

# The economic cost of suicide and non-fatal suicide behaviour to the New Zealand construction industry and the impact of **MATES in Construction** in reducing this cost

A report conducted for **MATES in Construction** New Zealand by Central Queensland University.



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## ABSTRACT

Suicidal behaviour has gained recognition worldwide as a significant public health problem. While being employed is associated with a reduced risk of suicide overall, suicide rates are differentially distributed across industry and occupational groups. In Aotearoa/New Zealand (NZ), for example, the age-standardised rate of suicide in the general population at 10.6 per 100,000 people compares to a rate of 19.7 per 100,000 in male construction industry workers. Despite the high prevalence, the cost and prevention of such behaviour have not been adequately addressed in society or the workforce.

This study draws on empirical evidence and a validated costing methodology to provide a first attempt at the economic and social cost of suicide and non-fatal suicide behaviour to the NZ construction industry and estimate the impact of MATES in Construction NZ (MATES) in reducing this cost.

In 2023, 80 construction industry workers lost their lives to suspected suicide, with a further estimated 1,628 workers requiring time off work due to a self-harming incident. The average age of death was 37 years, equating to a loss of 43 years of life and 28 years of productive life. The cost of this avoidable burden and impact is enormous and is estimated at close to \$1.14 billion (expressed in 2022 NZ dollars).

The MATES program effectively transforms the knowledge, attitudes, and behaviours of construction industry workers. This study conservatively estimates that the program saves at least one worker's life each year, generating \$14.2 million in savings to society. The potential return on investment is equivalent to 1:4.42. For every \$1 invested in MATES, a return of \$4.42 is achieved. Sensitivity analyses confirmed the robustness of these results to changes in key parameters. This is a conservative figure as MATES engagement data shows substantial demand for its interventions, suggesting that the number of lives saved is likely greater than one per year. This indicates an even higher return on investment.

More needs to be done to reduce and prevent the avoidable harm of suicide in NZ's construction industry. Effective, evidence-based, and appropriately resourced workplace suicide prevention initiatives such as the MATES program offer a viable solution. The MATES program is a practical, cost-effective, and well-received workplace strategy for addressing suicide. This analysis indicates that MATES not only saves lives and strengthens families/whānau but also enhances productivity and reduces the economic burden of suicidal behaviour. It represents a valuable investment in workplace safety for NZ's construction industry.

Keywords: Suicide, suicidal behaviour, cost, Aotearoa New Zealand, MATES in Construction, construction industry.



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## KEY FINDINGS: EXECUTIVE SUMMARY

*Background:* Suicide is a significant issue in the NZ construction industry, and contemporary data indicate an increasing trend of death by suicide among construction industry workers<sup>29</sup>. A limited number of studies have examined the economic loss and burden of suicide and non-fatal suicide behaviour<sup>16-25</sup>. While understanding and quantifying the true impact of suicidal behaviour is complex, quantifying the economic cost can help raise awareness and inform and support funding for preventive actions.

*Study aim:* The objective of this inaugural study is to draw on empirical research and a validated costing methodology to estimate the economic cost of suicidal behaviour to the NZ construction industry, including insight into the social cost of suicide and estimates of the impact of MATES in reducing this cost.

*Cost of Suicidal Behaviour:* In 2023, the construction industry experienced 80 suspected suicides, and an estimated 1,628 workers required time off due to self-harming incidents. **The total avoidable annual economic and social impact of suicidal behaviour in the industry is estimated at \$1.135 billion** (in 2022 NZ dollars).

*Economic Benefit of MATES:* **The MATES program demonstrates a positive economic impact, with \$14.2 million in costs avoided each year.**

*Return On Investment (ROI):* **The conservative ROI for MATES is 1:4.42, meaning that for every dollar invested, the benefit gained is \$4.42.**

*Higher Potential ROI:* MATES NZ is still a relatively young initiative, and it takes time to penetrate the market and workforce fully. However, with additional funding to expand its capacity and reach within the construction industry, the program will likely yield an even higher return on investment. This expansion would enhance MATES' ability to support more workers, ultimately leading to greater mental health and well-being improvements across the sector.

*Need for Action:* The burden and impact of suicide and non-fatal suicide behaviour in the construction industry are avoidable. More needs to be done to reduce and avert this harm.

*Practical Solutions:* Evidence-based, well-resourced workplace suicide prevention initiatives like MATES are a viable and effective solution to address these issues.



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## ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

ASIST	Applied Suicide Intervention Skills Training provided by LivingWorks. ASIST Training equips individuals to develop safe plans for workers at critical risk. These workers can be compared to the first aid officer on site.
Case Management	MATES team of registered counsellors and social workers provides direct assistance to workers in need.
Connector	Connector Training is provided to individuals on site who volunteer to become a Connector. A Connector is trained to help keep someone in crisis safe while at the same time connecting them to professional help. Although the optimum number of connectors is 1 in 20 (5%), it is about ensuring adequate coverage across the site and crews.
GAT	General Awareness Training (GAT) is delivered to at least 80% of workers on-site at a time and place convenient to the contractors. GAT helps to introduce workers to the nature of the problem of suicide and provides practical guidance as to how they can assist someone not travelling well.
Postvention Care	Postvention is psychological first aid, crisis intervention, and other support offered after a suicide to affected individuals or the workplace as a whole to alleviate possible adverse effects of the event.
Suicide literacy	Knowledge and understanding of risk factors, indications, intervention strategies, and available resources related to suicide aimed at effectively recognising and addressing potential risks
Supportline	A 24/7 MATES phone service available for immediate help and crisis intervention.



## INTRODUCTION

Suicide and non-fatal suicide behaviour are significant problems faced by most countries<sup>1</sup>. A suicide is a deliberate act of self-harm taken with the expectation that it will be fatal<sup>2</sup>. A suicide attempt is a non-fatal act of self-harm, often to seek help for unbearable psychological distress<sup>2</sup>. Estimates of the number of people who attempt suicide (a subset of the number of people who intentionally self-harm) vary widely. Most estimates suggest that for every death by suicide, there are a total of between 10 and 30 suicide attempts and that 15-25% of people who attempt suicide will re-attempt<sup>1</sup>.

Suicidal behaviour has gained recognition worldwide as a significant public health problem, with over 700,000 people taking their own lives each year<sup>1</sup>. In the 2022/23 financial year, there were 565 suspected self-inflicted deaths in NZ<sup>3</sup>. The age-standardised rate of suspected self-inflicted deaths was 10.6 (95% CI: 9.7, 11.5) per 100,000 population. Suicide rates for Māori are consistently higher than those for non-Māori; rates for Māori males are 1.9 times higher than that of non-Māori males, and rates for Māori females are about 1.8 times that of non-Māori females<sup>3</sup>. Most deaths by suicide are among people of working age, with suicide being the leading cause of death for the 20-24 years old age group<sup>3</sup>.

A death by suicide has a flow-on effect, impacting the lives of any number of individuals, from immediate family and whānau (extended family) to friends, colleagues, clinicians, first responders, coronial staff, volunteers of bereavement support services and other associates who experience grief and who may also suffer intense and conflicted emotional distress in response to a death of this kind<sup>4,5</sup>. Some survivors of suicide loss may also experience complicated, traumatic, or prolonged grief, which puts them at higher risk of experiencing depression, suicidal ideation, impaired work, and social adjustment<sup>6-8</sup>. The combination of grief, guilt, and remorse can remain for years, and potentially, three to four generations can experience the negative impact of the bereavement<sup>1,5</sup>.

