

An Analysis of Suicides in the Construction Industry within the U.S.



Shani Gomez¹ and Mahdi Safa^{2*}

¹Research Assistant, Engineering Technology, Sam Houston State University, United States

²Assistant Professor, Engineering Technology, Sam Houston State University, United States

Submission: November 24, 2020; **Published:** January 09, 2021

***Corresponding author:** Mahdi Safa, Assistant Professor, Engineering Technology, Sam Houston State University, Huntsville, TX 77340, United States

Abstract

The statistics have shown that the construction industry experiences high levels of fatalities every year. Although fatalities can be caused by factors such as slips and falls, failure to use equipment properly, or exposure to harmful chemicals, there are the non-work caused deaths that this research will focus on, such as suicides. The construction industry is a high stress-level filled environment due to a combination of risks, ever-changing projects, and deadlines that have to be met by a company for a decent reputation. Given such circumstances, it can be difficult for a company to focus its resources on the mental health of its employees bringing the concern of preventable suicides. The results of this study provide insights into the levels of suicides within the construction industry and related fields. The construction industry and related occupations held the highest rates of suicides compared to other industries. It would be economically beneficial to implement prevention programs similar to MATES in Construction to lower the rate and costs of suicides in the industry. The results of this study suggest that further research would be needed to quantify the savings that the US could have if a prevention program were put into place.

Keywords: Construction industry; Suicides; Prevention programs; Training.

Introduction

Statistics have shown that the construction industry experiences high levels of occupational fatalities every year. But due to the high-stress levels associated with the construction industry work-related fatalities are not the only kind of fatalities that take place within the construction industry [1,2]. The construction industry experienced the highest levels of suicide rates especially within men's occupational groups [3]. The contribution of this study is investigating the suicide rate of different populations in the construction industry and the best practices to prevent it.

Construction Industry Population

The construction industry has an extreme impact on the economy. Much of what is used exists due to the construction workforce [4]. From homes and office buildings to roads and highways, the construction industry is a major contributor to the United States' economy. Because of the significance of the construction industry, it provides over 7 million people with jobs and creates nearly \$1.3 trillion worth of structures every year. The construction industry is built of various types of jobs, with a diverse yet limited demographic, and irreplaceable stress.

The construction workforce is made of various sectors that can take place in offices or in the field. It provides various jobs from skilled work to managerial positions. The two main categories that in-field workers fall into are laborers and skilled workers. Each of these contributes significantly by providing the strength that builds the industry. Laborers are the majority of the workers [5]. Laborers are the ones working long shifts every day to make sure that the main plans for the construction. They work directly with the general contractors to bring the entirety of the project together. Skilled workers are usually a part of subcontractors. Skilled workers involve people that have studied or practiced one specialty of the construction industry like electricians and plumbing specialists. Without their contribution, the project would be incomplete. While the construction industry has a diversity of races, less than 13% of the construction industry demographic are females [6]. Because the demography of the industry is male-dominated, workers are constantly surrounded by construction masculinity. Work not only matters to men but is also part of them as a key dimension of their identity and masculinity. Consequently, successful masculinity was equated

directly with success at work whether in middle-class terms of a career or more working-class terms of physical labor [7]. It is possible to be more familiar with the term masculinity as something similar to patriarchy. In this role, men are obligated to lead and support their families completely. With this assumption, these workers bear a lot of responsibility on their shoulders.

The construction industry operates to strict timetables, usually with penalties for failing to meet deadlines [8]. It is a high-stress job that involves an environment full of various complications every day. This environment consists of a culture of taking safety risks and working long hours in primitive working conditions [9] to satisfy the goals of the job. Such high levels of pressure involved for a single project every time can build up over a period of time. It is primitive to have the appropriate mental health resources in place to support the members of the construction workforce. The construction industry will continue to make an impact, so all 7 million people should have access to the necessary resources to help with the stress that comes with the job [10].

