The economic cost of farm-related fatalities in Australia, 2001–04

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About the study

- All accidental deaths must be investigated by the Coroner.
- The National Coroners Information System was used to extract all unintentional deaths over the 2001–04 period. These deaths were reviewed on a case-by-case basis to identify all farm-related deaths, whether work or non-work related.
- Any death that was a direct consequence of working, living or visiting a farm was included in the study.
- Three methodologies were considered for the study:
  - Human capital
  - Friction cost
  - Willingness-to-pay

Human capital

- In addition to calculation of direct medical and administrative costs, human capital estimates indirect costs through the sum of annual earnings from year of death until retirement (Goeree et al., 1999).

Economic Approach	Advantages	Disadvantages
Human Capital	- Data readily available - Simple and transparent approach to use - Many studies to compare findings against - Based on neoclassical economic model	- Assumes near full employment and that loss carried until retirement - Unable to account for non-financial costs - Devalues the loss of women, the elderly, children and students, mentally impaired, unemployed, intellectuals, creative and artistic contributions - Overvalues indirect costs - Overestimates costs in economy with less than full employment - Does not reflect a key reason for the investment in safety: aversion to death/injury rather than income protection - Actuarial uncertainties regarding life expectancy and earnings

Friction cost

- Revolves around the principle that production losses associated with a premature mortality are over-estimated in the human capital approach, as work may be taken over by the unemployed or through reallocation of employees (Berger et al., 2001).

Economic Approach	Advantages	Disadvantages
Friction Cost	- Generally seen as the more accurate of the approaches	- Lacks theoretical framework underpinning calculations - Requires extensive data to estimating length of friction period and the losses involves - Argument that a deceased person can be replaced is against public health principles - Unable to measure the reduced capacity of an economy to produce at given employment level - Unable to account for non-financial costs - Contains few reduced productivity measurements

Willingness-to-pay (WTP)

- Does not involve estimate of direct and indirect costs, but rather assesses the value people place on health, pain and suffering and on the variation of these values across individuals and communities (Leigh et al., 2000).

Economic Approach	Advantages	Disadvantages
Willingness-to-pay	- Can overcome theoretical difficulties of Human Capital approaches - Comprehensive - Reflects individual preferences	- More complex and difficult to measure - Measures marginal costs rather than total cost of an incident - Assumes knowledge of risk and rational decision making - Individual perceptions of risk may differ - Does not necessarily imply ability to pay - Aggregating individuals' WTP may not produce social WTP as individuals may ignore social costs

Suitability of approaches for farm fatalities

- Friction cost:
  - Whilst it is suggested that this is preferred approach in health economics, the majority of influential occupational death studies use human capital approach (Leigh et al., 2000; Leigh, McCurdy and Schenker, 2001; Watson and Ozanne-Smith, 1997).
  - As the Australian economy is at or near full employment, friction cost is generally not suitable as there is not an adequate sized labour pool to draw labour resources, hence the market and wages adjust (Access Economics, 2008).
  - May better determine the production losses, but it is not capable of determining the societal burden of injury (Watson and Ozanne-Smith, 1997).

Suitability of approaches for farm fatalities

- WTP:
  - Assumes there is understanding of risks and hazards. While Farm Managers may have this understanding, the same could not be applied to all workers, contractors, visitors and family (Fragar, Pollock and Morton, 2008; Knowles, 2002; Schwab et al., 1995; Aherin and Murphy, 1987).
  - Bureau of Transport Economics (1992) argue that 'a carefully computed human capital figure could well be more useful than an uncertain WTP estimate'.
- Human capital was therefore determined to be most suitable method for measuring the cost of Australian farm-related fatalities.

Costs modelled

- Year 1 of model:
  - Wages, benefits and household production at age of death,
  - Police and ambulance costs,
  - Hospital costs,
  - Premature funeral costs,
  - Coronial and work safety authority investigation costs,
  - Death compensation costs, and
  - Friction costs

- Year 2 and beyond:
  - Wage, benefit and household production costs, with applied probability of survival and growth.