An emerging area of interest in suicide research is the impact of employment status and industry on rates of suicide<sup>9-13</sup>. A recent NZ review identified approximately 12% of suicides were work-related, 86% of work-related suicides involved stressors related to work, and 22% of work-related suicides used means related to work, with 10% occurring in the person's workplace<sup>14</sup>. While being employed is associated with a reduced risk of suicide overall, recent evidence suggests suicide rates are differentially distributed across industry and occupational groups. A 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<sup>13</sup>. 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<sup>15</sup>.

A limited number of studies have examined the economic loss and burden of suicide and non-fatal suicide behaviour<sup>16-25</sup>. The NZ Ministry of Health commissioned O'Dea and Tucker (2005) to report on the cost of suicide to society<sup>19</sup>. The authors valued direct, indirect, and intangible costs and generated an overall economic cost of \$238.53 million (direct and indirect) and a non-economic cost (intangible) at \$1.38 billion (expressed in 2002 dollars)<sup>26</sup>. Recent work by the Australian Productivity Commission estimated the total costs (direct, indirect, and intangible) of suicidal behaviour at \$30.5 billion per annum<sup>18</sup>. While understanding and quantifying the true impact of suicidal behaviour is complex, quantifying the economic cost can help raise awareness and inform





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and support funding for preventive actions<sup>27</sup>. The objective of this inaugural study is to draw on the empirical research and a validated costing methodology to estimate the economic cost of suicidal behaviour to the NZ construction industry, including insight into the social cost of suicide, and estimate the impact of MATES in Construction (MATES) in reducing this cost.







## MATERIALS AND METHODS

### Rates of suicide

Jenkin and Atkinson (2021) recently examined construction industry suicides in NZ<sup>28</sup>. For the financial years from 2007/09 to 2018/2019, there were 583 confirmed cases of suicide amongst those employed in the construction industry at the time of death (Table 1). Although fewer cases for the years 2017-2019 were closed and available for review at the time of Jenkin and Atkinson's study, the construction industry suicides as a proportion of all suicides amongst those employed ranged from 17.3% for 2010-11 to 29.7% for 2018/2019.

Table 1: Construction industry suicides compared with all suicides total, 2017-08 to 2018-19

NCIS employed at the time of death	In construction				All employed	
	YES		NO		N	%
	N	%	N	%		
<b>Closed cases</b>	583	22.9	1959	77.1	2542	100.0
2007/08	56	24.6	172	75.4	228	100.0
2008/09	60	28.2	153	71.8	213	100.0
2009/10	49	22.4	170	77.6	219	100.0
2010/11	35	17.3	167	82.7	202	100.0
2011/12	39	18.5	172	81.5	211	100.0
2012/13	53	25.0	159	75.0	212	100.0
2013/14	44	19.9	177	80.1	221	100.0
2014/15	56	23.0	187	77.0	243	100.0
2015/16	51	21.3	189	78.8	240	100.0
2016/17	65	27.8	169	72.2	234	100.0
2017/18	37	19.4	154	80.6	191	100.0
2018/19	38	29.7	90	70.3	128	100.0

### Age-standardised suicide rates

According to Jenkin and Atkinson (2021), the absolute numbers of suicides were too low to do a time trend of yearly or three-yearly rates<sup>28</sup>. Table 2 provides information on age-standardised rates of suicide (2007-2019) for construction industry workers compared to those working outside of the construction industry. Age-standardised rates overall for men working in the construction industry for 2007-2019 were 19.71 per 100,000 people (95% CI, 18.09-21.33) compared to 14.44 per 100,000 for men working outside of the construction industry (95% CI, 13.71-15.17). This was a statistically significant difference – the rate ratio was 1.36 (95% CI, 1.24-1.50, P <.0001).



Table 2: Age-adjusted rates of suicide (2007-2019)

			Deaths	Person Years	Crude Rate	Std Rate	95% CL	Prob
All	All occupations combined	Yes	583	3,488,531	16.71	10.67	(9.73-11.60)	.
		No	1,959	21,810,460	8.98	9.18	(8.77-9.59)	.
		Ratio	.	.	.	1.16	(1.05-1.28)	0.0027
Male	All occupations combined	Yes	571	2,819,988	20.25	19.71	(18.09-21.33)	.
		No	1,511	10,468,260	14.43	14.44	(13.71-15.17)	.
		Ratio	.	.	.	1.36	(1.24-1.50)	<.0001
Female	All occupations combined	Yes	12	668,543	1.79	1.62	(0.70-2.55)	.
		No	448	11,342,200	3.95	3.92	(3.55-4.28)	.
		Ratio	.	.	.	0.41	(0.23-0.74)	0.0028

### Contemporary suicide numbers

A specific request under the Official Information Act 1982 was made by MATES to the NZ Ministry of Justice for contemporary data regarding suicides and suspected suicides in the construction industry. Data was extracted from the Coroner’s Court case management system in March 2024 using the same occupational coding system as that of Jenkin and Atkinson (2021). Information received identifies that the number of cases recorded as a result of suspected or confirmed suicide/ intentional self-harm in the construction industry was 38 in 2019, 61 in 2020, 79 in 2021, 77 in 2022, and 80 in 2023<sup>29</sup>. The custodian noted that 2019 is a partial year covering 1 July to 31 December, identical to the Table 1 estimate provided for 2018-19. These contemporary data indicate an increasing trend of death by suicide among construction industry workers.

### Costing methodology

The costing approach used in this analysis relied on a methodology developed in Australia<sup>30, 31</sup> and applied in several costing studies<sup>18, 21, 32-35</sup>. The analysis identifies direct and indirect costs for a range of economic agents (including employers, workers, and society) segregated by severity. The current analysis introduces a non-economic category that attempts to consider the community value of a lost life, commonly referred to as intangible costs. This category has been included in



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several costing studies, including the only previous attempt to cost suicidal behaviour in NZ<sup>18, 19, 32</sup>. An Australian costing approach was selected due to the lack of a comparable, robust methodology in NZ.

### *Levels of severity of work-related incidents*

The current NZ analysis considers four levels of severity corresponding to recent work by the Australian Bureau of Statistics in reporting work-related injury and illness<sup>36</sup>: short absence from work, long absence and return to work, long absence and no return to work, and fatality. In deriving estimates of suicidal behaviour, data from the 2020-21 Australian Study on Mental Health and Wellbeing supports an estimate of 20.35 suicide attempts for every fatality<sup>37</sup>. Data from the Safe Work Australia injury reports indicate that 63.1% of workplace injuries result in a short absence<sup>32, 33</sup>, suggesting that 36.9% are for long absence. The 2021 Australian Return to Work Survey suggests that the return to work rate for those workers with a probable serious mental illness was 70.9% (compared with the national average of 91.6%<sup>38</sup>). The current analysis assumes that for every fatality, there are 20.35 attempts, with 63.1% resulting in a short absence, 26.2% resulting in a long absence with return to work, and 10.7% resulting in a long absence with no return to work.

### *Conceptual cost categories*

Seven cost groups are used to derive cost estimates: production disturbance costs, human capital costs, medical costs, administrative costs, transfer costs, other costs, and the community value of life (Table 3). Appendix A provides a summary of methods used in the costing analysis. Appendix B summarises key parameters used in the analysis by severity.

