THE ECONOMIC COST OF SUICIDE AND SUICIDE BEHAVIOUR IN THE NSW CONSTRUCTION INDUSTRY AND THE IMPACT OF MATES IN CONSTRUCTION SUICIDE PREVENTION STRATEGY IN REDUCING THIS COST

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The economic cost of suicide and suicide behaviour in the NSW construction industry and the impact of MATES in Construction suicide prevention strategy in reducing this cost

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ABBREVIATIONS USED IN THIS REPORT

ABS .....Australian Bureau of Statistics
ANZSCO ...Australian and New Zealand Standard Classification of Occupations
ANZSIC.....Australian and New Zealand Standard Industrial Classification
ASIST .....Applied Auicide Intervention Skills Training
AWE .....Average weekly earnings
BERT.....Building Employees Redundancy Trust
GAT .....General Awareness Training
LIFE.....Living is for everyone
MATES.....MATES in Construction
NCIS.....National Coronial Information System
NDS.....National Dataset for Compensation
NOHSC.....National Occupational Health and Safety Commission
NSW.....New South Wales
QLD.....Queensland
RRR .....Relative Risk Ratio
US .....United States
WHO .....World Health Organisation

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EXECUTIVE SUMMARY

BACKGROUND

Mental disorders are a major risk factor for suicide. A suicide is a deliberate act of self-harm taken with the expectation that it will be fatal. A suicide-attempt is a non-fatal act of self-harm, often with the aim of seeking help. Attempted suicide is far more common than fatal suicide events and it is currently believed that for every death by suicide, there are between 10 and 20 attempted suicides.

Suicidal behaviour has gained recognition worldwide as a significant public health problem. In Australia, suicide is the leading cause of death for males aged 25-44 years and females aged 25-34 years. A death by suicide has ripple effects, impacting the lives of any number of individuals who inevitably suffer intense and conflicted emotional distress in response to a death of this kind. Given most suicides occur within people of working age, it is surprising that very little research has been conducted into the cost of suicide in the work-place or on the potential impact of work-place suicide prevention strategies.

AIM

The aim of the current study is to quantify the economic cost of suicide, and suicide behaviour, among New South Wales (NSW) construction industry workers in 2010, and, to examine the potential impact of introducing a multi-faceted strategy called MATES in Construction (MATES) to address suicide prevention in the work-place in NSW in 2013-17.

METHOD

Suicide data were obtained from the National Coronial Information System (NCIS) for the period 2001-2012 for NSW and Queensland (QLD). Occupational information was coded according to the Australian and New Zealand Standard Classification of Occupations and the Australian and New Zealand Standard Industrial Classifications. Occupations coded as being in the construction industry fell into three major groups: technicians and trades worker; machine operators; and, drivers and labourers. Age standardised incidence rates were calculated using the direct standardisation method, as used by the Australian Institute of Health and Welfare.

The analysis used a costing methodology endorsed by the National Occupational Health and Safety Commission and used in a 2012 report by Safe Work Australia. Both direct and indirect costs were considered for a range of economic agents (including employers, workers and the government) and by severity of injury. For construction industry workers (i.e., technicians and trades workers; machine operators and drivers; and, labourers), total costs of suicide were estimated by multiplying average indirect and direct costs by cases of suicide and estimates of self-harm incidents. The classification structure for economic costs is based on six conceptual cost groups: production disturbance costs; human capital costs; medical costs; administrative costs; transfer costs; and, other costs. Costs were derived using an incidence based approach with costs that an injury imposes in future years discounted to 2010 dollars.

The effectiveness of MATES was measured using an approach developed to evaluate a US Air Force suicide prevention program. The approach relies on calculating the risk of suicide prior to, and after, the introduction of an intervention. Using the relative risk ratio (RRR) method, pre-MATES suicide risk was calculated for the 5 years immediately before the commencement of MATES activities in Queensland (2003-2007) with post-MATES suicide risk calculated for the 5 years immediately after the commencement of MATES activities (2008-2012). Counterfactual suicide numbers were estimated for 2008-12 by applying the pre-MATES risk level (i.e., assuming pre and post risk of suicide was similar) to the population of construction industry workers. The difference between expected and the counterfactual suicide numbers provides an estimate of the reduction in fatality by suicide in the post-MATES period. These averted suicides were further adjusted for the average penetration of MATES activities into the construction industry (i.e., 9%) over the pre-MATES period. The calculated QLD RRR was used to estimate the reduced risk and change in fatality by suicide among NSW construction industry workers for the period 2013-2017 were MATES to be introduced in NSW

RESULTS

Over the period 2001-2012, the age standardised suicide rates in the NSW construction industry were consistently higher than the state rates. In QLD, however, by 2012, the age standardised suicide rates in QLD construction industry workers were almost the same as that seen for the entire state. The QLD state rate is consistently

higher than the NSW state average. The average age of each suicide fatality among construction industry workers was 36.8 years and 37.7 years in QLD and NSW, respectively.

The average cost of a self-harm attempt resulting in a short-term absence from work is estimated at $925 in 2010 dollars. Each self-harm attempt resulting in full incapacity is estimated at $2.78 million; and, each suicide attempt resulting in a fatality is estimated at $2.14 million. The key cost driver for full incapacity and a fatality is lost income, equivalent to 27.3 years productive years. Across all categories, the burden of cost associated with self-harm and suicide is borne largely by the government: 97% or $4.80 million of the total combined cost of $4.92 million.

In 2010, there were 57 fatalities by suicide among NSW construction industry workers (skilled trades and machine operators/ labourers). Using the World Health Organisation statistics on self-harm and suicide behaviour suggests there were 145 self-harm attempts resulting in full incapacity and 710 self-harm attempts resulting in a short absence from work. Multiplying these numbers with the average cost per incident suggest that the cost of suicide and suicide behaviour in the NSW construction industry was $527 million in 2010.

Using the risk of suicide pre and post implementation of MATES and adjusting averted cases by the estimated penetration of MATES activities in the workforce (i.e., 9%), the analysis suggests a potential reduction in fatality by suicide among NSW construction industry workers, as a consequence of MATES, to be 1.98 fewer suicides over the five-year period 2013-2017, equivalent to 0.4 suicides each year. This equates to averting 1.01 self-harm attempts ending in full incapacity and 4.92 self-harm attempts ending in a short absence from work. The potential economic benefit of averting this harm is estimated at $3.66 million each year. The majority of benefits are estimated to flow to the government with a saving of $3.56 million each year. If the budget for rolling out the MATES program in NSW is $800,000 each year, the benefit cost ratio is equivalent to 4.6:1, representing a positive economic investment of public funds.

DISCUSSION

In undertaking this analysis a range of data, assumptions and methods were used. The focus has been on the human cost of suicide and suicide behaviour to the construction industry. It has not considered the wider implications to the Industry in terms of damage to property, loss of company image or the considerable investment the Industry makes complying with work health and safety regulations. The analysis relied on the best available evidence and used the gold standard NCIS data to identify fatalities by suicide in the construction industry. Data was, however, available for males only. Although males represent the majority of construction workers and have higher rates of suicide than females, the results will, nevertheless, be an underestimate of the true cost of suicide and suicide behaviour. National standards were used to classify construction industry workers with a focus on technicians, tradesmen, machine operators, drivers and labourers. However, these standards are not perfect and when combined with NCIS data, resulted in construction-related employees such as managers and/or other professionals being omitted.

> "More than $3.5 million saved each year and a return to government of nearly $5 for every dollar invested."

As highlighted in the Safe Work Australia study, economic costing is not an exact science. Cost estimates depend on the particular costing approaches used, the range of cost components that can be estimated, the quality of available data and the value of key parameters. Assumptions relating to the values of key parameters in this study have been chosen to be deliberately conservative.

In spite of these methodological challenges the results provide a conservative assessment of the cost associated with suicide and suicide behaviour in the NSW construction industry in 2010. Evidence suggests that MATES is a feasible, affordable, and acceptable work-place strategy to address suicide in the work-place. This analysis suggests that MATES can save lives at the same time as saving scarce resources. It represents a positive economic investment into work-place safety in the NSW construction industry.

