements. Wellington. BERL.

[5] Miller, T. (1990). The Plausible Range for the Value of Life--Red Herrings Among the Mackerel. *Journal o[Forensic Economics* 3(3), pp. 17-39. Access Economics (2008). The Health of Nations: The Value of a Statistical Life. Report for Australian Safety and Compensation Council.

[6] Lindhjem, H., Navrud, S. and Braathen, N. A. (2010). Valuing lives saved from environmental, transport and health policies: A meta analysis of stated preference studies. Paris. OECD.

[7] Aldy, J. E. and Viscusi, W. K. (2008). Adjusting the Value of a Statistical Life for Age and Cohort Effects. *Review of Economics and Statistics* 90 (3), 573-581.

A review is overdue

Efforts to base policy advice on robust cost benefit analysis and initiatives being taken to put a monetary value on the health and safety benefits of transport, health and other policies are commendable, but only if they apply appropriate methods. The methods currently used to estimate the VOSL and related measures are flawed:

- The current VOSL value is a 20 year old estimate updated on the assumption that people's willingness to pay is only related to their real wage rate, but in reality society's preference for safety and health improvement might have changed substantially over this period.
- Public policy and investment decisions commonly apply the VOSL derived for transport risk to situations with different types of risk, or else apply VOSLY and other derivative measures which could be resulting in the misallocation of large amounts of taxpayers' money.

An investment now into research to re-estimate the VOSL, any variation by risk areas and values per life year could have big pay-offs in providing a more appropriate suite of values to apply in specific situations, and achievement of better value for money from future policy decisions.

This Insight was written by Dr Jagadish Guria at NZIER, June 2010

For further information please contact Jagadish - jagadish.guria@nzier.org.nz

NZIER | (04) 472 1880 | econ@nzier.org.nz | PO Box 3479 Wellington