#### *Production disturbance costs*

Production disturbance costs reflect short-term impacts until production is returned to pre-incident levels and includes the cost of overtime and overemployment, employer excess payments, staff turnover costs, and staff training and retraining costs. The cost of overtime and overemployment is the proportion of overtime totally related to work-related injuries and the wages of workers that would not be required if there were no work-related injuries. It is estimated by combining average weekly earnings (AWEs)<sup>39</sup> by duration of absence by severity and then multiplied by 0.4. Workers who incur injuries resulting in a long absence with no return to work are assumed to be replaced after 26 weeks, consistent with turnover and recruitment costs. Employer excess payments represent the portion of costs of a claim requiring payment by the employer before workers' compensation provisions begin. Employer excess payments are estimated as average daily earnings multiplied by the average of the excess period of 3.3 days. Employer excess payments are applied to long absences and fatalities. Staff turnover costs are the costs to the employer associated with hiring new employees to replace injured or absent workers. This includes advertising costs, and the costs associated with time spent in the recruitment process. Turnover and recruitment costs are estimated to be equal in value to 26 weeks at AWE. Staff training and retraining costs are the costs to the employer associated with training existing staff and retraining new staff. Staff training and retraining costs in the event of full incapacity or a fatality is equivalent to 2.5 weeks of AWE.

#### *Human capital costs*

Human capital costs are long-run costs occurring after restoration of pre-incident production and include loss of future earnings, loss of government revenue, and social welfare payments for lost earning capacity. This analysis uses the human capital approach to value loss of future earnings



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for full incapacity and fatality, wherein loss of earnings from time of injury to retirement age (65 years) are calculated assuming a discount profile and productivity loss. Although there is no official retirement age in NZ, the common age to retire is 65 years, when NZ Superannuation and several other pension payments start<sup>40</sup>. For full incapacity, future earnings can also include average social welfare payments received (since these contribute to post-injury income). Workers are assumed to increase productivity (through experience and job knowledge) at the rate of 1.3% per annum (average over the period 1996-2022)<sup>41</sup>. This figure is used in conjunction with the official cash rate (3.83% average over the period 1999-2022)<sup>42</sup> and inflation rate (2.3% average over the period 1990-2022)<sup>43</sup> to determine the present value of future income streams. Loss of government revenue reflects the tax losses due to foregone income and is valued using the marginal tax rate appropriate to the AWE (i.e., 33%)<sup>44</sup>. Future earnings for full incapacity cases also include the average social welfare payments received in the form of supported living payment (\$327.02 per week per person for a couple) since these contribute to post-injury income<sup>45</sup>.

#### *Medical costs*

Medical costs are costs incurred through medical treatment of workers injured in work-related incidents. Medical costs by severity are estimated at \$949 for a short absence, \$9,250 for a long absence with return to work, \$14,480 for a long absence with no return to work and \$2,811 per fatality<sup>33, 46, 47</sup>. In all work-related incidents involving medical care, it is assumed that the employer covers the first \$578, with workers contributing 15% of the difference and the government covering the remainder. Although the relative contributions by workers and the government may vary according to private insurance arrangements, the total cost will not.

#### *Administrative costs*

Administrative costs included in this analysis include investigation costs, legal fines and penalties, travel expenses, and funeral costs. Investigation costs refer to the expenses incurred during the investigation of an incident, as well as the administrative costs associated with collecting and reporting information on work-related incidents. Investigation costs by severity are estimated at \$32 per short absence, \$786 for a long absence with a return to work, \$2,747 for a long absence with no return to work, and \$3,286 per fatality<sup>33, 46, 47</sup>. Legal fines and penalties are costs associated with successful prosecutions associated with proceedings initiated by workers' compensation authorities due to serious work-related incidents. The average legal fine per conviction is \$115,698 and the prosecution rate is assumed to be 3% of incidents for full incapacity and fatality (cost equivalent to \$3,471<sup>46</sup>). Travel costs represent expenses for travel to doctors, rehabilitation centres, solicitors, etc. Travel costs are estimated at \$6 per short absence; \$107 for a long absence with return to work, \$301 for a long absence with no return to work and \$220 per fatality<sup>33, 46, 47</sup>. 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 fully incapacitated workers. The average NZ funeral costs are estimated at around \$10,000, but it can be much more or less depending on the arrangements<sup>48</sup>. It is acknowledged that funeral or tangi (Māori ceremony for mourning someone who has died) costs will vary by cultural or religious beliefs and can be a lot higher for Māori as there can be hundreds who attend with the cost to bring the body home to the marae an additional \$3,000 - \$5,000. A conservative estimate of \$10,000 has been applied. While funeral expenses may be associated with all deaths, fatality by suicide brings these costs forward.





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### *Other costs*

Other costs are costs not classified in other areas and include the cost of carers, aids/modifications for full incapacity cases, and the cost of bereavement and postvention services for fatalities. Work and Income NZ provides a Supported Living Payment (\$327.02 per week per person for a couple without children)<sup>45</sup>. The NZ Ministry of Disabled People provides low-cost equipment (any item that costs less than \$50) to support everyday tasks<sup>49</sup>. These payments are discounted to present value terms over the period between the incident and life expectancy. Postvention is psychological first aid, crisis intervention, and other support offered after a suicide to affected individuals or the workplace as a whole to alleviate possible negative effects of the event. A fatality by suicide has a flow-on effect, with research suggesting that each fatality by suicide directly impacts six to twenty people<sup>4</sup>. The economic cost associated with suicide bereavement is estimated at \$15,682 per person multiplied by six people bereaved<sup>46, 47, 50</sup>. The analysis further assumes (based on verbal evidence from an industry source) that each fatality by suicide may be witnessed by, on average, three colleagues who would then require counselling and time off work as part of postvention care. These costs are estimated at \$10,000 per worker from the time of the incident to return to full duties<sup>35</sup>. Although this assumption is in line with other attempts to measure the ripple effects of suicide, it may be considered as conservative as it only considers the impact on workers and not families, whānau, or friends<sup>22, 27</sup>. Further, it does not consider the costs associated with a site shutdown in the event of a fatality or employers' time in dealing with subsequent inquiries.

### *Transfer costs*

Transfer costs refer to the deadweight losses associated with the administration of taxation and welfare payments. Deadweight costs due to inefficiencies incurred through tax loss are estimated at 10.81% of the total net present value of loss of government revenue (i.e., taxation revenue)<sup>32, 33</sup>. Deadweight costs due to inefficiencies incurred by social welfare payments are estimated at 9.75% of welfare payments' total net present value. These proportions are consistent with estimates from NZ Treasury<sup>51</sup>.

### *Non-economic community value of lost life*

The community value of lost life cost is estimated using a 'willingness to pay' approach based on the value of a statistical life. The value of a statistical life is an estimate of the financial value society places on reducing or avoiding the death of one person<sup>52</sup>. By convention, it is assumed to be based on a healthy person living for another 40 years. The community value of lost life is known as a 'statistical' life because it is not any particular person's life. The NZ Ministry of Transport estimated the value of a statistical life at \$4.969 million, adjusted to 2022 dollars<sup>43, 53</sup>.

### *Other methodological considerations*

Consistent with previous costing attempts<sup>22, 35</sup>, the methodology used in this analysis is 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<sup>32, 33</sup>. This is known as the lifetime cost approach, indicating the benefits of reducing work-related incidents. The costs that an injury imposes in future years are discounted to present values (i.e., constant 2022 dollars in this analysis). The lifetime cost approach assumes that the levels and structures of current costs accurately reflect future costs.