INTRODUCTION

Mental disorders occur when there are impairments in a person's cognitive, emotional, or perceptual functioning that cause significant dysfunction in one or more areas of social or occupational performance.[1, 2]

When left medically untreated, mental disorders carry a significant risk of disability and death. Mental disorders are a major risk factor for suicide.[1, 2] Specific mental disorders that have been linked to suicide include depressions, substance abuse (both alcohol and drugs), anxiety disorders, personality disorders (such as borderline or antisocial personality disorder), and schizophrenia.

A suicide is a deliberate act of self-harm taken with the expectation that it will be fatal.[1] A suicide-attempt is a non-fatal act of self-harm, often with the aim of seeking help. Attempted suicide is far more common than fatal suicide events and it is currently believed that for every death by suicide, there are between 10 and 20 attempted suicides.[1] The number of attempted suicides in Australia is estimated to be more than 60,000 each year, with more than two-thirds of these attempts by women.[3, 4]

Suicidal behaviour has gained recognition worldwide as a significant public health problem. In Australia, suicide is a leading cause of death with 2,273 deaths (aged over 15 years) in 2011 (1,747 male deaths and 546 female deaths), representing 1.5% of all deaths over the age of 15.[5] Most deaths by suicide are among people of working age with suicide being the leading cause of death for males aged 25-44 years and females aged 25-34 years.[5]

A death by suicide has a flow-on effect, impacting the lives of any number of individuals – from family to friends, colleagues, clinicians, first responders, coronial staff, volunteers of bereavement support services and other associates – who inevitably suffer intense and conflicted emotional distress in response to a death of this kind.[6, 7] The combination of grief, guilt and remorse can remain for years and potentially, three to four generations can be bereaved. To date, there has been limited research into the cost of suicide and suicidal behaviour to the Australian economy.[8] A Menslink commissioned study conducted by KPMG estimated the economic cost of suicide among Australian men and women at $1.7 billion in 2012.[9]

An emerging area of interest in suicide research is the impact of employment status and industry on rates of suicide.[1, 8, 10] While being employed is associated with reduced risk of suicide overall, recent evidence suggests suicide rates are differentially distributed across industry and occupational groups. A recent review by Milner et al (2013) on suicide by occupation found a stepwise gradient in risk, with the lowest skilled occupations being at greater risk of suicide than the highest skill-level group.[10] In a separate analysis using data from the National Coronial Information System (NCIS), Milner et al (2014) confirmed that this gradient also applies within the construction industry.[11]

In a review undertaken by Doran (2013) for the New South Wales Mental Health Commission, it was noted that several experts point to the need for work-places to become better equipped to handle psychological stress within their own companies.[12] If employers were more aware of the economic consequences of the impact of mental disorders on their employees, the work-place could provide an ideal setting for mental health promotion and prevention. Hilton et al (2008) suggests that effective treatment for mental health problems yields substantial increases in employee productivity and would be a sound economic investment for employers.[13]

Unfortunately, the prevention of suicide has not been adequately addressed in society or the workforce, due to a lack of awareness of suicide as a major problem and the taboo in many societies to discuss it openly.[1] Mann et al (2005) conducted a systematic review of suicide prevention strategies and found that, overall, a range of National suicide prevention strategies have been proposed despite knowledge deficits about the effectiveness of some common key components.[14] The authors suggest that the most promising interventions are physician education, means restriction (i.e., reducing access to lethal methods), and gatekeeper education (i.e., where the roles of gatekeepers are formalized and pathways to treatment are readily available).[14]

MATES in Construction (MATES) is an example of a multi-faceted strategy developed in Australia to address suicide prevention in the work-place. MATES was established in 2008 by the Building Employees Redundancy Trust (BERT) to prevent suicide in the construction industry. MATES is a multimodal prevention and early intervention program, consistent with the living is for everyone (LIFE) strategy[15] and Mrazek and Haggerty's spectrum of prevention and intervention[16].

MATES has three main components: general awareness training (GAT), connector training and applied suicide intervention skills training (ASIST). GAT involves a one hour training session provided by accredited trainers to construction workers on sites with the aim of increasing awareness of suicide as a work-place health and safety issue, improve knowledge of warning signs and encourage workers to seek support. Connector training involves a four hour training session provided by MATES. The role of a connector is to keep co-workers safe while connecting them to help, i.e. to an ASIST – trained worker, MATES field officer or case manager. ASIST workers undergo an intensive two day training course to better prepare them for identifying cues and responding appropriately to calls for help with the object of reaching a contract or safe plan involving extra help and safety. MATES accredited sites or employers also receive promotional materials and access to other MATES programs including a 24/7 helpline.

Gullestrup et al (2011) evaluated the effectiveness of MATES for the period April 2008 to November 2010. A non-equivalent group comparison design was used to evaluate effectiveness of GAT on participants' mental health and suicide prevention knowledge. Comparison data were collected from two sites in Queensland (QLD) with participants completing the GAT questions prior to exposure to the GAT course. Findings from over 7,000 workers are reported, indicating strong construction industry support, with 67%of building sites and employers approached agreeing to participate. The authors found that GAT participants' demonstrated significantly increased suicide prevention awareness compared with a comparison group. Connector training participants rated MATES as helpful and effective, felt prepared to intervene with a suicidal person, and knew where to seek help for a suicidal individual following the training. Workers engaged with the after-hours crisis support phone line and case management, with MATES providing postvention support to 10 non-MATES sites. These data support the potential effectiveness and social validity of MATES for preventing suicide in construction workers. Further work is however required to validate these findings on actual reductions in suicide by construction workers undergoing MATES training.

"The prevention of suicide has not been adequately addressed in society or the workforce, due to a lack of awareness of suicide as a major problem and the taboo in many societies to discuss it openly."

Although MATES originated in QLD, it is equally relevant to other Australian States and Territories. The aim of the current study is to quantify the economic cost of suicide and suicide behaviour among NSW construction industry workers in 2010, and, to examine the potential human and economic impact of introducing MATES in NSW over the period 2013-2017.

METHODS

RATES OF SUICIDE AND SUICIDE BEHAVIOUR IN THE CONSTRUCTION INDUSTRY

Suicide data were obtained from the NCIS for the period 2001-2012 for NSW and QLD. NCIS is a national internet based data storage and retrieval system for Australian coronial cases, established in 2001.[17, 18] NCIS is utilised by coroners, government agencies and researchers for identifying cases for death investigation, research and to monitor external causes of death in Australia.[17] Only males were included in this study due to small number of women being employed in the construction industry who suicided and confidentiality issues with reporting small sample sizes.

Occupational information was coded according to the Australian and New Zealand Standard Classification of Occupations (ANZSCO) (up to the 6-digit level) and the Australian and New Zealand Standard Industrial Classifications (ANZSIC), Division E.[19-22] Those in the construction industry were identified as being involved in the construction or demolition of buildings and other structures.[22] Occupations coded as being in the construction industry fell into three major ANZSCO groups: technicians and trades workers (ANZSCO 3); machine operators and drivers (ANZSCO 7); and, labourers (ANZSCO 8).[21] For consistency with Milner et al (2013),[10] cases in higher skilled occupations such as construction managers (ANZSCO 1) and architects were excluded as their skills were considered more relevant to other ANZSIC categories such as Division M Professional, Scientific and Technical Services. Further detail on occupational coding can be found in Appendix 1.

The calculation of age standardised incidence rates of suicide relied on data from the NCIS and Census population information (2006 and 2011) on the construction industry workforce (males only, technicians and trades workers; machine operators and drivers; and, labourers).[23] Age standardised incidence rates were calculated using the direct standardisation method with the 2001 population, as used by the Australian Institute of Health and Welfare.[24, 25] Age-standardisation is a technique used to enhance the comparability of data from different populations by making adjustments for the confounding effects of compositional differences in age structure between the populations or sub-populations being compared.[26] A directly age-standardised rate is defined as the weighted average of event rates, with the weights being equal to the proportion of people in each age group in a chosen standard population. Age standardised male suicide rates for Australia, NSW and QLD were sourced from the Australian Bureau of Statistics (ABS).[5, 27] It is important to note that for the states, the ABS only provide an average standardised rate for the period 2001-2005.[27]

"The World Health Organisation estimates that between 20–30% of the workforce will suffer from a serious mental health problem and for every employee who dies by suicide, another 10–20 will make a suicide attempt."