Economic model

$$PVF = \sum_{n=y}^{l} P_{(y,s)}(n)\left[Y_{s,j}(n) + Y_s^h(n)\right] * (1+g)^{n-y} \;/\; (1+r)^{n-y}$$

Where:

PVF	= present discounted value of future earnings due to premature death
$P_{(y,s)}(n)$	= probability that a person of sex (s) and age (y) will survive to age (y+1)
y	= age of the individual at death
s	= sex of the individual
n	= age if the individual had survived
l	= life expectancy
$Y_{s,j}(n)$	= median annual earnings of an employed person of sex (s), occupation (j), and age (n) (includes benefits and life-cycle wage growth adjustment)
$Y_s^h(n)$	= mean annual imputed value of home production of a person of sex (s) and age (n)
g	= wage growth rate attributable to overall productivity
r	= real discount rate

Source: Adapted from Biddle (2004)

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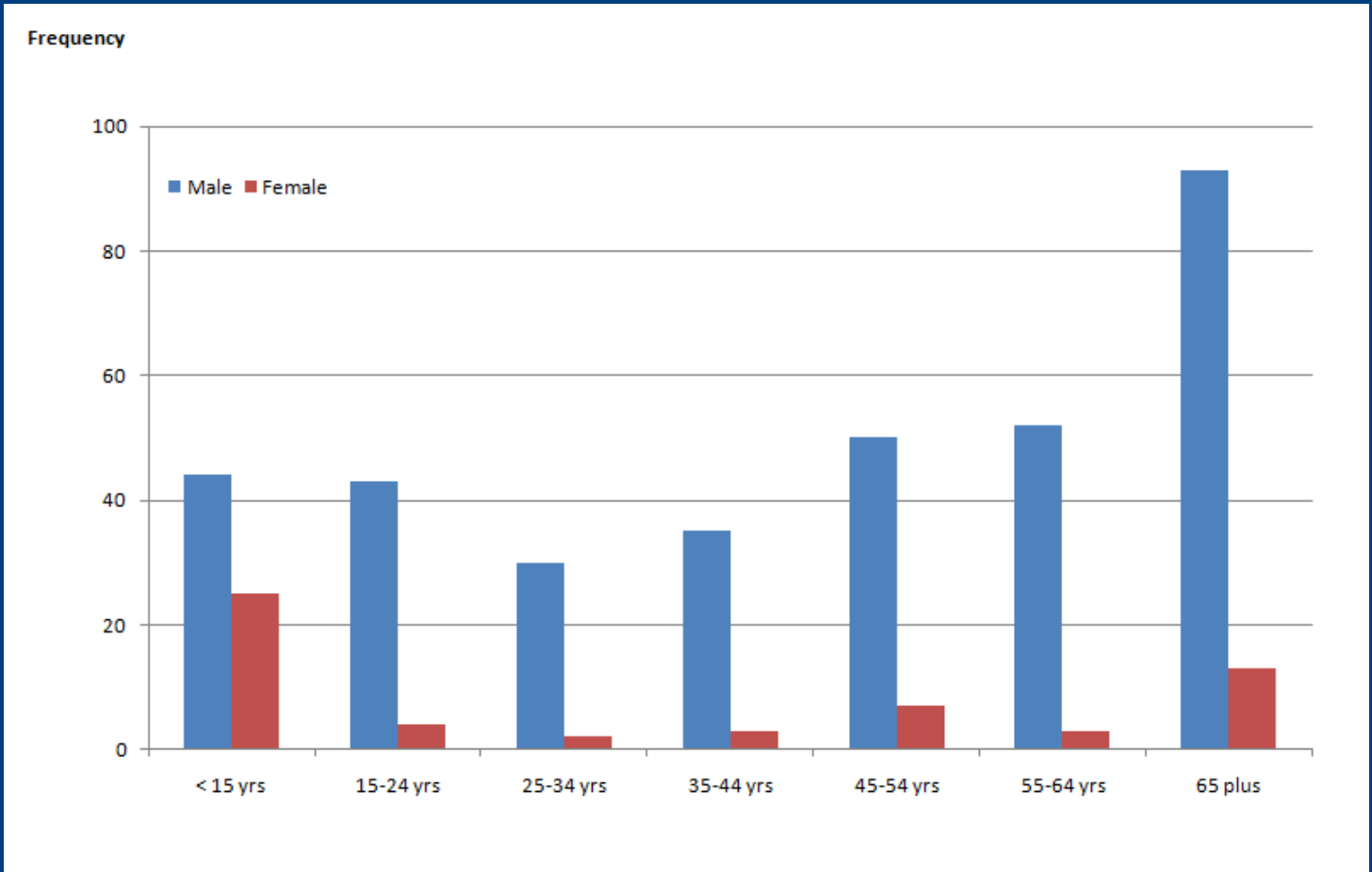
The significant findings