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Table 3: Economic cost borne by the employer, worker, and society (including the worker's family/whānau)

<b>Total</b>	<b>Employer (E)</b>	<b>Worker (W)</b>	<b>Society (S)</b>
<b><i>Production disturbance costs</i></b>			
Overtime and overemployment	Overtime premium	Zero	Zero
Employer excess payments	Employer excess payments	Zero	Zero
Staff turnover costs	Staff turnover costs	Zero	Zero
Staff training and retraining costs	Staff training and retraining costs	Zero	Zero
<b><i>Human capital costs</i></b>			
Present value of earnings before incident minus earnings after incident	Zero	Loss of income, net of compensation, welfare and tax	Compensation and welfare payments for lost income earning capacity; tax losses
<b><i>Medical costs</i></b>			
Medical and rehabilitation costs incurred as a result of injury	Threshold medical payments	Gap payments	Medical payments not covered by employer or worker
<b><i>Administrative costs</i></b>			
Investigation costs	Employer investigation costs	Zero	Costs of running the compensation system (including investigation claims)
Legal fines and penalties	Employer fines and penalties	Zero	Zero
Travel costs	Zero	Out-of-pocket expenses	Compensation for travel costs
Funeral/Tangi costs	Zero	Out-of-pocket expenses	Compensation for funeral costs
<b><i>Other</i></b>			
Carers	Zero	Zero	Payments to carers
Aids, equipment, and modifications	Zero	Zero	Reimbursements for aids, equipment, modifications
Postvention	Postvention	Zero	Postvention



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<b>Transfer costs</b>			
Deadweight costs of tax revenue foregone, and social welfare paid	Zero	Zero	Deadweight costs of tax revenue foregone, and social welfare paid
<b>Community value</b>			
Economic cost that society places on value of a life	Zero	Zero	Years of life lost by value of statistical life

## Sensitivity analysis – costing suicide

Sensitivity analyses were undertaken to test the robustness of results to changes in key parameters. The ratio of suicides to suicide attempts (i.e., 1:20.35) was adjusted to 1:15, reflecting the World Health Organisation estimate<sup>1</sup>. The proportion of suicide attempts resulting in full incapacity (i.e., 10.7% of attempts) was reduced by five percentage points (i.e., to 5.7%) to reflect a lower estimate reported by the Australian Productivity Commission<sup>18</sup>. Average Weekly Earnings (SWE) of \$1,404 per week was increased to \$1,518 per week to reflect an average wage across all industries<sup>39</sup>.

## Estimating the effectiveness of MATES in Construction

Since its establishment in NZ, MATES has had substantial uptake in the building and construction sector and has developed an evidence base supporting its effectiveness. Table 5 provides an overview of MATES activities in NZ from 2019-20 to 2022-23. All activities have increased steadily since the commencement of MATES. By 2022-23, an estimated 7.5% of the NZ construction industry workforce had undertaken a suicide prevention General Awareness Training (GAT). Almost 3,500 workers had completed Connector training, and 350 had reached out for support through Case Management.

Previous evaluation research has demonstrated the social validity of the program among construction workers<sup>37</sup>, effectiveness in shifting beliefs around suicide<sup>38,39</sup>, improvements in suicide prevention literacy, and increased intentions among workers to offer help to workmates and to seek help for themselves<sup>38,41-43</sup>. Help-seeking behaviour is reinforced via contact with MATES Case Management. MATES utilises the brokerage model – a brief approach to Case Management in which Case Managers help clients to identify their needs and broker supportive services over a brief contact period<sup>37</sup>. This model assumes that a client in need will voluntarily use the services once they know that they are available and learn how to access them. The brokerage model works best when a client’s biggest challenge is access to services rather than availability of services. In a brokerage case management model, the Case Manager serves as a link between a client and community resources. The focus is on assessing needs, planning a service strategy, and connecting and following up with clients<sup>73</sup>. The brokerage Case Management approach has been shown to be effective in improving depression scores, suicide ideation, and quality of life<sup>74,75</sup>.



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**Table 5: MATES in Construction activities 2019-20 to 2023-24**

Year	Construction industry workforce*	General Awareness Training (GAT)	GAT cumulative	% GAT / workforce	Connector Training	ASIST Training	Case management	Site Visits	Toolbox Talks	Supportline calls***	Postvention****
2019-20	651,169	3,740	3,740	1%	124	32	45	208	31		
2020-21	658,433	15,064	18,804	3%	765	74	172	1,172	280		36
2021-22	663,771	11,492	30,296	5%	583	121	278	2,314	938		32
2022-23	671,472	22,776	53,072	8%	2,373	176	379	1,557	229	1,238	9
2023-24	671,472**	12,097	65,169	10%	1,326	157	427	3,415	342	1,099	10

\*CI = construction industry workforce<sup>72</sup>

\*\* At the time of writing, no updated workforce data was available for 2023-24

\*\*\* No Supportline data is available for 2019/20-2021/22

\*\*\*\* Postvention data for 2019/20 is not available. While the number of postvention incidents is significant, the scale and complexity of each incident can vary greatly, as does the level of resources needed to support affected workers.





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Doran et al. (2021) conducted an in-depth review of MATES (Queensland) Case Management for the period 2010-2018<sup>36</sup>. The aim of the review was to quantify service demand, examine the demographic and occupational profile of clients, and document the presenting issues, referral pathways, and perceived benefit of Case Management among individuals who had used this service. The review found that workers who contacted Case Management felt that their needs and concerns were being appropriately addressed, particularly in relation to suicide ideation<sup>36</sup>.

The current analysis draws on the MATES (Queensland) Case Management database to develop a counterfactual that estimates the number of potential suicides prevented by the intervention of MATES. It is the concept of what would have happened if MATES programs, particularly Case Management, had not been available. Although MATES NZ records Case Management data, MATES Queensland data provides a more extended time series. It takes time for MATES activities to penetrate the industry, and the Queensland data can, therefore, provide a more accurate longer-term understanding of potential impact.

### *Case Management data*

An extract of the MATES (Queensland) Case Management records was analysed. The dataset contained 4,220 Case Management records for 3,759 unique person identifiers, entered between January 2010 and December 2018. Most clients (90.3%) were associated with only one case record, and 0.5% of clients had four or more records, up to a maximum of six<sup>36</sup>.

### *Counterfactual classification*

A tiered system of inclusion criteria was developed to estimate the counterfactuals based on available Case Management data. Variables for suicide risk, a list of issues, and referral information were used. Table 6 describes the relevant information contained in these variables.



**Table 6: Case Management information considered in developing counterfactuals**

Variable	Description	Summary statistics
Providers	The list of providers to which a client was referred for assistance.	3213 records where the client was referred to at least one provider.
Suicide risk	A binary variable indicating whether the client was identified as being at risk of suicide.	245 records.
Suicide related issues	The list of issues for a client included suicide ideation, suicide intervention or suicide attempt.	554 records. (No records included suicide attempt).
Suicide bereavement	The list of issues for a client included suicide bereavement.	38 records.
Mental health	The list of issues for a client included diagnosed or undiagnosed mental health.	337 diagnosed. 131 undiagnosed (includes 6 cases with both diagnosed and undiagnosed).
Number of issues	The number of presenting issues listed for a client.	2105 with more than 1 issue. 1036 with 3 or more issues.