TABLE 1: SAFE WORK AUSTRALIA CATEGORIES OF SEVERITY

CATEGORY LABEL	SEVERITY	CATEGORY DEFINITION
Short absence	Less than 5 days off work	A minor work-related injury or illness, involving less than 5 working days absence from normal duties, where the worker was able to return to full duties
Long absence	Five days or more off work and return to work on full duties	A minor work-related injury or illness, involving 5 or more working days and less than 6 months off work, where the worker was able to return to full duties
Partial incapacity	Five days or more off work and return to work on reduced duties or lower income	A work-related injury or illness which results in the worker returning to work more than 6 months after first leaving work
Full incapacity	Permanently incapacitated with no return to work	A work-related injury or disease, which results in the individual being permanently unable to return to work.
Fatality	Fatality	A work-related injury or disease, which results in death.

Source: *Safe Work Australia, 2012*[28]

LEVELS OF SEVERITY OF WORK-RELATED INCIDENTS

The Safe Work Australia report created five mutually exclusive categories of severity to define the level of severity. These categories were based on definitions from the National Dataset for Compensation (NDS), and were developed using incident severity and duration of absence. Severity can range from minor incidents involving little or no absence from work to fatalities (Table 1).

The World Health Organisation estimates that between 20% - 30% of the workforce will suffer from a serious mental health problem and for every employee who dies by suicide, another 10-20 will make a suicide attempt (17% resulting in a permanent disability and 83% no disability).[1] These statistics are supported by research in Australia.[4,8,9] In this analysis, for every 15 suicide attempts there is one fatality and from the 15 attempts, 3 (17%) are classified as full incapacity with 12 (83%) classified as short absence. Corresponding duration of absence (for use in calculation of production disturbance costs) are 0.2 weeks for short absence; 2.6 weeks for full incapacity and fatality.

ESTIMATING COST OF SELF-HARM AND SUICIDE IN THE NSW CONSTRUCTION INDUSTRY

In 1995, the Industry Commission developed a methodology to examine the direct and indirect cost of work-related incidents.[29] The Industry Commission methodology was further refined based on the recommendations of independent reviews[30,31] Further refinements were made to the methods in a 2004 report undertaken by the National Occupational Health and Safety Commission (NOHSC)[32] and a 2012 report by Safe Work Australia.[28] This revised method is used in the current analysis to provide an estimate of the cost of self-harm and suicide in the construction industry.

Although a full explanation of methods is available in the 2012 Safe Work Australia report,[28] it is important to consider key issues. Both direct and indirect costs were considered for a range of economic agents (including employers, workers and the government) and by severity of injury. The average cost associated with each category were combined with estimates of suicide and self-harm incidents by NSW construction industry workers to produce an estimate of total costs. The classification structure for economic costs is based on six conceptual cost groups: production disturbance costs; human capital costs; medical costs; administrative costs; transfer costs; and, other costs (Table 2). A summary of the key parameters, assumptions and data sources for cost items is provided in Appendix 2.

METHODS

PRODUCTION DISTURBANCE COSTS

Production disturbance costs reflect short term impacts until production is returned to pre-incident levels and includes the value of lost production and staff turnover costs. Value of lost production is measured by combining average duration of absence (by severity category)[28] with male average weekly earnings (AWE).[33] Cost of overtime reflects the proportion of overtime related to work-related injuries and wage of workers that would not be required if there were no injury. Overtime is valued by combining AWE with duration of absence (by severity category) and adjusting by 0.4.[33] The cost of replacing existing staff affected by work-related incidents is equivalent to six weeks of AWE, and the cost of training new staff in the event of full incapacity or a fatality is equivalent to 2.5 weeks of AWE.[33] Tax losses due to foregone income are valued using tax rate of 22%.[34]

HUMAN CAPITAL COSTS

This analysis uses the human capital approach to costing. Human capital costs consider the long run costs, such as loss of potential output, occurring after a restoration of pre-incident production levels.[28] They are calculated as a residual between total human capital loss and deadweight loss to society from taxation redistributions.

For full incapacity or fatality, human capital costs are measured by considering the value of potential future earnings from time of injury to retirement age (i.e., <65years) assuming a discount profile and productivity loss. The discount profile considers the likely changes in the value of money over time by including the opportunity cost of saving (4.1%)[35] and the rate of inflation (2.8%).[36] A productivity factor of 1.6% is applied to reflect long term increases in AWE above the prevailing wage inflation rate.[37]

NCIS data are used to identify the average age of suicide over the period 2001-2010 for construction workers used in this analysis (technicians / trades workers, machine operators / drivers, labourers). The average age of suicide is used as a proxy for the average age of a full incapacity case. For full incapacity, future earnings also include the average social welfare payments received since these contribute to post-injury income. These costs are borne by the government through the disability support pension – equivalent to $700 per fortnight (in 2010 dollars).[38] The average life expectancy of a male in NSW is 79.6 years.[39] It is assumed that an incapacitated person will receive the disability support pension from time of incident until average age of death. Further, it is assumed the fully incapacitated and fatalities never return to work and the full cost is borne by the government in terms of lost income and tax revenue. These assumptions are consistent with those used in the Safe Work Australia report.[25]

MEDICAL COSTS

Medical costs are expenses incurred by workers and the community though medical treatment. Average medical costs by severity are sourced from Safe Work Australia: $500 per short absence; $13,375 per full incapacity case; and, $2,930 per fatality.[28, 40] In all work-related incidents involving medical care, the employer covers the first $500, employers contribute 15% of the difference (if any), with the government accounting for the remainder.

ADMINISTRATIVE COSTS

Administrative costs included in this analysis are investigation costs, travel costs and funeral costs. Investigation costs consider the costs of investigating an incident and the administrative cost of collecting and reporting information on work-related incidents. Average investigation costs by severity are sourced from Safe Work Australia: $28 per short absence; $2,374 per full incapacity case; and $2,840 per fatality.[28, 40] It is assumed that government investigation costs would be equal to the cost borne by the employer. Travel costs represent expenses for travel to doctors, rehabilitation centres, solicitors etc, - $4 per short absence and $730 per full incapacity case.[28, 40] For full incapacity cases, the government is assumed to match travel expenses 1–1 with the individual, in effect assuming a 50% travel concession for full incapacitated workers. Funeral costs are estimated at $4,000 and borne entirely by the worker (family).[28, 40] It is acknowledged that funeral costs may be associated with all deaths, fatality by suicide brings these costs forward.

OTHER COSTS

Other costs included in this analysis are cost of carers and aids/modifications for full incapacity cases and the cost of postvention services for fatalities. Postvention is a psychological first aid, crisis intervention, and other support offered after a suicide to affected individuals or the work-place as a whole to alleviate possible negative effects of the event.[7] Safe Work Australia uses disability support pension payments of $2,056 and $646 per annum as a proxy for the cost of carers and the cost of aids and modifications, respectively.[28, 40] The total of these payments is discounted to present

value terms over the period between the incident and reduced life expectancy.

A fatality by suicide has a flow-on effect, impacting the lives of any number of individuals, from family to friends, colleagues, clinicians, first responders, coronial staff, volunteers of bereavement support services and other associates, who inevitably suffer intense and conflicted emotional distress in response to a death of this kind. Research suggests that each fatality by suicide impacts directly on six to twenty people.[6] The economic cost associated with suicide bereavement has been estimated at $14,058.[41] Evidence from an Industry source suggests that each fatality by suicide may be witnessed by on average three colleagues that would then require counselling and time off work as part of postvention care. These costs are estimated at $10,000 per worker from time of incident to return to full duties. This assumption is in line with other attempts to measure the ripple effects of a suicide but may be considered as conservative as it only considers the impact on workers and not families or friends.[4,5,9]

TRANSFER COSTS

The redistribution of public sector resources to care for incapacitated person incurs deadweight costs on society - for every dollar of tax raised, about 28.75 cents is absorbed in the distortions induced and the administration of the tax system. In this analysis the deadweight loss is measured as the value of taxation receipts foregone, equivalent to 28.75 cents in every foregone tax dollar.[42]

> "Research suggests that each fatality by suicide impacts directly on six to twenty people."