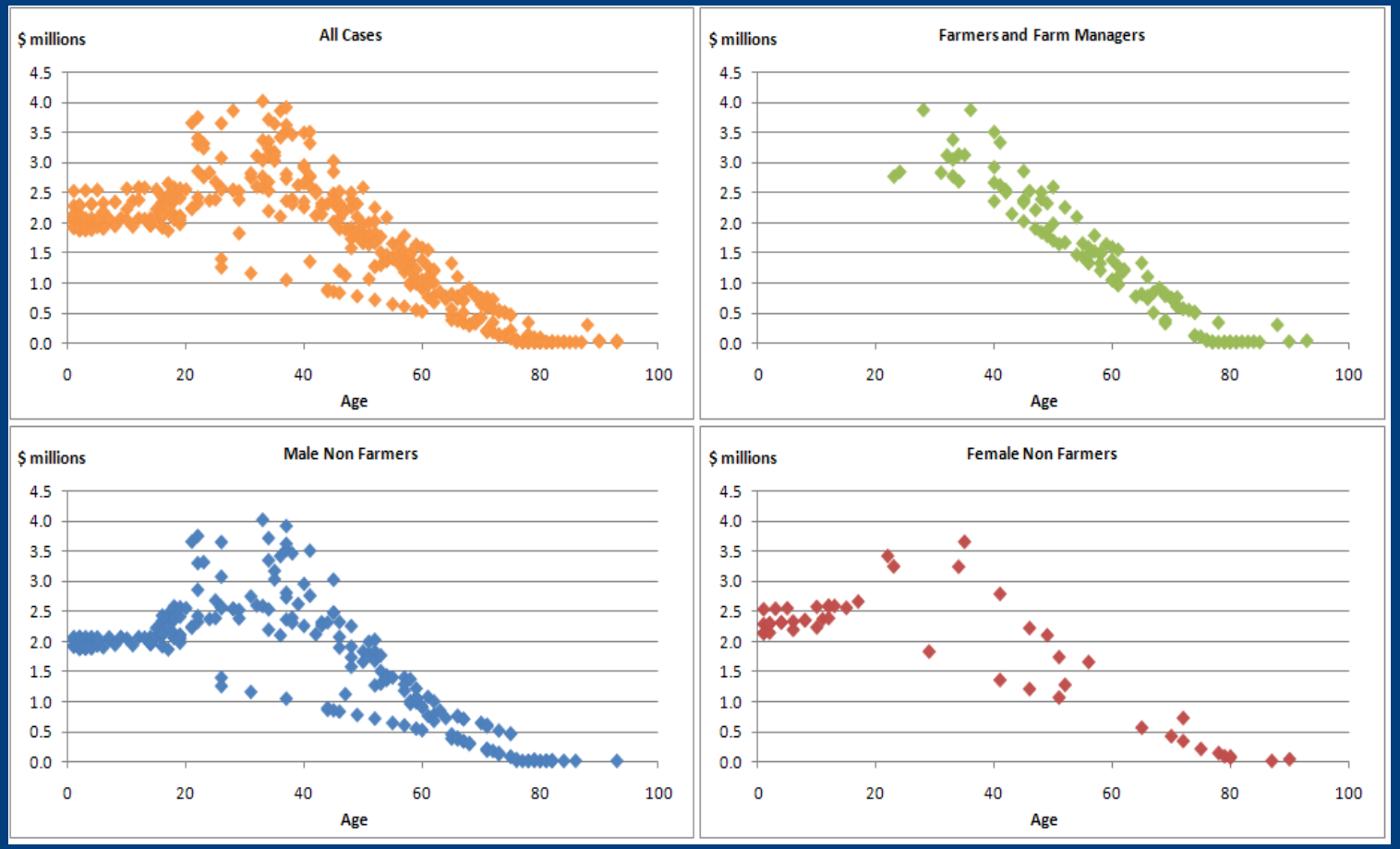
- 404 fatalities over 2001–04.
- The majority were male (n=347, 86%).
- Most commonly aged over 65 (n=106, 26%) followed by children aged under 15 years (n= 69, 17%).
- The bottom line…