### *Inclusion criteria*

Inclusion criteria were designed to enable analysis of counterfactuals under various assumptions. Categorical criteria separated cases into discrete groups by their nature, such as whether the case was referred to providers. Cumulative criteria were designed to sequentially relax the exclusivity of their rules over a set of seven different profiles. Cases that are included under more stringent criteria are also included under more relaxed criteria, resulting in a cumulative count across profiles for comparison. The criteria are described below, and the full classification scheme is presented in Table 7.

### *Categorical criteria*

- **Referred to at least one provider:** MATES utilise the brokerage model whereby Case Managers connect clients with services rather than provide direct services themselves<sup>73</sup>. As such, a fundamental assumption of the counterfactual based on Case Management data is that the client must have been referred to at least one provider.
- **Suicide risk:** Case Managers' assessment of suicide risk is taken at face value. That is, a client assessed as being at risk of suicide is more likely to die by suicide without intervention than a client assessed as not being at risk. Given the problematic nature of accurate suicide assessment, however, counterfactuals were calculated both for the category of at-risk assessments and for those both with or without the at-risk assessment.

### *Cumulative criteria*

- **Suicide-related issues:** It was assumed that suicide attempts and ideation related to a higher risk of suicide. Case records with "suicide ideation," "suicide intervention," or "suicide attempt" included in the list of presenting issues were assumed to relate to an increased risk of suicide for those clients.
- **Suicide bereavement:** Suicide-related issues were extended to include "suicide bereavement" from the list of presenting issues in this category<sup>4, 5</sup>.
- **Mental health:** It was assumed that mental health issues, when compounded with other



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presenting issues, increased the likelihood of suicide. Case records were included under this criterion for two levels — “diagnosed,” where the list of issues included “Mental health (diagnosed)” as self-reported by the client, and “any,” where the list of issues contained either “Mental health (diagnosed)” as self-reported by the client or “Mental health (undiagnosed)”.

- *Number of issues:* It was assumed that a greater number of presenting issues was related to a higher likelihood of suicide. Case records were included under this criterion at three levels — “three or more,” “more than one,” and “any.” The mode of the frequency distribution for the number of issues among cases assessed as being at risk of suicide that also had at least one suicide-related issue was two. The threshold of “three or more” was set to include cases with more noted issues than was typical of this subset of cases.







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### Classification scheme

Counterfactual profiles A through G describe the sequentially more inclusive criteria. All counterfactuals required that the client be referred to at least one provider and counterfactual profiles were computed separately for cases that were assessed as being at risk of suicide and those where this assessment may or may not have been made.

Table 7: Counterfactual classification scheme

Categorical			Cumulative			
Suicide Risk	Referred to provider(s)	Counterfactual	Suicide-related issues	Include bereavement	Mental health	Number of issues
Yes	Yes	A (most restrictive)	Yes	No	Diagnosed only	> Mode (3+)
		B	Yes	Yes	Diagnosed only	> Mode (3+)
		C	Yes	Yes	Any	> Mode (3+)
		D	Yes	Yes	Any	> 1
		E	Any or none	Any or none	Any	> 1
		F	Any or none	Any or none	Any	Any
		G (most inclusive)	Any or none	Any or none	Any or none	Any
Any	Yes	A (most restrictive)	Yes	No	Diagnosed only	> Mode (3+)
		B	Yes	Yes	Diagnosed only	> Mode (3+)
		C	Yes	Yes	Any	> Mode (3+)
		D	Yes	Yes	Any	> 1
		E	Any or none	Any or none	Any	> 1
		F	Any or none	Any or none	Any	Any
		G (most inclusive)	Any or none	Any or none	Any or none	Any





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### *Application of counterfactuals to suicide counts and rates*

The potential impact of MATES is estimated as the difference between the actual and potential suicide numbers. Type A counterfactuals were added to the suicide counts for males in the NZ construction industry provided by Jenkin and Atkinson<sup>47</sup> to demonstrate what the suicide count would have potentially been had these persons died by suicide. NZ construction industry labour force estimates for males<sup>76</sup> were used to estimate crude suicide rates and counterfactual suicide rates over the period. The analysis relied on males, given that the industry is male-dominated, and males are more likely than females to engage with Case Managers and have higher rates of suicide.

### *Estimating the return on investment of MATES in Construction*

The economic impact of MATES is calculated by comparing the operating costs of MATES with the savings generated through averted suicidal behaviour derived from the counterfactual scenario. MATES NZ operating costs were provided for 2020-21 to 2023-24 and adjusted using appropriate Consumer Price Index (CPI) indices to reflect constant 2022 dollars, consistent with the costing estimates.

## **Sensitivity analysis – return on investment**

Sensitivity analyses were undertaken to test the robustness of results to changes in key parameters. The ratio of suicides to suicide attempts (i.e., 1:20.35) was adjusted to 1:15, reflecting the World Health Organisation estimate<sup>1</sup>. The proportion of suicide attempts resulting in full incapacity (i.e., 10.7% of attempts) was reduced by five percentage points (i.e., to 5.7%). AWE of \$1,404 per week was increased to reflect AWE across all industries (i.e., \$1,518 per week)<sup>56</sup>.

## **Ethics**

Ethical approval to use NCIS data was granted by the Department of Justice and Community Safety Human Research Ethics Committee (JHREC) (Project identification code: CF/21/5112) and the Central Queensland University Human Research Ethics Committees (application reference 22877). The analysis of suicide data relied on a published study<sup>28</sup>.



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## RESULTS

### Cost estimates

Table 8 provides a summary of the average and total cost associated with suicide and non-fatal suicide behaviour in the NZ construction industry by the severity of the injury, expressed in 2022 NZ dollars. The average economic cost per incident is estimated at \$1,088 for a short-term absence, \$25,497 for a long absence with return to work, \$3.09 million for a long absence with no return to work, and \$2.32 million per fatality. Adding the non-economic or intangible value of a statistical life (i.e., \$4.969 million) increases the average cost of a single fatality to \$7.29 million. The key cost driver in average cost estimates for a long absence with no return to work and fatality is the human capital costs associated with loss of income, loss of government revenue, and social welfare payments.

In 2023, there were 80 fatalities by suspected suicide among construction industry workers in NZ<sup>29</sup>. Using an accepted ratio of self-harm attempts to fatality of 20.35 to 1, and based on 80 fatalities, this equates to 1,027 incidents resulting in a short absence, 426 incidents resulting in a long absence with a return to work, and 175 incidents resulting in a long absence with no return to work. Multiplying average costs with incidents of suicidal behaviour results in an economic cost of \$737.54 million expressed in 2022 dollars. Combining the community value of lost life increases the cost to \$1.135 billion.

Varying the proportion of self-harm attempts that resulted in full incapacity from 10.7% to 5.7% had the most significant impact on costs from a baseline of \$1.135 billion to \$884 million. Long absences with no return to work had the highest unit cost of any incident (including fatality). Hence, any reduction in the number of these incidents had a larger-than-average impact on economic cost estimates. Adopting the World Health Organisation estimate of 15 suicide attempts for each fatality reduced the cost from \$1.135 billion to \$990 million. Increasing AWE from \$1,404 to \$1,518 per week had a negligible impact on cost estimates.