Suicide Rates, Methods, and Prevention

The construction industry plays a large role in the economy of the United States and while their involvement continues to increase, it is important to recognize the increasing numbers of suicide too. The number of suicides that are committed each year in the United States has increased by 40% in less than 2 decades [11]. With these numbers continuously increasing, it is important to focus on the appropriate resources to get ahead of those fatalities. Even though there are over 800,000 suicides occurring every year worldwide, suicide is a preventable cause of death [12,13]. These deaths not only affect individuals, but society

as a whole, so it is important to understand if this affects a specific type of population, through what means, and what can help prevent the increase of these numbers. In 2017, nearly 38,000 persons of working age (16–64 years) in the United States died by suicide [11]. Suicide is one of the leading causes of death in the U.S. It places in the top ten causes of death with heart disease, cancer, and other diseases of that caliber. Suicide more likely to be committed by males rather than females. According to Murphy, while “women are twice as likely as men to experience major depression, women in the United States commit suicide at only one-fourth of the rate that men do.” This would suggest that of those 38 thousand people that committed suicide in 2017, 28,500 were males. Historically, suicide risk has been known to increase with age, this also identified older men as the group at highest risk [14]. This correlates to the different methods used by men and women to commit suicide.

The intentional cause of one’s death is approached in various methods, but there are more common methods that correlate based on gender. The higher number of male suicides has a lot to do with their plan in action, precautions to avoid interruption, and rapidly effective means [15]. This would mean that in the case of suicidal behavior males more frequently use violent or lethal methods [16] to succeed on the first attempt. Based on the general population, the most common suicide methods are firearm, poisoning, and hanging [17] which are more violent methods of suicide. In data collected by the World Health Organization (WHO), Table 1, 60.6% of male suicides were through firearms and 20.4% was through hanging. This is drastically different from the females who committed suicide at about half the amount of firearm methods (at 35.7%) and poisoning at 31%.

Table 1: Suicide by Method in the United States from 1999-2002 (World Health Organization, 2008)

	Total #	Other Poisoning	Pesticides	Hanging	Drowning	Firearms	Falls	Other
Men	97,014	7.1%	0.3%	20.4%	0.9%	60.6%	1.9%	8.8%
Women	23,629	31.1%	0.5%	16.9%	2.1%	35.7%	3.4%	10.5%

At a young age, factors such as bullying, school avoidance, being victimized at school, and school dropout predict an increased risk of suicide [18,19]. But that age group only makes up 30% of the deaths by suicide. For 70% of the population that is outside of that age group, firearm suicide was the most common suicide method [12]. This would correlate to a higher level of males that commit suicide through violent methods. There are various programs that are implemented within the United States to help prevent suicides. Gatekeeper training (GKT) is a program that aims to enable non-specialist to identify and respond to those at risk [20]. This program entails the gatekeeper, an individual in a community who has physical contact with large numbers of community members as part of their usual routine [13]. The gatekeeper interacts with the members of the community and

can distinguish certain behaviors that are common in people who commit suicide. Once identifies, the gatekeeper is able to provide guidance and direction to ease the person away from negative behaviors that lead to suicide. Research in gatekeeper training has shown that the training improves the knowledge, beliefs, attitudes, self-efficacy, and reluctance to the intervention [13,21]. This gatekeeper training (GKT) has been adopted by various organizations, but also in many occupations as the first line of prevention for people at risk of suicide. A large majority of the United States population has a job which is why it is important to implement prevention programs. Exposure to stressful working conditions can influence the relationship between occupations and suicide [22]. A report in the Morbidity and Mortality Weekly Report found that men in construction experienced twice as many

suicides as the rate for all men [3]. The highest suicide rate among women was from those working in arts, design, entertainment, media, and sports [3]. The focus on this should allow for a shift in company-wide suicide prevention. Evidence suggests that GKT is effective in reducing suicide as part of a systematic approach to suicide prevention [20]. This can play an extremely important role in high-stress level jobs like the construction industry.

Suicides in construction

The construction industry suffers as one of the highest occupational risk groups for suicides [20]. With the impact of the construction industry, it is important to develop a better prevention plan. Suicide is a shy topic with the general population, but it becomes even more difficult to discuss in the male population which is the majority of the construction workforce. Unfortunately, health, and more specifically mental health, remains a taboo subject and continues to be stigmatized within the sector [23]. In the construction industry, women make up less than 15% of the population. This would evidently mean that the male suicide rates in the construction industry would be higher than women's, but it does not explain why the numbers are significantly high. Studies show that rates were significantly higher in six major occupational groups, the first being construction, and extraction [11]. Another study showed that there were 1,947 male suicides identified within the construction industry over the 10 year period of that specific study [22]. While research interest has been captured due to the elevated rate of suicides among the construction industry workers [24], to this date, there has been little research in differential vulnerabilities to suicide [22].