INCIDENCE BASED APPROACH TO COSTING

Consistent with the Safe Work Australia report, the methodology used in this analysis is based on an incidence based approach. The incidence based approach allows a better estimate of the economic cost, since it allows the future costs for new cases to be followed over the expected lifetime of the case. This approach is known as the lifetime cost approach, and provides an indicator of the benefits of reducing work-related incidents. The costs that an injury imposes in future years are discounted to present values, i.e., constant 2010 dollars in this analysis. The lifetime cost approach assumes the levels and structures of current costs accurately reflect future costs.

A further assumption made in the Safe Work Australia report and, carried over to this report, is that the methodology is based on an ex-post approach in which costs are attributed to incidents after they occur and as a direct result of the incident. The nature of the compensation-based data, on which the Safe Work Australia report is based, lends itself to an ex-post estimation process. The current and future costs associated with each case can be assigned individually (since the number of cases and the nature of each case is known), and the total cost estimated by aggregating the cost of each case and/or cost component from the bottom-up.

ESTIMATING THE EFFECTIVENESS OF MATES IN QLD AND NSW CONSTRUCTION INDUSTRY

Table 3 provides an overview of MATES construction activities in QLD over the period 2008-2013. All activities have increased steadily since commencement of MATES in 2008. Over the period 2008-2013, the average penetration rate of MATES into QLD construction industry workforce is estimated at 9% (i.e., proportion of the workforce exposed to GAT over the period). There has been a steady increase in the number of Connectors trained and ASIST workers undergoing intensive training.

In an evaluation of the US Air Force suicide prevention program, Knox et al (2003)[43] calculated the relative risk ratio (RRR) (or the ratio of risk) of suicide for Air Force employees, before and after the intervention. RRR was calculated using the formula:

(RRR) = Risk (after intervention) / Risk (before intervention)

RRR is the ratio of suicides among Air Force employees after the intervention divided by the ratio of suicides among Air Force employees before the intervention. If the intervention had a positive effect (indicated by a RRR <1.0) the percentage of

METHODS

TABLE 2: ECONOMIC COST BORNE BY THE EMPLOYER, WORKER AND GOVERNMENT

CONCEPTUAL GROUP	COST ITEM	EMPLOYER	WORKER	GOVERNMENT
Production disturbance costs	Value of lost production	Overtime premium and value of wages paid while away from work	Zero	Zero
	Staff turnover costs	Staff turnover costs	Zero	Zero
Human capital costs	Net present value of lost earnings	Zero	Zero	Loss of income & welfare payments transferred to worker for loss of wage minus deadweight loss associated with tax revenue forgone
Medical costs	Medical and rehabilitation costs	Threshold medical payments	Gap payments	Medical payments not covered by employer or worker
Admin. costs	Investigation costs	Employer investigation costs	Zero	Costs of running the compensation system (including investigation claims)
	Travel costs	Zero	Out of pocket expenses	Compensation for travel costs
	Funeral costs	Zero	Out of pocket expenses	Zero
Other	Carers	Zero	Zero	Payments to carers
	Aids, equipment & modifications	Zero	Zero	Reimbursements for aids, equipment & modifications
	Postvention	Postvention	Zero	Postvention
Transfer costs	Deadweight costs of tax revenue foregone	Zero	Zero	Deadweight costs of tax revenue foregone

Source: *ABS, MATES in Construction*

risk reduction (or preventive fraction) was calculated as 1 – RRR × 100.

The Knox method is used in this analysis, using QLD data, to estimate RRR of suicide for male construction industry workers. Pre-MATES suicide risk was calculated using time series data on suicide cases for the 5 years immediately before the commencement of MATES activities (2003-2007), and post-MATES suicide risk was calculated for the 5 years immediately after the commencement of MATES activities (2008-2012). Populations for each year were taken from ABS Labour Force survey data for the construction industry, (males only; technicians and trades workers; machine operators and drivers; and labourers).[44]

Counterfactual suicide numbers were estimated for the post-MATES period (2008-12) by applying the pre-MATES risk level to the post-MATES population of QLD construction industry workforce post-MATES (i.e., assuming pre and post risk of suicide was similar). The difference between the expected and counterfactual suicide cases provides an estimate of suicide cases averted in the post-MATES period (2008-12). This result was then adjusted to reflect the average penetration of MATES activities into the QLD construction industry over the pre-MATES period (i.e., 9%). The calculated QLD RRR was used to estimate the reduced risk and change in fatality by suicide among NSW construction industry workers with a similar introduction of MATES that occurred in QLD. A sensitivity analysis is undertaken to examine the potential impact of doubling the penetration rate (i.e., exposing 18% or 30% of the construction workforce to MATES, on average, each year).

TABLE 3: MATES ACTIVITIES IN QLD 2008-2013

YEAR	QLD CONSTRUCTION INDUSTRY WORKFORCE	GENERAL AWARENESS TRAINING (GAT)	GAT CUMULATIVE	% OF WORKFORCE EXPOSED TO GAT	CONNECTOR TRAINING	ASIST TRAINING
2008	174,050	730	730	0.4%	55	
2009	172,475	3,174	3,904	2.3%	227	30
2010	164,950	5,465	9,369	5.7%	333	54
2011	168,625	7,274	16,643	9.9%	478	47
2012	161,325	9,588	26,231	16.3%	507	52
2013	161,325	9,530	35,761	22.2%	793	55

Source: *ABS, MATES in Construction*

RESULTS

SUICIDE AMONG QLD AND NSW CONSTRUCTION INDUSTRY WORKERS

The number of number of suicides deaths in QLD and NSW construction industry workers over the period 2001-2012 is provided in Table 4. These data show considerable variability between years. The average age of each suicide fatality among construction industry workers was 36.8 years and 37.7 years in QLD and NSW, respectively (not shown in Table). A more accurate comparison of suicide fatalities between the states should be made with age standardised incidence rates.

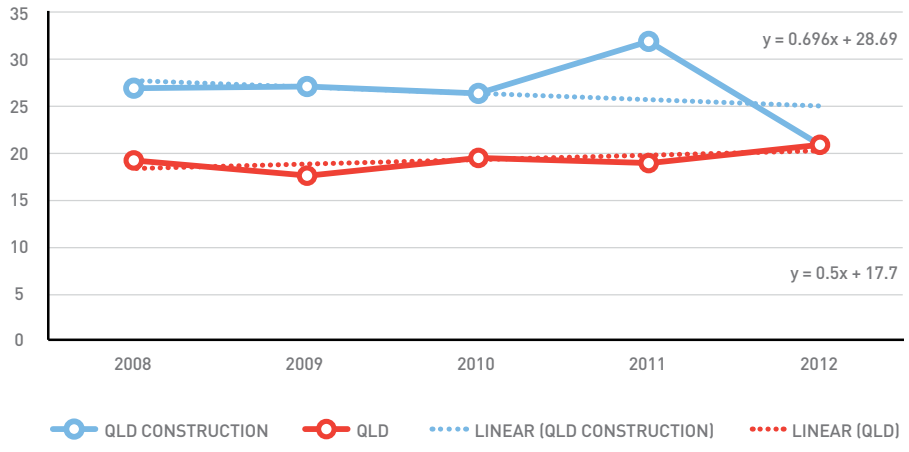
Figures 1 and 2 provide a comparison of age standardised suicide rates (males only) in the construction industry with the State rates (males only) for QLD and NSW, respectively. As noted in the methods, the ABS only provides an average standardised rate for QLD and NSW for the period 2001-2005.[27] Over the period of interest age standardised suicide rates in the NSW construction industry were consistently higher than the state rates. In QLD, however, by 2012, the age standardised suicide rates in QLD construction industry workers were almost the same as that seen for the entire state. The QLD state rate is consistently higher than the NSW state average.

