



Best Practice Regulation Guidance Note

Value of statistical life

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Key Points:

- Willingness to pay is the appropriate way to estimate the value of reductions in the risk of physical harm – known as the value of statistical life.
- Based on international and Australian research a credible estimate of the value of statistical life is \$4.2m and the value of statistical life year is \$182 000 in 2014 dollars.
- There are complicating assumptions used to derive these estimates so a sensitivity analysis should be undertaken as part of the cost-benefit analysis.

This note provides guidance on how officers preparing the cost-benefit analysis in Regulation Impact Statements should treat the benefits of regulations designed to reduce the risk of physical harm.

A number of regulatory proposals are aimed at reducing the risk of physical harm, for example, occupational health and safety laws, warning labels on tobacco products and transport safety measures such as seat belt laws. This raises the issue of how to measure and articulate this benefit in a Regulation Impact Statement. Different methods have been proposed for valuing reductions in the risk of physical harm and this note sets out a method most appropriate for the best practice regulation process.

Value of Statistical Life

The value of statistical life is often used to estimate the benefits of reducing the risk of death (EPA 2000, Viscusi 2003). The value of statistical life is an estimate of the financial value society places on reducing the average number of deaths by one. A related concept is the value of statistical life year, which estimates the value society places on reducing the risk of premature death, expressed in terms of saving a statistical life year. The value of statistical life is most appropriately measured by estimating how much society is willing to pay to reduce the risk of death. However, there are different methods of measuring society's willingness to pay to reduce the risk of death.

- One direct method is to ask individuals through a survey what they would pay to save or prolong life. There is evidence that willingness to pay surveys overestimate willingness to pay when compared to actual consumer choices subject to a budget constraint (Brown et al., 1996; Neill et al., 1994; Bishop and Heberlein, 1979).

- One method which incorporates a budget constraint is to observe how much consumers pay for products that reduce the risk of death or injury, for example, the purchase of safety items in a car.
- Another indirect method is to observe how much workers are willing to pay (through reduced wages) for an improvement in workplace safety. This form of analysis is most commonly used for estimating the value of statistical life.

A number of empirical studies have derived estimates for the value of statistical life using the above methods. In reviewing the studies relevant to Australia, Abelson (2007) noted that the estimates range from \$3m to \$15m. Based on economic theory, international research and international practice Abelson argues that the most credible estimate is \$3.5m for the value of statistical life and \$151 000 for the value of statistical life year. These estimates represent an average and are based on a healthy person living for another 40 years.

Importantly, the research into the value of statistical life, including Abelson (2007), has argued that the estimates will vary according to the characteristics of the people affected and the nature of the risk or hazard. For example, the value of statistical life is likely to be higher if it is based on younger people with longer to live and particularly painful deaths are likely to attract a higher willingness to pay to avoid.

Guidance for preparing Regulation Impact Statements

Ideally the value of statistical life would be estimated for the individual regulation taking into account the types of risks addressed and the people affected. However, as noted by the US EPA, this is likely to be too costly to be undertaken for individual regulatory proposals.

Consistent with the advice of international regulatory agencies (USEPA 2000), the OBPR advises officers preparing RISs to use an estimate derived from previous studies. Given that the Abelson estimate of VSL and VSLY is based on recent empirical evidence and that this empirical evidence has been assessed to ensure that it is comprehensive and rigorous, the OBPR recommends that departments and agencies use the estimate of \$3.5m for the value of statistical life and \$151 000 for the value of statistical life year (both of these are measured in 2007 dollars). Using CPI data¹ to express these estimates in 2014 dollars gives a VSL of \$4.2 million, and a VSLY of \$182,000.

Applying the estimate

If the regulation is to have an impact in future years then the benefit in these years needs to be discounted using an appropriate discount rate. Table 1.1 shows how to apply the discount rate to a proposed regulation estimated to prevent 3 deaths each year during implementation and 5 deaths each year after it is fully implemented (a 7% real discount rate is used in this hypothetical example). The base year of the proposal is 2014.

So over a nine year period the estimated present value of the benefit of preventing deaths from this regulation is the sum of the discounted benefits (that is, \$12.7m + \$11.8m + ... + \$12.3m = \$123m). This figure can be used in conjunction with the other estimated benefits and costs of the regulation to estimate its net present value.

¹ Australian Bureau of Statistics, *Consumer Price Index*, cat. no 6401.0.

Table 1.1: Application of discount rates to value of statistical life

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Deaths prevented	3	3	3	5	5	5	5	5	5
VSL (\$m)	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Benefit ^a (\$m)	12.66	12.66	12.66	21.1	21.1	21.1	21.1	21.1	21.1
Discount factor	1.07	1.07 ²	1.07 ³	1.07 ⁴	1.07 ⁵	1.07 ⁶	1.07 ⁷	1.07 ⁸	1.07 ⁹
Discounted benefit ^b (\$m)	12.7	11.8	11.1	17.2	16.1	15.0	14.1	13.1	12.3

^a benefit = deaths prevented * VSL. ^b discounted benefit = benefit/discount factor.

Sensitivity analysis is also recommended given the range of values derived for VSL and VSLY from different empirical studies, particularly if the reduction in the risk of death or injury accounts for a significant proportion of the benefits of the regulation.

Injury, disease and disability

Many regulations have the benefit of reducing the risk of injury, disease or disability. One method to value these benefits is to adjust the value of statistical life year (which could be interpreted as the value of a year of life free of injury, disease and disability) by a factor that accounts for the type of injury, disease or disability. The Australian Institute of Health and Welfare has published disability weights for most diseases and injuries that can be used to adjust the VSLY (Mathers et al 1999, pp. 186-202). As an example, an amputated foot has a disability weight of 0.3, which equates to 30% of a VSLY or \$54,600 per year (0.3*\$182 000) when measured in 2014 dollars.

References

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