To some extent, this may be connected to the demographic characteristics of the largely male workforce [22]. But suicide is a significant health problem that is known to disproportionately affect those employed in manual occupations, including construction workers and tradespeople [25]. In other countries, efforts have been made to improve the prevention of suicide in this industry, and an example is with Mates in Construction (MATES). MATES was designed to address these high suicide rates through the implementation of multi-component prevention and early intervention programs [20]. It is important to get ahead of the problem before it grows and MATES recognizes this. MATES is a charity program to prevent suicide through implementing recommendations of the Australian Institute for Suicide Prevention and Research (AISRAP) [26,27]. MATES is a multi-component program that aims to raise awareness about suicide in the workplace; this program also reduces stigmas associated with mental health and help-seeking, facilitates and supports help-seeking and help-offering behaviors, and ensures the appropriateness and viability of help provided. Another key part of MATES is their General Awareness Training (GAT) which is a form of gatekeeper training that involves providing training to all construction workers on-site to engage and activate suicide prevention [25]. GAT consists of a training program by

accredited trainers to improve the "knowledge of warning signs and encouraging workers to seek support" [27]. Another benefit of MATES is access to a 24/7 helpline that studies have shown to be extremely useful. Other studies have found evidence to support the social validity and effectiveness of the MATES in the Construction program [24].

According to the Centre for Mental Health (2017), 91 million days are lost each year due to mental health problems [23]. Mental health takes a toll on the economy and suicide furthers the impact. It is important to set aside time to incorporate appropriate suicide prevention strategies in the construction industry. Since three-fourths of the population that commit suicide is usually male, resources are needed to ensure the prevention of suicide in occupations that are majority male like the construction industry. Related studies in the area of study are limited. However, the author made great efforts to find and document available associated resources. The results of this study show (1) that the construction industry is at a high risk of suicide rates; (2) the male population are more susceptible to commit suicide where this sector is dominated by a male workforce; (3) unfortunately, there is only a limited number of prevention programs implemented in this industry.

Economic impact of suicide in construction

Suicides cause a huge strain in the workplace, not only emotionally, but from the economic perspective as well. In a single year, suicides in the South Australian Construction Industry cost "\$57.34 million in 2012, with 98% (\$56.03 million) of this cost borne by the Government" [28]. This value comes from direct and indirect costs of suicides from categories like production disturbance cost, human capital cost groups, medical costs, administrative costs, transfer costs, and other costs. Direct costs come from medical care and medicolegal costs while indirect costs "refer to earnings lost due to permanent disability or premature mortality" [29]. Based on various studies of the economic cost of suicides, this cost can be charged to the employer, the government, and times the worker. While employment has shown to reduce the risk of suicide overall, current research has shown that suicide rates differ "across industry and occupational groups" [28]. This means that while suicides may not be prominent in a specific field, it holds a strong economic impact in any country. With over 160,000 types of jobs in the United States, this concern "has not been adequately addressed in society or the workforce" and has left a financial debt in companies that employed people that committed suicide. According to the World Health Organization (WHO), "for every employee who dies by suicide, another 10-20 will make a suicide attempt" [28] suggesting that the problem is more severe. At that rate of acceleration, the employer can suffer a great financial loss for each attempt. In the year 2001, Ireland's total cost of suicide was estimated at 1 billion USD. A study in Australia found that in the year 2014, 903 people committed suicide, over 13,000 workers attempted suicide, about 17% of

which resulted in full incapacity, and the other 83% resulted in a short-term absence from work. This calculated to an estimated cost of \$6.73 billion [30].