TABLE 4: NUMBER OF SUICIDE DEATHS IN THE QLD AND NSW CONSTRUCTION INDUSTRY, 2001-2012

YEAR	QLD	NSW
2001	39	54
2002	38	47
2003	36	53
2004	51	59
2005	41	54
2006	30	52
2007	49	49
2008	45	43
2009	43	37
2010	45	57
2011	53	42
2012	36	42

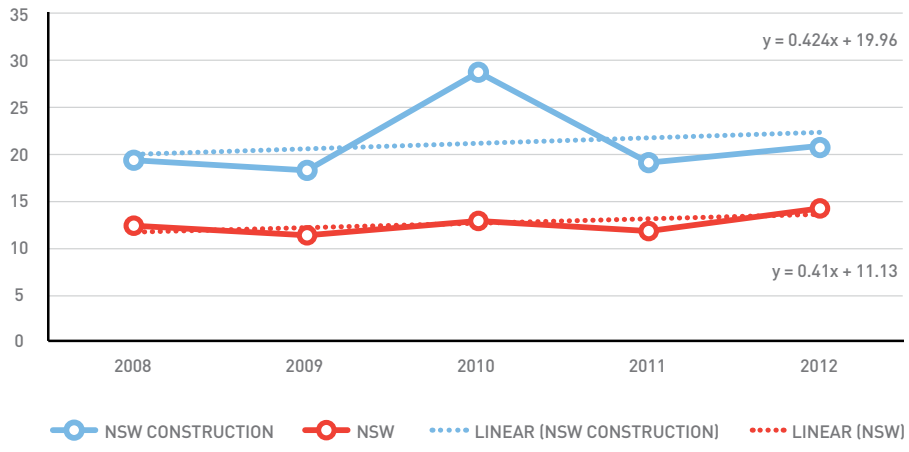
Source: *NCIS*

FIGURE 1: AGE STANDARDISED SUICIDE STATISTICS FOR WORKERS IN THE QLD CONSTRUCTION INDUSTRY, 2001-2012 (MALES ONLY)



Source: *NCIS, ABS*

FIGURE 2: AGE STANDARDISED SUICIDE STATISTICS FOR WORKERS IN THE NSW CONSTRUCTION INDUSTRY, 2001-2012 (MALES ONLY)



Source: *NCIS, ABS*

RESULTS

AVERAGE COST OF SUICIDE AND SUICIDE BEHAVIOUR IN THE NSW CONSTRUCTION INDUSTRY

Table 5 provides an overview of the average cost associated with self-harm and suicide incidents in the construction industry in 2010 dollars. Each incident involving a short-term absence is estimated to cost $925 with the employer accounting for 97% ($893) of this cost. Each self-harm attempt resulting in full incapacity is estimated to cost $2.78 million with the government accounting for 98% ($2.74 million) of this cost. Each suicide attempt resulting in a fatality is estimated to cost $2.14 million with the government accounting for 96% ($2.06 million) of this cost. The key cost driver in both full incapacity cases and a fatality is lost income (and taxes) and, for full incapacity only, the additional cost of welfare payments. Given the average age of each suicide is 37.7 years in NSW, this equates to a loss of 27.3 years (65 years – 37.7 years) in potential productive employment. Across all categories, the burden of cost associated with self-harm and suicide is borne largely by the government – 97% ($4.8 million) of the total combined cost of $4.93 million.

TOTAL COST OF SUICIDE AND SUICIDE BEHAVIOUR IN THE NSW CONSTRUCTION INDUSTRY

In 2010 there were 57 fatalities by suicide among male NSW construction industry workers (skilled trades and machine operators/labourers). Using the World Health Organisation statistics on self-harm and suicide behaviour, suggests there were 145 self-harm attempts resulting in full incapacity and 710 self-harm attempts resulting in a short absence from work. Multiplying these numbers with average cost per incident (Table 5), suggest that the cost of suicide and suicide behaviour in the NSW construction industry is $527 million in 2010 (Table 5). Ninety-eight percent ($515 million) of this cost is borne by the Government.

"The burden associated with self-harm and suicide is borne largely by the government – 97% ($4.8 million) of the total cost."

EFFECTIVENESS OF MATES IN QLD AND NSW CONSTRUCTION INDUSTRY

Table 6 provides the results of RRR calculations using suicide data for workers in the QLD construction industry. The RRR ratio (post risk versus pre risk) equals 0.9036, suggesting that the risk of suicide decreased by 9.64% in the post-MATES period compared with the pre-MATES period. Table 7 reports 222 fatalities by suicide in QLD construction industry workers for the post-MATES period. The counterfactual scenario, i.e., fatality by suicide post-MATES period, using pre-MATES period risk rate, is estimated at 246 (population of 841,425 x pre-risk rate of 0.000292). Compared with the observed number of suicides of 222, the difference is an estimated 24 fewer fatalities by suicide (over 5 years) after the commencement of MATES. Adjusting for the penetration of MATES activities into the QLD construction industry (9%) suggests a reduction in fatality by suicide as a consequence of MATES, to be 2.24 suicides over the five-year period equivalent to 0.454 suicides each year.

The QLD RRR ratio was used to estimate the number of fatalities by suicide that might be averted among NSW construction industry workers post commencement of MATES activities. Table 7 reports a total of 221 fatalities by suicide among NSW construction industry workers for the period 2008-2012 equating to a pre-risk rate of suicide of 0.000207 (221 suicides / 1,068,500 workers). Given the introduction of MATES for the 2013-2017, using the QLD RRR ratio of 0.9036, yields a forecast post-risk rate of 0.000187 (0.9036*0.000207)). Using these data, the expected number of suicides among NSW

construction industry workers in the post-MATES period is 196 (0.000187 * 1,050,518 (estimated 2013-2017 population)).

The counterfactual scenario, i.e., fatality by suicide post-MATES period using pre-MATES period risk rate, is estimated at 217 (population of 1,050,518 x pre-risk rate of 0.000207). Comparing projected fatalities by suicide (196) with counterfactual numbers fatalities (217) results in a difference of 21 fewer suicides (over 5 years) post commencement of MATES. Assuming the same penetration of MATES activities into the construction industry (9%) suggests a reduction in fatality by suicide, as a consequence of MATES, to be 1.98 suicides over the five-year period equivalent to 0.4 suicides each year.

IMPACT ON MATES ON THE COST OF SUICIDE AND SUICIDE BEHAVIOUR IN NSW CONSTRUCTION INDUSTRY

The potential economic impact of implementing MATES in the NSW construction industry is an estimated saving of $3.66 million each year (Table 8). Given the total cost of suicide and suicide behaviour in NSW construction industry workers is estimated to cost over $500 million, MATES provides an opportunity to avert harm and save dollars. The majority of benefits are estimated to flow to the government with a saving of $3.56 million each year. If the budget for rolling out the MATES program in NSW is $800,000 each year, the benefit cost ratio is equivalent to 4.6:1 representing a positive economic investment of public funds.

SENSITIVITY ANALYSIS

In this analysis the effectiveness of MATES was influenced by the penetration of MATES activities into the construction industry. A rate of 9% was used to reflect the proportion of construction industry workers undergoing GAT training. Doubling the penetration rate to 18% suggest an average yearly reduction in fatality by suicide of 0.75 (compared to 0.45 for a 9% penetration rate) and an overall economic saving of $6.8 million (compared to $3.7 million for a 9% penetration rate). Increasing the penetration rate to 30% suggests an average yearly reduction in fatality by suicide of 1.26 (compared to 0.45 for a 9% penetration rate) and an overall economic saving of $11.6 million (compared to $3.7 million for a 9% penetration rate). Although both variations in penetration rates provide substantive economic benefit, the actual benefits accruing from MATES will depend on the pace of implementation and the commitment by the government and industry to support MATES.

"Given the total cost of suicide and suicide behaviour in NSW construction industry workers is estimated to cost over $500 million, MATES provides an opportunity to avert harm and save dollars."