Table 8: Average and total annual cost of suicidal behaviour in the New Zealand construction industry, 2022 dollars

	Short absence	Long absence - return to	Long absence - no return to	Fatality	
<b>Average cost</b>					
Production disturbance costs	\$101	\$15,354	\$55,542	\$45,838	
Human capital costs	\$0	\$0	\$2,730,427	\$2,056,173	
Medical costs	\$949	\$9,250	\$14,480	\$2,811	
Administrative costs	\$38.18	\$893.19	\$6,518.43	\$16,976.60	
Other costs	\$0	\$0	\$128,312	\$123,609	
Transfer costs	\$0	\$0	\$151,600	\$73,350	
<b>Total average economic cost</b>	<b>\$1,088</b>	<b>\$25,497</b>	<b>\$3,086,879</b>	<b>\$2,318,757</b>	
Community value	\$0	\$0	\$0	\$4,969,178	
<b>Total average economic and non-economic cost</b>	<b>\$1,088</b>	<b>\$25,497</b>	<b>\$3,086,879</b>	<b>\$7,287,936</b>	
<b>Total costs</b>	<b>Short absence</b>	<b>Long absence - return to</b>	<b>Long absence - no return to</b>	<b>Fatality</b>	<b>Total</b>
Production disturbance costs	\$103,796	\$6,544,840	\$9,717,255	\$3,667,023	\$20,032,915
Human capital costs	\$0	\$0	\$477,695,170	\$164,493,801	\$642,188,971
Medical costs	\$974,140	\$3,942,923	\$2,533,246	\$224,917	\$7,675,226
Administrative costs	\$39,203	\$380,730	\$1,140,416	\$1,358,128	\$2,918,477
Other costs	\$0	\$0	\$22,448,440	\$9,888,728	\$32,337,169
Transfer costs	\$0	\$0	\$26,522,817	\$5,867,987	\$32,390,804
<b>Total economic cost</b>	<b>\$1,117,139</b>	<b>\$10,868,493</b>	<b>\$540,057,344</b>	<b>\$185,500,586</b>	<b>\$737,543,562</b>
Community value	\$0	\$0	\$0	\$397,534,269	\$397,534,269
<b>Total economic and non-economic cost</b>	<b>\$1,117,139</b>	<b>\$10,868,493</b>	<b>\$540,057,344</b>	<b>\$583,034,854</b>	<b>\$1,135,077,830</b>









## Effectiveness of MATES in Construction

### Counterfactual estimates

The counterfactual classification scheme was applied to Case Management data from 2010 to 2018. For each year, duplicate personal identifiers were removed to prevent double-counting clients. However, the same client may appear in different years. Results are presented in Table 9 with counterfactual counts as a percentage of all clients by year presented in Appendix C. The cumulative, inclusive nature of the counterfactual profiles is demonstrated in Appendix D, showing the aggregate number of cases across all years of available data. As highlighted in Table 9, as the classification restrictions are relaxed (i.e., from type A to type G), the number of clients included within each category increases, together with the estimate of counterfactual numbers. For example, in 2018, the most restrictive classification (A) involved six clients, representing 1% of all clients contacting Case Managers in that year; the least restrictive classification (G) involved 487 clients, representing 82.4% of all clients contacting Case Managers in that year.

Table 9: Counterfactual counts based on classification scheme.

Year	Referred to provider(s)	Suicide risk	Counterfactual						
			A	B	C	D	E	F	G
2010	Yes	Yes	1	1	1	1	1	1	11
	Yes	Any	3	3	3	4	12	13	159
2011	Yes	Yes	1	1	1	1	1	1	8
	Yes	Any	4	4	4	4	18	22	264
2012	Yes	Yes	0	0	0	1	1	1	16
	Yes	Any	5	5	5	6	21	27	281
2014	Yes	Yes	1	1	1	1	1	1	13
	Yes	Any	2	2	2	3	10	18	284
2013	Yes	Yes	1	1	1	1	1	1	11
	Yes	Any	2	2	2	2	16	18	256
2015	Yes	Yes	0	0	0	1	1	1	21
	Yes	Any	5	5	5	6	28	38	367
2016	Yes	Yes	1	1	1	2	2	2	22
	Yes	Any	3	3	3	4	13	17	361
2017	Yes	Yes	2	2	2	2	2	2	46
	Yes	Any	8	9	10	10	39	48	472
2018	Yes	Yes	6	6	14	15	18	18	51
	Yes	Any	14	14	42	46	158	171	487

Type A counterfactuals were added to the suicide counts provided by King et al. (2022)<sup>77</sup> to demonstrate what the suicide rate may have been had these persons died by suicide (Table 10). For the period 2010-2017, a total of 334 Queensland construction industry workers lost their lives through suicide, corresponding to an average crude rate of 21.3 per 100,000 workers. Suicide numbers without MATES are estimated at 341, corresponding to an average crude rate of 21.8 per



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100,000 workers. Engagement of at-risk clients through MATES Case Management over the period 2010-2017 is estimated to potentially avert seven fatalities or an average of 0.875 fewer suicides each year. These figures indicate that 0.2% of clients (7 lives saved / 3,497 clients) who engaged with MATES through Case Management between 2010 and 2017 were prevented from dying by suicide.

Although Table 10 reports data for 2010-2018, the counterfactual for 2018 is estimated at six lives saved, considerably higher than previous years. Incorporating 2018 data into the counterfactual estimates results in an average per annum reduction of 1.44 fatalities by suicide, equivalent to one life saved for every 313 case management clients. Given this range, this analysis uses the mid-point of approximately one life saved each year.

**Table 10: Estimates of counterfactual suicide rates for male construction industry workers**

Year	QLD CI workforce	Actual suicides	Crude rate of suicide	Potential suicides without MATES	Potential rate of suicide without MATES
2010	196,793	49	24.9	50	25.4
2011	199,544	63	31.6	64	32.1
2012	192,800	36	18.7	36	18.7
2013	199,365	28	14.0	29	14.5
2014	197,483	30	15.2	31	15.7
2015	181,638	46	25.3	46	25.3
2016	192,851	42	21.8	43	22.3
2017	208,632	40	19.2	42	20.1
2018	203,251	45	22.1	51	25.1

## The return on investment of MATES in Construction

The average annual operating cost of MATES NZ over the period 2020-21 to 2023-24 was \$3.2 million (in constant 2022 dollars). The counterfactual analysis, as explained above, suggests a potential reduction in 1 suicide each year among construction industry workers. This equates to averting 2.2 self-harm attempts ending in a long absence with no return to work, 5.3 self-harm attempts ending in a long absence with return to work, and 12.8 self-harm attempts ending in a short absence from work.

The potential economic benefit of averting this harm is estimated at \$14.21 million, with a potential return on investment equivalent to 1:4.42, representing a positive economic investment of public funds. This means that for every dollar invested in MATES NZ, the benefit gained is \$4.42. Engagement data (see Table 5) suggests that the number of lives saved by MATES NZ is likely higher than just one per year, indicating an even greater ROI.



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## DISCUSSION

The purpose of this inaugural study has been to provide a first attempt at quantifying the economic cost of suicidal behaviour to the NZ construction industry and estimate the impact of MATES in reducing this cost. In undertaking this analysis, a range of data, assumptions, and methods were used. The analysis relied on the latest available evidence that had used NCIS data to identify fatalities by suicide among construction industry workers. As highlighted earlier, attempts to quantify the cost of suicide<sup>12, 20, 50, 51</sup> (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 the National Occupational Health and Safety Commission has endorsed<sup>49</sup>. However, certain methodological variations were required to suit this study and to add value to the Safe Work Australia report. For example, unlike the Safe Work Australia report, this analysis accounted for postvention costs related to worker and family/whānau suicide bereavement and counselling. However, evidence indicates that postvention costs are substantial, extending to the community and the industry. Failure to include these costs would underestimate any cost estimate<sup>8,67</sup>. Nonetheless, this analysis did not include the full scope of postvention costs due to the lack of sufficient data.