$651 million

Distribution of fatalities, by age group and gender, 2001–04



Distribution of economic cost, by age, gender and farmer grouping, 2001–04



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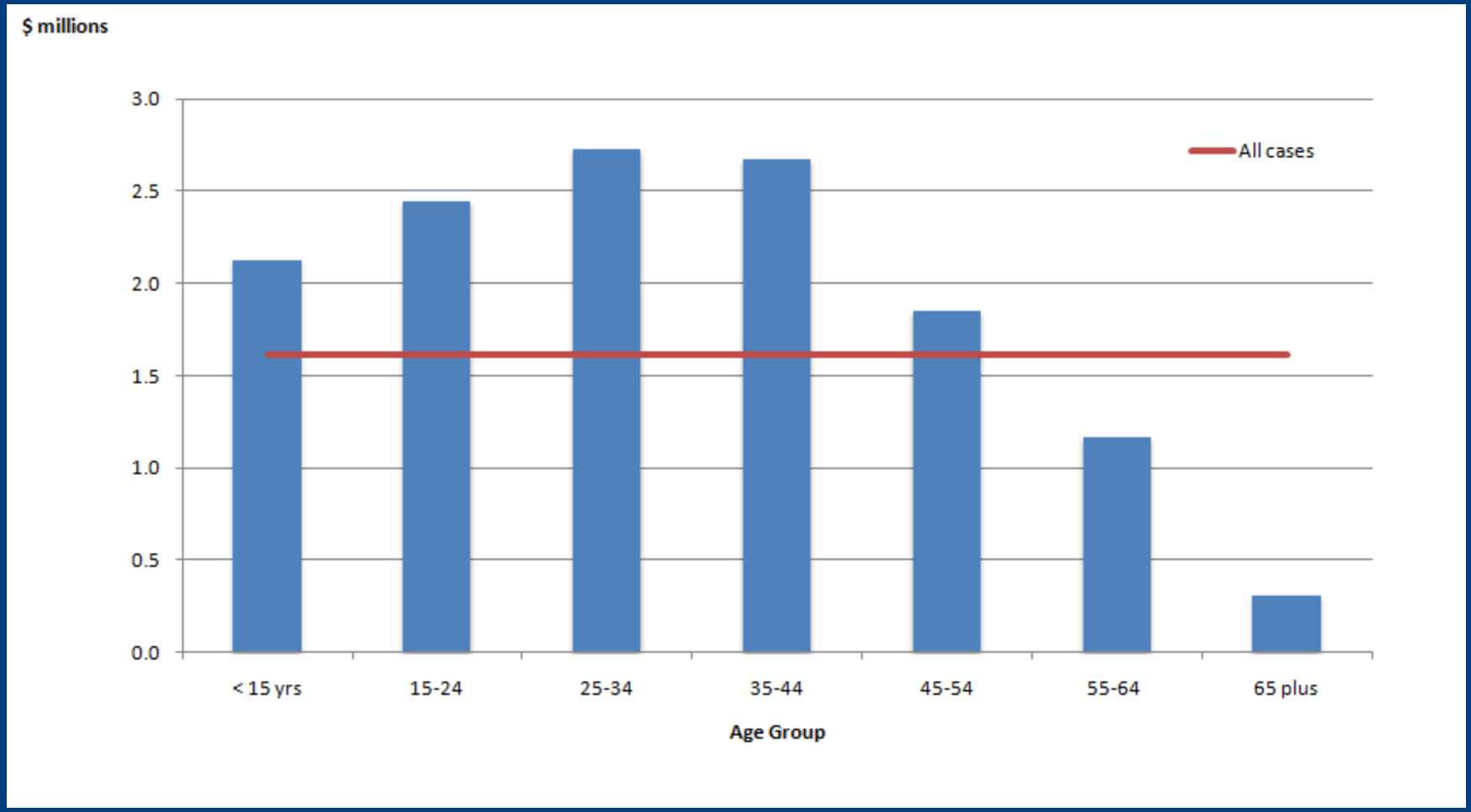
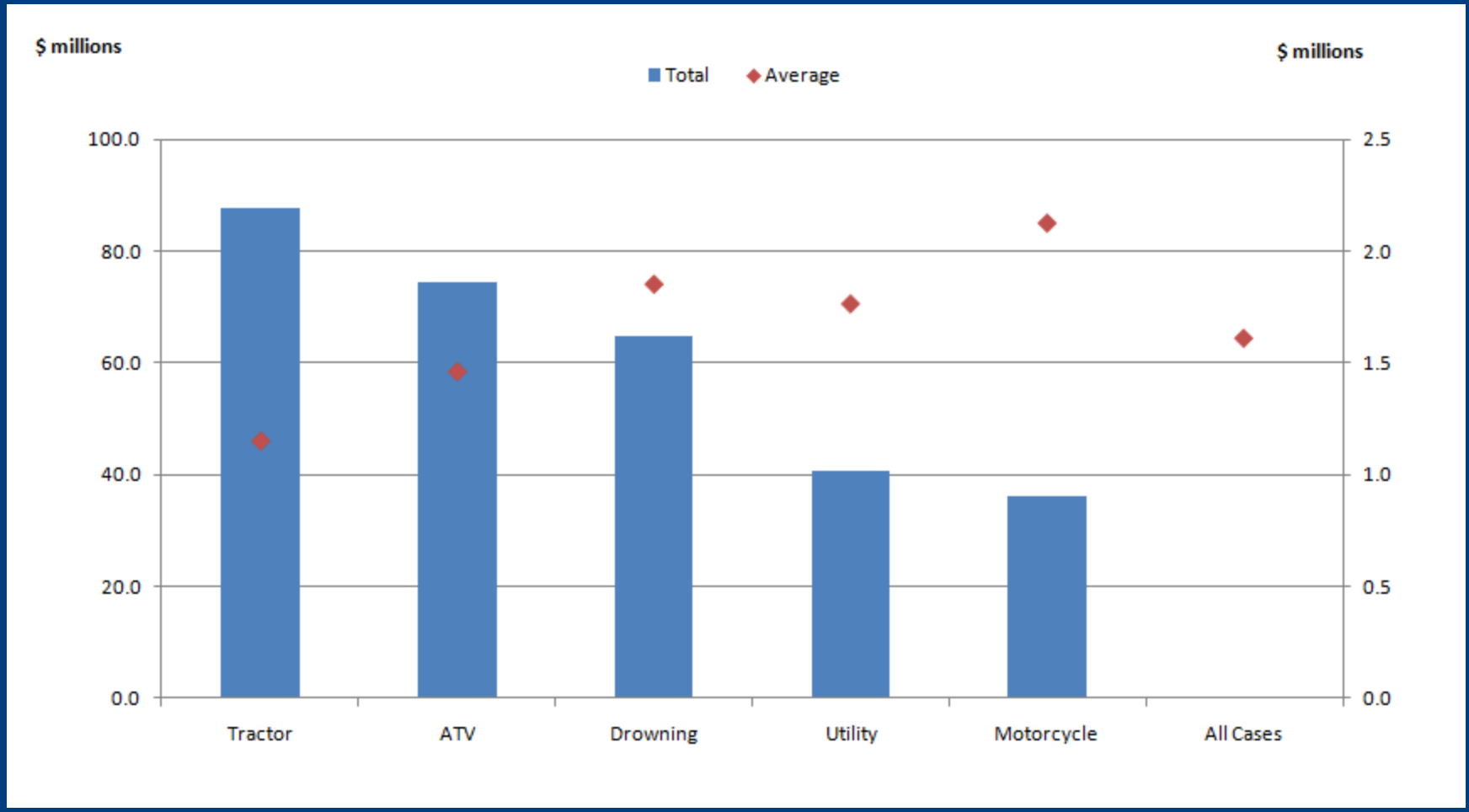