RESULTS

TABLE 5: AVERAGE COST PER WORK-RELATED INCIDENT, 2010 DOLLARS

	EMPLOYER	WORKER	GOVERNMENT	TOTAL
Short absence				
Production disturbance costs	$104	$0	$261	**$365**
Human capital costs	$0	$0	$0	**$0**
Medical costs	$500	$0	$0	**$500**
Administrative costs	$28	$4	$28	**$60**
Other	$0	$0	$0	**$0**
Transfer costs	$0	$0	$0	**$0**
Total	**$632**	**$4**	**$289**	**$925**
Full incapacity				
Production disturbance costs	$41,866	$0	$0	**$41,866**
Human capital costs	$0	$0	$2,507,169	**$2,507,169**
Medical costs	$500	$1,931	$10,944	**$13,375**
Administrative costs	$2,374	$365	$2,739	**$5,478**
Other	$0	$0	$89,995	**$89,995**
Transfer costs	$0	$0	$124,714	**$124,714**
Total	**$44,740**	**$2,296**	**$2,735,561**	**$2,782,597**
Fatality				
Production disturbance costs	$41,866	$0	$0	**$41,866**
Human capital costs	$0	$0	$1,847,050	**$1,847,050**
Medical costs	$500	$365	$2,066	**$2,930**
Administrative costs	$2,870	$4,000	$2,870	**$9,740**
Other	$30,000	$0	$84,348	**$114,348**
Transfer costs	$0	$0	$124,714	**$124,714**
Total	**$75,236**	**$4,365**	**$2,061,048**	**$2,140,649**

TABLE 6: COST OF SUICIDE AND SUICIDE BEHAVIOUR AMONG NSW CONSTRUCTION INDUSTRY WORKERS, 2010

	EMPLOYER	WORKER	GOVERNMENT	TOTAL
Short absence				
Production disturbance costs	$258,834	$0	$0	**$258,834**
Human capital costs	$0	$0	$0	**$0**
Medical costs	$354,825	$0	$0	**$354,825**
Administrative costs	$19,870	$2,839	$19,870	**$42,579**
Other	$0	$0	$0	**$0**
Transfer costs	$0	$0	$0	**$0**
Sub-Total	**$633,529**	**$2,839**	**$19,870**	**$656,238**
Full incapacity				
Production disturbance costs	$6,085,272	$0	$0	**$6,085,272**
Human capital costs	$0	$0	$364,416,944	**$364,416,944**
Medical costs	$72,675	$280,707	$1,590,674	**$1,944,056**
Administrative costs	$345,061	$53,053	$398,114	**$796,227**
Other	$0	$0	$13,080,842	**$13,080,842**
Transfer costs	$0	$0	$18,127,194	**$18,127,194**
Sub-Total	**$6,503,008**	**$333,760**	**$397,613,767**	**$404,450,535**
Fatality				
Production disturbance costs	$2,386,381	$0	$0	**$2,386,381**
Human capital costs	$0	$0	$105,281,868	**$105,281,868**
Medical costs	$28,500	$20,777	$117,734	**$167,010**
Administrative costs	$163,590	$228,000	$163,590	**$555,180**
Other	$1,710,000	$0	$4,807,836	**$6,517,836**
Transfer costs	$0	$0	$7,108,704	**$7,108,704**
Sub-Total	**$4,288,471**	**$248,777**	**$117,479,732**	**$122,016,979**
TOTAL	**$11,425,008**	**$585,375**	**$515,113,369**	**$527,123,752**

RESULTS

TABLE 7: RATE AND NUMBER OF SUICIDES AMONG QLD CONSTRUCTION INDUSTRY WORKERS PRE AND POST COMMENCEMENT OF MATES

PERIOD	NUMBER OF CONSTRUCTION INDUSTRY SUICIDES	CONSTRUCTION INDUSTRY WORKFORCE	RATE
Pre-MATES period (2003-2007)			
2003	36	115,000	
2004	51	126,375	
2005	41	145,250	
2006	30	154,275	
2007	49	168,050	
Total	207	708,950	0.000292
Post-MATES period (2008-2012)			
2008	45	174,050	
2009	43	172,475	
2010	45	164,950	
2011	53	168,625	
2012	36	161,325	
Total	222	841,425	0.000264
Relative Risk (Post Risk/Pre Risk)			**0.903614**

***** *Averages of quarterly ABS Labour Force Survey construction industry populations (Males only, technicians and trade workers/machine operators and drivers)*

TABLE 8: RATE AND NUMBER OF SUICIDES AMONG NSW CONSTRUCTION INDUSTRY MALE WORKERS, 2008-2012

PERIOD	NUMBER OF CONSTRUCTION INDUSTRY SUICIDES	CONSTRUCTION INDUSTRY WORKFORCE	RATE
Post-MATES period (2008-2012)			
2008	43	224925	
2009	37	206050	
2010	57	212700	
2011	42	209350	
2012	42	215475	
Total	222	1068500	0.000207
Relative Risk (Post Risk/Pre Risk)			**0.903614**

***** *Averages of quarterly ABS Labour Force Survey construction industry populations (Males only, technicians and trade workers/machine operators and drivers)*

TABLE 9: POTENTIAL ECONOMIC SAVINGS FROM MATES IN CONSTRUCTION, NSW

TYPE OF INCIDENT	NO. OF INCIDENTS REDUCED BY MATES EACH YEAR	AVERAGE COST PER INCIDENT	TOTAL COST SAVINGS	% SAVINGS TO GOVERNMENT
Short absence	4.92	$925	$4,554	**3%**
Full incapacity	1.01	$2,782,597	$2,806,585	**98%**
Fatality	0.40	$2,140,649	$846,707	**96%**
Total	**6.3**		**$3,657,846**	**97%**

DISCUSSION

MATES in Construction is a multi-faceted strategy developed in Australia to address suicide prevention in the workplace.

Although the feasibility, uptake and effectiveness of MATES have been reported earlier, there has been no consideration of the potential impact of the program in terms of averting harm or saving dollars. The purpose of this study has been to quantify the economic cost of suicide and suicide behaviour among NSW construction industry workers and to examine the potential human and economic impact of introducing MATES into the NSW construction industry.

In undertaking this analysis a range of data, assumptions and methods were used. The focus has been on the human cost of suicide and suicide behaviour to the construction industry. It has not considered the wider implications to the Industry in terms of damage to property, loss of company image or the considerable investment the Industry makes complying with work health and safety regulations.

The analysis relied on the best available evidence and used the gold standard NCIS data to identify fatalities by suicide in the construction industry. Data were, however, available for males only. Although males represent the majority of construction workers and have higher rates of suicide than females, the results will, nevertheless, be an underestimate of the true cost of suicide and suicide behaviour and the potential impact of MATES. National standards were used to classify construction industry workers with a focus on technicians, tradesmen, machine operators, drivers and labourers. However, these standards are not perfect and when matched with NCIS, certain construction-related employees such as managers and/or other professionals were omitted.

As highlighted in the Safe Work Australia study,[28] economic costing is not an exact science. Cost estimates depend on the particular costing approaches used, the range of cost components that can be estimated, the quality of available data and the value of key parameters. Assumptions relating to the values of key parameters in this study have been chosen to be deliberately conservative. This study has closely followed the methodology adopted by Safe Work Australia which had been endorsed by the National Occupational Health and Safety Commission.[28] However, certain methodological variations were required to suit this study and to add value to the Safe Work Australia report. For example, this analysis included postvention costs associated with suicide bereavement and counselling. Evidence suggest that postvention costs are significant to both the community and the industry and failure to include these costs would underestimate any cost estimate.[7, 8, 41]

Conversely, we have not attempted to estimate the costs saved by the transfer of knowledge from the employee, learning workplace safety tools at work, and then applying them to family and friends outside of work. The ripple effects of other suicide gatekeeper programs like MATES have shown that for each person trained another five people have conversations with that trainee and learn about best practices in suicide intervention. This transfer on knowledge then increases the potential that costs of lives lost outside of work are saved, similar to the dissemination of CPR skills taught at work and applied in community. Further, no attempt was made to estimate the costs saved through the rehabilitation of emerging mental health conditions identified by trained MATES workers. While the individuals who were identified and referred for help by trained co-workers may not have been at risk for suicide, the progression of their mental health condition may have affected other absenteeism and presenteeism costs. The costs of the treatment for early identified mental health challenges is certainly less that the costs of lost productivity and life from untreated and progressive suicidal intensity.