The construction industry has one of the higher rates of suicide in the workforce. Because of this, it experiences a strong economic impact from each suicide or suicide attempts. In construction, the employer’s contribution can start at as low as USD 461,684 to USD 4,4091,567 (original estimates provided in Australian dollars, as shown in Table 2.1). This financial contribution works at different levels starting from short absences in which the worker is only out of work for less than 5 days from their suicide attempt. Full incapacity is the next category is full incapacity in which the worker so permanently incapacitated and will be unable to return to work. Lastly, which is as described, fatality, the actual loss of life in the attempt of suicide.

Table 2: Cost of suicides and suicidal behavior among New South Wales construction industry workers, 2010 (in Australian dollars)

Type of Incident	Employer	Worker	Government
Short absence	\$633,529	\$2,839	\$19,870
Full incapacity	\$6,503,008	\$333,760	\$397,613,767
Fatality	\$4,288,471	\$248,777	\$117,479,732
Total	\$11,425,008	\$585,375	\$527,123.752

Note: This table was provided by Research Trends “The Impact of Suicide Prevention Strategy on Reducing the Economic Cost of Suicide in the New South Wales Construction Industry.”

When determining these losses, factors such as production disturbance costs, human capital costs, medical costs, medical costs, administrative costs, other, and transfer costs. Production costs come from “short term impacts until production is returned to pre-incident level” [28] which can include the loss of production itself and turnover cost from workers unable to continue in the job. On the other hand, human capital costs are valued by the long-run costs from the loss of potential output or from the loss of potential future earnings starting on the day of injury/loss to retirement age. Medical costs are calculated from the actual “expenses incurred by workers and the community through medical treatment”. The contribution of the company can vary depending on the country, for example, in Australia the employer covers the first \$500 and continue the 15% difference with the government covering the remainder [28]. According to Doran, when it comes to Administrative costs, this analysis covers investigation costs, travel costs, and funeral costs. Other costs consisted of “carers and aids/modifications for full incapacity cases and the cost of postvention services for fatalities” [28]. Lastly, there are transfer costs which consisted of the deadweight costs to society for redistributing the public sector resources for the care of an incapacitated person. Each of these costs varies

based on the type of impact from the suicide attempt and can be quantified differently in each country, but even for reference, the cost of fatal and non-fatal suicide attempts is economically impactful to any society. While this data comes from Australian research, it can be used to provide an insight into the expenses (Table 2). This data can also provide structure as to how other countries can evaluate the cost of suicide in their own country. It is important to keep in mind that the contributions of the government will change drastically. This is especially important in countries like the US in which there is not a uniform health care plan, but instead, individual health care insurance provided by private insurance companies that collect from individuals and employers [31].

Cost of prevention

Essentially, the cost of suicide from an economic standpoint is very high. Millions of dollars per each fatal or non-fatal suicide can cost every party involved a large sum. Implementing a suicide prevention strategy may be one of the more economically efficient strategies to proceed with. As shown in results from a specific study (Table 3), “the Australian workforce has an estimated saving of \$61.26 million each year [the equivalent of USD 44.73 million]” [30]. This would mean that investing in prevention programs will have a more permanent benefit that ignoring the cause. This is especially relevant in countries such as the US, in which the employer normally provides their worker with a form of private health insurance. With a savings of \$61,259,276 each year to prevent a portion of suicide attempts, an employer can view a prevention program as an investment for the company long-term. As stated by Germain, unfortunately, the prevention of suicide has not been adequately addressed in society or the workforce. The lack of awareness on the subject could be the reason why it is such a taboo subject. Discussions are not being held about this prominent problem meaning that the proper prevention cannot be considered in order to improve.

Table 3: Potential economic savings of a workplace suicide prevention in one year (in Australian Dollars).

Type of Incident	Number of incidents reduced by MATES Each Year	Total Cost Savings	% Savings to Government
Short absence	102.3	\$1,184	24%
Full incapacity	21.0	\$47,277,964	98%
Fatality	8.2	\$13,860,149	96%
Total	131.5	\$61,259,276	97%

Note: This data was provided by the International Journal of Environmental Research and Public Health “The Economic Cost of Suicide and Non-Fatal Suicide Behavior in the Australian Workforce and the Potential Impact of a Workplace Suicide Prevention Strategy”.