Conversely, we have not attempted to estimate the costs saved by transferring knowledge from the employee, learning workplace safety tools at work, and applying them to family, whānau, and friends outside of work. The ripple effects of 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 of 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 the 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 a mental health condition or psychological distress may have affected other absenteeism and presenteeism costs. The costs of the treatment for early identified psychological distress and/or mental health challenges are certainly less than the costs of lost productivity and life from untreated and progressive suicidal intensity.

Our costing methodology, consistent with the Safe Work Australia approach<sup>51</sup>, 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 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<sup>78</sup>. 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<sup>78</sup>.

The counterfactual method used in this analysis provides the basis of a transparent and communicable framework for measuring one aspect of the impact of MATES on suicide and psychosocial well-being in the construction industry. Importantly, it is based directly on evidence of



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MATES activity and intervention concerning individuals, as opposed to analyses of overall suicide rates, which include persons who died by suicide and were not exposed to MATES programs or personnel. The clear articulation of this method permits discussion and debate as to the appropriateness of each classification level toward refining and improving the measure. Four main limitations of this counterfactual approach are noted. First, the method classifies the severity of case features that are available in Case Management data, and it is assumed that this correlates with suicidality. Second, it assumes that the applied Case Management approach effectively prevents suicide and, therefore, cannot be used to directly evaluate the effectiveness or efficacy in preventing suicide. Individual case-level outcomes (i.e., persons in Case Management who did or did not die by suicide) are required to support this type of analysis. Such a classification may be used to monitor and describe the nature of caseloads experienced by MATES and to provide a broader assessment of psychosocial wellbeing. Third, the estimated counterfactual using the strictest inclusion criteria (Type A) may still overestimate the number of suicide deaths prevented. Finally, the analysis assumes that the benefit of Case Management is transferable from the Australian to NZ context. This is a reasonable assumption given that the MATES model and approach to Case Management are similar across countries. Further research and discussion are required to develop an appropriate weighting for the counterfactual classifications to more conservatively estimate the number of suicides prevented by MATES Case Management.

Despite these methodological challenges, the results provide a conservative assessment and are in line with previous attempts to cost injury and suicidal behaviour in the construction industry<sup>35, 54</sup>. Each incident involving a short-term absence is estimated to cost \$1,088, each long absence with return to work \$25,497, each long absence with no return to work \$3.09 million, and each fatality \$2.32 million. Adding the non-economic or intangible value of a statistical life increases the average cost of a fatality to \$7.29 million. In 2023, there were 80 fatalities by suspected suicide among construction industry workers in NZ. Using the ratio of self-harm attempts to fatality of 20.3 to 1, and based on 80 fatalities, this equates to an estimated 1,027 incidents resulting in a short absence, 426 incidents resulting in a long absence with return to work, and 175 incidents resulting in long absence with no return to work. Multiplying these numbers with the average cost per incident shows that the economic cost of suicide and non-fatal suicide behaviour in the NZ construction industry is significant at \$738 million, expressed in 2022 dollars. Combining the community value of lost life increases the cost to \$1.135 billion. Although the valuation of community value using the statistical life concept is relatively controversial, it has been used in several studies<sup>19, 53</sup>, including the Australian Productivity Commission<sup>18</sup>, and a recent report commissioned by the construction industry culture taskforce<sup>55</sup> that examined workplace issues within Australia's construction industry and the economic cost of doing nothing to address these issues.

The impact of MATES in averting the economic cost of suicide and non-fatal suicide behaviour in the NZ construction industry was calculated by comparing the operating costs of MATES with the savings generated through averted suicidal behaviour derived from a counterfactual analysis. Engagement of at-risk clients through MATES Case Management was estimated to result in 1 fewer suicides each year. This equates to averting 2.2 self-harm attempts ending in a long absence with no return to work, 5.3 self-harm attempts ending in a long absence with return to work, and 12.8 self-harm attempts ending in a short absence from work. The potential economic benefit of averting this harm is \$14.19 million. The potential return on investment of MATES is equivalent to 1:4.42. For every \$1 invested in MATES, the benefits are \$4.42. Several sensitivity analyses





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confirmed the robustness of these results in terms of changes in key parameters. All variations resulted in a positive return on investment for MATES.





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## Where to from here?

Unfortunately, the economic cost of suicidal behaviour and the prevention of such behaviour has not been adequately addressed in society or the workforce. The lack of awareness about suicide as a significant issue<sup>9, 56, 57</sup>, along with the pervasive and problematic belief that suicide is primarily due to mental illness, has led to a narrow focus on crisis intervention and mental health services in suicide prevention. Additionally, the lack of commitment from government organisations to invest in understanding and implementing community-based and work-related suicide prevention strategies has contributed to the issue not being adequately addressed in workplaces, particularly within the construction sector<sup>58</sup>. 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<sup>59</sup>. Mann et al. (2005) 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 formalised and pathways to treatment are readily available)<sup>59</sup>. An updated systematic review of suicide prevention strategies conducted by Zalsman et al. (2016) found sufficient evidence of the effectiveness of various strategies, but the authors did note a lack of evidence-based workplace strategies<sup>60</sup>.

Since Zalsman et al.'s review, MATES has been established in NZ to address high rates of suicide among NZ construction workers<sup>61</sup>. MATES is a multimodal prevention and early intervention program. Originally established in Australia, MATES has had substantial uptake in Australia and NZ's building and construction sector and has developed an evidence base supporting its effectiveness. Previous evaluation research has demonstrated the social validity of the program among construction workers<sup>62</sup>, effectiveness in shifting beliefs around suicide<sup>63-65</sup>, improvements in suicide prevention literacy, and increased intentions among workers to offer help to workmates and to seek help for themselves<sup>63, 66-68</sup>. Research has also demonstrated the significant economic return of investing in workplace suicide prevention initiatives such as MATES<sup>22, 34, 35</sup>. MATES has now been endorsed by the World Health Organisation as a best-practice community development suicide prevention model<sup>69</sup>.



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## CONCLUSION

Rates of suicide and non-fatal suicide behaviour are far too high in NZ. Although being employed has a protective effect on suicide behaviour, over one-third of all suicide fatalities are among employed people<sup>3</sup>. The burden and impact of suicide and non-fatal suicide behaviour in the construction industry are avoidable. More needs to be done to reduce and avert this harm, and effective, evidence-based, and appropriately resourced workplace suicide prevention initiatives such as MATES in Construction NZ offer a viable solution.







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## Data Availability Statement

All data used in this manuscript are appropriately referenced and publicly available.