World Health Organisation guidance on the relationship between suicide and suicide behaviour has been used to identify the relationship between fatality by suicide, self-harm resulting in full incapacity and self-harm resulting in only a short absence from work.[1] These relationships have also been supported by Suicide Prevention Australia[8] and evidence from the Australian National Survey of Mental Health and Wellbeing.[3]

Data from the United States suggests that this relationship is closer to 25:1 (not 15:1 as used in this analysis). Where appropriate we have matched severity of injury using categories developed by Safe Work Australia using National compensation data.[28, 40] This analysis, however, used three out of the five possible categories excluding long absence and partial incapacity. Our assumption that the majority of self-harm cases return to work after a short absence may underestimate the true prevalence of self-harm incidents that belong in either of these other two categories, hence underestimating the true cost of suicide behaviour to the construction industry.

Our costing methodology, consistent with the Safe Work Australia approach,[28] adopts an incidence based approach. The incidence based approach is more appropriate for comparative economic analyses. The alternative prevalence based approach assesses the number of people within the system at a given point in time, regardless of when the injury occurred. Under this approach, costs are generally allocated in a top-down manner, where total expenditures for a given year are proportioned across the identified categories of injury or illness.[45] While the prevalence approach to measuring total cases would provide the best estimate of total costs, since costs would be estimated over the total number of cases currently in the system at a given point during the reference year, it is difficult to obtain accurate prevalence data relating to occupational injury. Using inaccurate or incomplete prevalence data is likely to result in an underestimate of the number of cases and therefore produce an underestimate of total costs.[28]

The analysis to model the potential effectiveness of MATES on fatalities by suicide relied on a method applied in evaluating the US Air Force suicide prevention program. A relative risk ratio (RRR) was derived by examining risk of suicide pre and post MATES periods. NCIS data were available for the QLD construction industry for the period 2001-2012. Given MATES commenced in QLD in 2008, the pre-MATES period is defined as 2003-2008 and the post-MATES period defined as 2008-2012. A counterfactual was developed that examined estimated fatality by suicide post-MATES period using pre-MATES period risk rate. The difference between expected and the counterfactual provides an estimate of the reduction in number of suicide cases in the post-MATES period. These rates were further adjusted for the average penetration of MATES activities into the construction industry workforce over the pre-MATES period. For NSW, certain assumptions were required to estimate expected and counterfactual fatalities by suicide in the post-MATES period. Rates of penetration were varied in the sensitivity analysis to test the robustness of results to variations in industry exposure to MATES activities.

"Each incident involving a short-term absence is estimated to cost $925; each self-harm attempt resulting in full incapacity is estimated to cost $2.74 million; and each suicide resulting in a fatality is estimated to cost $2.14 million."

DISCUSSION

In spite of these methodological challenges the results provide a conservative assessment of the cost associated with suicide and suicide behaviour in the NSW construction industry for the year 2010. Each incident involving a short-term absence is estimated to cost $925; each self-harm attempt resulting in full incapacity is estimated to cost $2.74 million; and each suicide resulting in a fatality is estimated to cost $2.14 million. The average age of each suicide is estimated at 37.7 years in NSW equating to a loss of 27.3 years in potential productive employment. Multiplying these estimates with the number of self-harm and suicide incidents results in a cost of $490 million with 98% of this cost borne by the Government. Using a different methodology, KPMG estimated the economic cost of suicide in NSW at $451 million.[9]

The results of the analysis lend support to the potential effectiveness of MATES in reducing the harm and cost of suicide and suicide behaviour among NSW construction industry workers. Taking a conservative approach, the modelling suggest a potential reduction in fatality by suicide, as a consequence of MATES, to be 1.98 suicides over the five-year period equivalent to 0.4 suicides each year. This equates to averting 1.01 self-harm attempts ending in full incapacity and 4.92 self-harm attempts ending in a short absence from work. The potential economic benefit of averting this harm is quantified at $3.66 million each year. The majority of benefits are estimated to flow to the government with a saving of $3.56 million each year. If the budget for rolling out the MATES program in NSW is $800,000 each year, the benefit cost ratio is equivalent to 4.6:1 representing a positive economic investment of public funds.

According to the World Health Organisation and Suicide Prevention Australia, suicide is mostly preventable yet significant gaps exist in our understanding of the relationship between work and suicide thereby limiting prevention efforts.[1, 8] As a serious public health problem it demands our attention, but its prevention and control, unfortunately, are no easy task. Research indicates that the prevention of suicide, while feasible, involves a whole series of activities with appropriate dissemination of information and awareness essential elements.

"Suicide is mostly preventably yet significant gaps exist in our understanding of the relationship between work and suicide thereby limiting prevention efforts."

CONCLUSION

MATES is a feasible, affordable, and acceptable workplace strategy that addresses suicide in the workplace. The program seeks to exploit the fact that most people who intend to suicide would rather live than die, but simply find it impossible to manage the pain they are in. Through appropriate training, MATES helps workers identify the behavioural signals exhibited by a suicidal worker and helps provide the support structure needed to get the worker through difficult times. MATES works towards changing the culture within the industry to make it more acceptable to discuss personal issues at work. This analysis suggests that MATES can save lives at the same time as saving scarce resources. It represents a positive economic investment into workplace safety in the NSW construction industry.

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APPENDIX 1:

INDUSTRY AND OCCUPATIONAL DEFINITIONS

INDUSTRY DEFINITION

Source: *ABS (2006). Australian and New Zealand Standard Industrial Classification (ANZSIC). Canberra: ABS.*

The Construction Division (E) includes units mainly engaged in the construction of buildings and other structures, additions, alterations, reconstruction, installation, and maintenance and repairs of buildings and other structures.

Units engaged in demolition or wrecking of buildings and other structures, and clearing of building sites are included in Division E Construction. It also includes units engaged in blasting, test drilling, landfill, levelling, earthmoving, excavating, land drainage and other land preparation.

The industries within this division have been defined on the basis of their unique production processes. As with all industries, the production processes are distinguished by their use of specialised human resources and specialised physical capital. Construction activities are generally administered or managed at a relatively fixed place of business, but the actual construction work is performed at one or more different project sites.

This section contains the following subsection :

- Subdivision 30 Building Construction
- Subdivision 31 Heavy and Civil Engineering Construction
- Subdivision 32 Construction Services

OCCUPATIONS WE INCLUDED IN CONSTRUCTION (PER INDUSTRY CODING)

1. Building Construction (residential and non-residential building construction)
   - House construction, alteration or renovation
2. Heavy and Civil Engineering Construction, e.g:
   - Construction of roads, bridges, railway tracks, mine sites, dams, swimming pools
   - Structural steel construction workers 8217 (eg rigger, scaffolder)
   - Structural steel trades, e.g. metal fabricators, boiler makers, welders.
3. Construction Services
   - Land development and site preparation, e.g:
     – Earthmoving, excavating
   - Building structure services, e.g:
     – Concreting
     – Bricklaying
     – Roofing
     – Structural steel erection services eg metal storage tank or silo erection, reinforcing steel erection, welding, truss or joist work on construction projects
   - Building installation services
     – Plumbing services (including roof plumber)
     – Electrical services eg light, wiring and cable installation
     – Repair and maintenance of electrical wiring (note: repairing electrical appliances is not included in construction industry)
     – Air conditioning and heating services

(e.g. air conditioning duct work installation)
  - Fire and security alarm installation services (e.g. fire alarm system, fire sprinkler, closed circuit video surveillance system installation, repair and maintenance of fire or security alarm systems)
  - Other building installation services (e.g. installing curtains, lifts, insulation material)
- Building completion services
  - Plastering
  - Carpenter (eg wooden flooring installation, cabinet making - on site fabrication)
  - Tiling and carpeting eg floor sanding and polishing
  - Painting and decorating
  - Glazing
- Other construction services e.g. landscape construction services
  - Brick paving
  - Pool fencing
- Construction machinery operator eg
  - Crane driver (coded under Crane, Hoist and Lift Operators)
- Other construction services (not elsewhere classified)
  - Waterproofing of building (coded under Insulation and Home Improvement Installers)