Economic cost of most common agents causing death, by total and average



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Limitations of study

- Many costs cannot be incorporated into the model.

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- Many costs cannot realistically be incorporated into the model.
- Data available on closed cases in the NCIS is variable, therefore it is possible that there are cases throughout this period that should have been included in the study but were unable to be identified.
  - In April 2008, 6% of 2001 and 13% of 2004 cases were still open before the Coroner.
- Average annual income for farmers and farm managers from the ABS is very low, $29K, which is more indicative of farm hand wages.
- Model assumed retirement of 65 years, except for farming, which was 70 years. It is acknowledged that many farmers continue to work until well into their 80s or even until their death of natural causes.

Conclusions and contribution of research

- This was the first comprehensive study into the cost of farm-related fatalities in Australia.
- The cost is considerable; in just four years, over the period 2001–04, the 404 farm-related fatalities cost the economy $651 million in 2008 dollars.
- That equates to 2.7 per cent of the 2008 farm GDP, at an average cost of $1.6 million per fatality.
- This is a conservative estimate.
  - Many costs were not able to be incorporated.
  - Long-term, permanent and serious injuries would increase this figure substantially.

Conclusions and contribution of research

- Increased adoption of Farmsafe Australia's interventions targeting:
  - tractors,
  - quad bikes,
  - drownings,
  - utilities, and
  - 2 wheel motorcycles

  have the potential to offer considerable cost savings, as these five agents account for 47 per cent ($303.5 million) of the economic cost.

- While rates of farm-related fatalities have reduced in recent years, they remain an extremely costly impact on the agricultural sector. Current investment in prevention from government and individual producers needs to be increased, as there is a clear cost-benefit in preventing these fatalities.

Thank you.