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## Appendix A: Summary of methods used in costing analysis

COST CATEGORY	DESCRIPTION	SOURCE
<b>Production disturbance costs</b>		
Value of lost production	Average weekly earnings for males in construction industry (AWE) x average duration of absence (by severity category); AWE x average duration of absence x 0.4	Stats NZ (Earnings from main wage and salary job by industry, sex, age groups, and ethnic groups); SWA (duration of absence)
Employer excess payments	Average daily earnings x 3.3 days	Stats NZ (Earnings from main wage and salary job by industry, sex, age groups, and ethnic groups); SWA (duration of absence)
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)	Stats NZ (Earnings from main wage and salary job by industry, sex, age groups, and ethnic groups); SWA (duration of absence)
<b>Human capital costs</b>		
Loss of income	For full incapacity: loss of earnings from time of injury to retirement age (i.e., <65 years), cash rate=3.83%, inflation rate=2.3%, productivity rate=1.3%. Future earnings for full incapacity include supported living payments (\$327.02 per week) since these contribute to post-injury income.	Stats NZ (Earnings from main wage and salary job by industry, sex, age groups, and ethnic groups); RBNZ (cash rate), Stats NZ (consumer price index), Stats NZ (productivity rate), Work and Income NZ (supported living payments)
Loss of government revenue	For full incapacity, taxation and other revenue foregone when workers are unable to work due to work-related incidents	Stats NZ (Earnings from main wage and salary job by industry, sex, age groups, and ethnic groups); NZTO (estimates of effective taxation rate)
Social welfare payments	Sickness and social welfare payments borne by the government for people with disabilities (supported living payments - married without children of \$327.02 per week discounted to present value over the period between the incident and reduced life expectancy)	Work and Income, NZ government
<b>Medical costs</b>		
Health and medical costs	Average medical costs from National dataset for compensation-based statistics	Safe Work Australia (medical cost) (inflation and exchange rate adjusted)
<b>Administrative costs</b>		
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 (inflation and exchange rate adjusted)
Legal fines and penalties	Legal fines and penalties are costs associated with successful prosecutions due to serious work-related incidents. The average fine per conviction is \$115,698, and the prosecution rate is assumed to be 3% of incidents for full incapacity and fatalities	Safe Work Australia report (inflation and exchange rate adjusted)



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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 (inflation and exchange rate adjusted)
Funeral expenses	The average New Zealand funeral costs around \$10,000, but it can be much more or less depending on the arrangements. The total cost will vary based on a variety of factors, including religious beliefs and/or requirements	Funeral cost guide ( <a href="https://www.moneyhub.co.nz/funeral-costs.html">https://www.moneyhub.co.nz/funeral-costs.html</a> )
<b>Other</b>		
Carer costs	For full incapacity, the additional cost of care (supported living payments -	Work and Income, NZ government
Cost of aids, equipment, and modifications	For full incapacity cases only, the present value of future costs for aids and modifications (\$50 per week, discounted to present value over the period between the incident and reduced life expectancy).	Work and Income, NZ government
Postvention costs	The cost associated with bereavement for six family/friends - estimated at \$16,630 per person; employer cost associated with providing counselling	The multiplier effect for six people by Corso et al. (2007), Average social cost of bereavement by Comans et al. (2013) (inflation and exchange rate adjusted)
<b>Transfer costs</b>		
Transfer costs	Deadweight costs due to inefficiencies incurred through tax loss are estimated at 10.81% of the total net present value of loss of government revenue (i.e., taxation revenue). Deadweight costs due to inefficiencies incurred by social welfare payments are estimated at 9.75% of welfare payments' total net present value.	Access Economics 2009, Ministry of Transport 2021
<b>Community</b>		
Community value	Years of life lost (fatalities x (average life expectancy - average age of suicide) x value of statistical life	NCIS data analysis (fatalities and average age suicide), Stats NZ (life expectancy), Ministry of Transport (value of statistical life)



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## Appendix B: Summary of key parameters used in costing analysis by severity

Parameter	Short absence	Long absence - return to work	Long absence - no return to work	Fatality
Average earnings (construction - male)				
Per annum	\$73,008.00	\$73,008.00	\$73,008.00	\$73,008.00
Per week	\$1,404.00	\$1,404.00	\$1,404.00	\$1,404.00
Per day	\$280.80	\$280.80	\$280.80	\$280.80
Marginal tax rate of average earnings	33.0%	33.0%	33.0%	33.0%
Average absence from work (days)*	0.9	128.5	130.0	43.6
Time required to replace staff (weeks)	0	0	26	26
Time required to train new staff (weeks)	0	0	2.5	2.5
Average age of injury/fatality (years)			37	37
Average retirement age (years)	65	65	65	65
Average productive years lost	0	0	0	28
Discount rate (per annum)	3.8%	3.8%	3.8%	3.8%
Inflation rate (per annum)	2.3%	2.3%	2.3%	2.3%
Productivity rate (per annum)	1.3%	1.3%	1.3%	1.3%
Average social welfare / supported living payment (per annum)	\$0	\$0	\$17,005	\$0
Average years of life lost	0.0	0.0	0.0	43
Average medical costs	\$949	\$9,250	\$14,480	\$2,811
Average threshold medical payments	\$578	\$578	\$578	\$578
Average workers contribution	\$56	\$1,301	\$2,085	\$335
Medicare excess contribution	\$315	\$7,371	\$11,816	\$1,898
Average investigation costs	\$32	\$786	\$2,747	\$3,286
Average fine and/or penalty	\$0	\$0	\$3,471	\$3,471
Average travel expenses	\$6	\$107	\$301	\$220
Average funeral expenses	\$0.00	\$0.00	\$0.00	\$10,000
Average carer allowance (per annum)	\$0	\$0	\$17,014	\$0
Average life expectancy at birth in males (in years)	81.3	81.3	80	80
Average years of life lost	0	0	0	43
Cost of aids, equipment, and modifications (per annum)	\$0	\$0	\$50	\$0
Average years of life receiving disability support pension, carer allowance, equipment payment	0	0	43	0.0
Postvention costs - suicide bereavement (family and friends)	\$0	\$0	\$0	\$93,609
Postvention costs - suicide bereavement (coworkers)	\$0	\$0		\$30,000
Deadweight loss of government revenue	0%	0%	10.8%	10.81%
Deadweight costs of welfare payments	0%	0%	9.75%	9.75%
Value of a Statistical Life	0	0	0	\$4,969,178

\*Workers replaced after 26 weeks



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## Appendix C: Counterfactual counts as percentage of all clients by year

Year	Referred to provider(s)	Suicide risk	Counterfactual						
			A	B	C	D	E	F	G
2010	Yes	Yes	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	6.7%
		Any	1.8%	1.8%	1.8%	2.4%	7.3%	7.9%	97.0%
2011	Yes	Yes	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	2.8%
		Any	1.4%	1.4%	1.4%	1.4%	6.4%	7.8%	93.6%
2012	Yes	Yes	0.0%	0.0%	0.0%	0.3%	0.3%	0.3%	4.4%
		Any	1.4%	1.4%	1.4%	1.7%	5.8%	7.5%	77.6%
2014	Yes	Yes	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	3.4%
		Any	0.5%	0.5%	0.5%	0.8%	2.6%	4.7%	74.0%
2013	Yes	Yes	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	2.5%
		Any	0.4%	0.4%	0.4%	0.4%	3.6%	4.0%	57.4%
2015	Yes	Yes	0.0%	0.0%	0.0%	0.2%	0.2%	0.2%	4.1%
		Any	1.0%	1.0%	1.0%	1.2%	5.5%	7.4%	71.8%
2016	Yes	Yes	0.1%	0.1%	0.1%	0.3%	0.3%	0.3%	3.2%
		Any	0.4%	0.4%	0.4%	0.6%	1.9%	2.4%	52.0%
2017	Yes	Yes	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	7.0%
		Any	1.2%	1.4%	1.5%	1.5%	6.0%	7.3%	72.2%
2018	Yes	Yes	1.0%	1.0%	2.4%	2.5%	3.0%	3.0%	8.6%
		Any	2.4%	2.4%	7.1%	7.8%	26.7%	28.9%	82.4%





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## Appendix D: Cumulative properties of counterfactual classifications, all years