OCCUPATIONS EXCLUDED FROM CONSTRUCTION

- Any level 1 (manager) occupations e.g. Construction manager (1331). We did not include these under construction, as their skills were considered general managerial skills not necessarily specific to construction.
- Architects and building consultancy services were not included in construction as their skills fit more into the professional group (Division M 692) Architectural, Engineering and Technical Services.
- Building operation jobs: e.g. facilities manager, building manager, Building operations manager, Building Services Coordinator
- Council workers
- Building materials suppliers
- Jobs in the manufacturing industry e.g. Fitters, Turners
- Jobs in Mining e.g. Driller, Miner 7122, mining labourers 821
- Boat or other vehicle builders
- Sand blasting or steam cleaning of building exteriors
- Landscaper (coded as Gardeners 3622)

OCCUPATIONS IN THE FOLLOWING AREAS HAVE BEEN INCLUDED IN CONSTRUCTION: (DRAWN FROM OCCUPATIONAL GROUPS 3, 7 AND 8):
Source: *ABS (2013). Australian and New Zealand Standard Classification of Occupations. Cat. No. 1220.0. Canberra: ABS.*

GROUP 3: TRADES AND TECHNICIANS

- This group comprises of skilled construction/plumbers/floor etc tradespersons
- Builders (without more information) have been coded as 3 Trades and technicians (Note: these people were originally coded in level 1 but were later recoded into the general level 3 category)
- Construction trades workers without more information - coded as 33
- Building and engineering technicians 312 (eg. site supervisor, foreman, estimator, building surveyor, leading hand, building scheduler, Vicroads works manager)
- Set builders (e.g., drama set)- code as carpenter 331212 (from ABS)
- Patio builder or patio installer– code as wall and floor tiler
- Brick cleaner / brick cutter – code as ABS Bricklayer (331111)
- Renderers – code as plasterer
- Building planner/designer – coded as Architectural Draftsperson 312111 as they may not be a qualified architect in professionals category.
- Linesman / electrical lineman have been included in construction as they are classified by ABS as an Electrical distribution trades worker, who prepare, install, repair, maintain and patrol electric power distribution networks. These task are part of Heavy and Civil Engineering Construction.

Foreman

- If no other information, code Foreman in ANZSCO 3. These occupations are usually in construction.
- A **construction foreman** is the worker or tradesman who is in charge of a construction crew. Normally the **foreman** is a construction worker with many years of experience in a particular trade who is charged with organizing

the overall construction of a particular project. Typically the foreman is a person with specialist knowledge of a given trade who has moved into the position and is now focused on an overall management of all trades rather than any particular specialized group.

- Foremen are best understood as Project Managers who have come to that position after experience as a construction worker, as opposed to an individual who has followed a professional project management development program.
- Specifically, a foreman may train employees under his or her supervision, ensure appropriate use of equipment by employees, communicate progress on the project to a supervisor and maintain the employee schedule. Foremen may also aRRRange for materials to be at the construction site and evaluate plans for each construction job.

Roof related jobs

- Roof Tiler includes the following: - Roofer, roof builder, roof maintenance contractor, roof and gutter installer, roof renovator, roof repairer, roof restorer, roofing company, roofing contractor
- Roof carpenter - coded as carpenter 331212

GROUP 7: MACHINERY OPERATORS AND DRIVERS

- Coded the following as earthmoving plant operators 7212:
  - Earthmoving Contractor
  - Proprietor earth moving co.
- Asphalt contractor and asphalter coded as Paving Plant Operator 721913
- Asphalt worker coded as Paving and Surfacing Labourer 821511 – "worker" in the title may suggest lower skilled job, we don't know so code down.

GROUP 8: UNSKILLED LABOURERS

- Construction self-employed coded as 821
- Concrete Cutter – coded as Concreter 821211
- Marina Construction – coded as Structural Steel Construction Workers 8217 – included in construction group
- Building maintenance e.g. Handyman, Building Maintenance Supervisor, Building supervisor have been included in construction

OTHER CODING NOTES

If occupation is non-specific and could fit into numerous skill level categories, code down. i.e., 'construction' – code down to at least as 821 (assume they are not a construction manager)

- Include 'labourers' (code as 8) and tradesman/tradesperson (code as 3) without further job information in the construction group.
- Code all contractors and sub-contractors in trade they are in, e.g. painting contractor coded as painter, contractor with Austin Cranes coded as crane operator
- Code the following as Bricklayers, Carpenters and Joiners 331:
  - Apprentice builder
  - Builder/painter
  - Builder/construction
  - Self-employed builder
  - Sub contactor builder
- Code Builder/carpenter as carpenter 331212
- Builder/carpenter's labourer – coded as Builder's Labourer 821111

APPENDIX 2:

SUMMARY OF KEY PARAMETERS USED IN COSTING ANALYSIS

ITEM	DESCRIPTION	SOURCE
Production disturbance costs (time off work/overtime)	Average weekly earnings (AWE) x average duration of absence (by severity category); AWE x average duration of absence x 0.4	ABS Cat. no. 63100TS0002 (Employee earnings - : males / construction industry); Safe work Australia report
Staff turnover costs	The cost of replacing existing staff affected by work-related incidents (26 weeks of AWE) and training of new staff (2.5 weeks of AWE)	ABS Cat. no. 63100TS0002 (Employee earnings - : males / construction industry)
Human capital costs	For full incapacity or fatality: loss of earnings from time of injury to retirement age (i.e., <65years), discount rate = 4.1%, inflation rate = 2.8%, productivity rate = 1.6%. For full incapacity, future earnings includes average social welfare payments received (since these contribute to post- injury income).	ABS Cat. no. 63100TS0002 (Employee earnings - : males / construction industry), RBA cash rate (2008-2014), ABS CPI (2008- 2014), Commonwealth Government Intergenerational Report
Loss of government revenue	For full incapacity or fatality, taxation and other revenue foregone when workers are unable to work due to work-related incidents	ABS Cat. no. 63100TS0002 (Employee earnings - : males / construction industry); ATO estimates of effective taxation rate
Social welfare payments	Sickness and social welfare payments borne by the government for people with disabilities	Department of Human Services (http://www.humanservices.gov.au/customer/s ervices/centrelink/disability-support-pension)
Health and medical costs	Average medical costs from National dataset for compensation-based statistics (disability support pension payments of $700 per fortnight (in 2010 dollars) discounted to present value over the period between the incident and reduced life expectancy	Safe Work Australia report
Admin costs (legal costs)	Legal costs associated with a typical work-related incident	Safe Work Australia report
Admin costs (investigation costs)	Investigation costs: As a proxy for the costs to firms, investigation and inspection costs reported in jurisdictional annual reports are assumed to match the cost to employers for these functions	Safe Work Australia report
Admin costs (travel expenses)	Payments made for travel expenses to workers' compensation jurisdictions by claimants (as a proxy, assuming that compensation is adequate to cover these expenses).	Safe Work Australia report
Admin costs (funeral expenses)	Average funeral costs are estimated at $4,000.	Safe Work Australia report
Transfer costs	The redistribution of public sector resources to care for incapacitated person incurs deadweight costs on society - for every dollar of tax raised, about 28.75 cents is absorbed in the distortions induced and the administration of the tax system)	Access Economics 2009
Other (carers)	For full incapacity, the additional cost of care (estimated applicable disability support pension payments of $2 056 per annum, discounted to present value over the period between the incident and reduced life expectancy)	Safe Work Australia report
Other (aids, equipment and modifications)	For full incapacity cases only, the present value of future costs for aids and modifications (Estimated applicable disability support pension payments of $646 per annum, discounted to present value over the period between the incident and reduced life expectancy).	Safe Work Australia report
Other (postvention)	Cost associated with bereavement for 6 family / friends - estimated at $14,058 per person; employer cost associated with providing counselling and time off work for 3 colleagues who may have witnessed fatality - estimated at $10,000 from time of incident to return to full duties	Multiplier effect for 6 people by Corso et al (2007), average social cost of bereavement by Comans et al (2013)

"MATES saves lives and saves money. It is a positive economic investment in workplace safety in the NSW construction industry."

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