Research Methodology

This study began with an intensive literature review from a pool of limited sources for the background research of the topic. It continued with an analysis of the economic impact that suicide has on workers, employers, and the government. The research then adopted a quantitative approach by using data from the Census of Fatal Occupational Injuries (CFOI) to compare the rates of suicide in various characteristics. This data was collected from 2011 to 2018 and identified the number of suicides by occupation, age, gender, state, and more for each year. This data was used for the analysis of suicides in the construction industry in comparison to other industries to better understand the percentage of constructions suicides among the overall level of suicides. The data was further analyzed to include fields related to construction rather than just construction occupations. This included occupations in management, installation, transportation, etc. The data was plotted and further analyzed for a trend among the construction groups and related fields.

Analysis & Results

The data provided by the CFOI gave a detailed insight into the number of suicides at each occupation. The data reflected that construction occupations and related fields (such as management, architecture & engineering, sales, administration, installation, transportation, and military) have some of the highest levels of suicide amongst all 23 listed occupations. As shown in Table 4.1,

construction and extraction occupations had the 7th highest level of suicides, behind 6 others and 5 correlating to the construction industry in some way. The construction and extraction occupation focuses more on the actual laborers in the field, but the construction industry overall is a combination of various occupations in one industry. There are several management positions such as project engineers, superintendents, foreman, safety coordinators, and the head administration like the CEOs, President, or Vice President. Architecture and engineering occupations are a big example of fields correlating to the construction industry, these occupations set the foundation for construction to take place. Sales are usually where construction starts, each company is expected to prepare a portfolio with estimates so that they can take a specific job. Office and administrative support occupations are applied in the industry through the top levels of a company, but also supporting staff. This is like people working in human resources, receptionist, IT personnel, and other necessary supporting roles that handle many of the background components of a company. Installation, maintenance, and repair occupations are key roles in constructions, this role finalizes various components in a job such as electrical and plumbing installation. Without the inclusions of transportation and material moving occupations, there would not be material on-site, to begin with, or even to relocate. There are several types of heavy equipment and special materials that need to be transported in order to start any job, so these occupations are crucial in the industry.

Table 4: Suicide Rates by Occupation (2011-2018).

Occupation	2011	2012	2013	2014	2015	2016	2017	2018
Management occupations*	39	42	37	37	22	36	33	28
Business and financial operations occupations	5	3	4	5	4	6		
Computer and mathematical occupations			4	5	3	5	5	4
Architecture and engineering occupations*	7		4		5	6		
Life, physical, and social science occupations		4	8	7	4	5		6
Community and social services occupations	3				3	5		2
Legal occupations	6	3	3	3	4	9	3	5
Education, training, and library occupations					3	4		3
Arts, design, entertainment, sports, and media occupations		4		4	4	4	3	11
Healthcare practitioners and technical occupations	11	7	10	8	10	9	10	8
Healthcare support occupations		3						
Protective service occupations	23	20	18	9	19	19	22	19
Food preparation and serving related occupations	3	7	5	6		9	6	6
Building and grounds cleaning and maintenance occupations	11	8	11	4	13	12	18	10
Personal care and service occupations	7	6	3	4	3		9	7
Sales and related occupations*	25	15	32	45	27	30	22	37

Office and administrative support occupations*	9	11	7	11	8	6	7	7
Farming, fishing, and forestry occupations		4	8	7	4	6	7	3
Construction and extraction occupations*	11	16	17	24	11	19	16	32
Installation, maintenance, and repair occupations*	23	25	30	29	24	38	28	35
Production occupations	16	22	15	21	21	21	22	21
Transportation and material moving occupations*	23	28	39	30	28	25	38	27
Military occupations	10	16	20	15	7	15	15	28
TOTAL	232	244	275	274	227	289	264	299
*Occupations related to construction.								

It should be noted that the data (Table 4) was provided by The Census of Fatal Occupational Injuries (CFOI) which has published data on fatal occupational injuries for the United States since 1992 [32].

of Fatal Occupational Injuries (CFOI) which has published data on fatal occupational injuries for the United States since 1992 (Census of Fatal Occupational Injuries (CFOI) - Current and Revised Data, 2019). The asterisk "*" shows the occupations that are related to construction.

Figure 1 information and data was provided by The Census

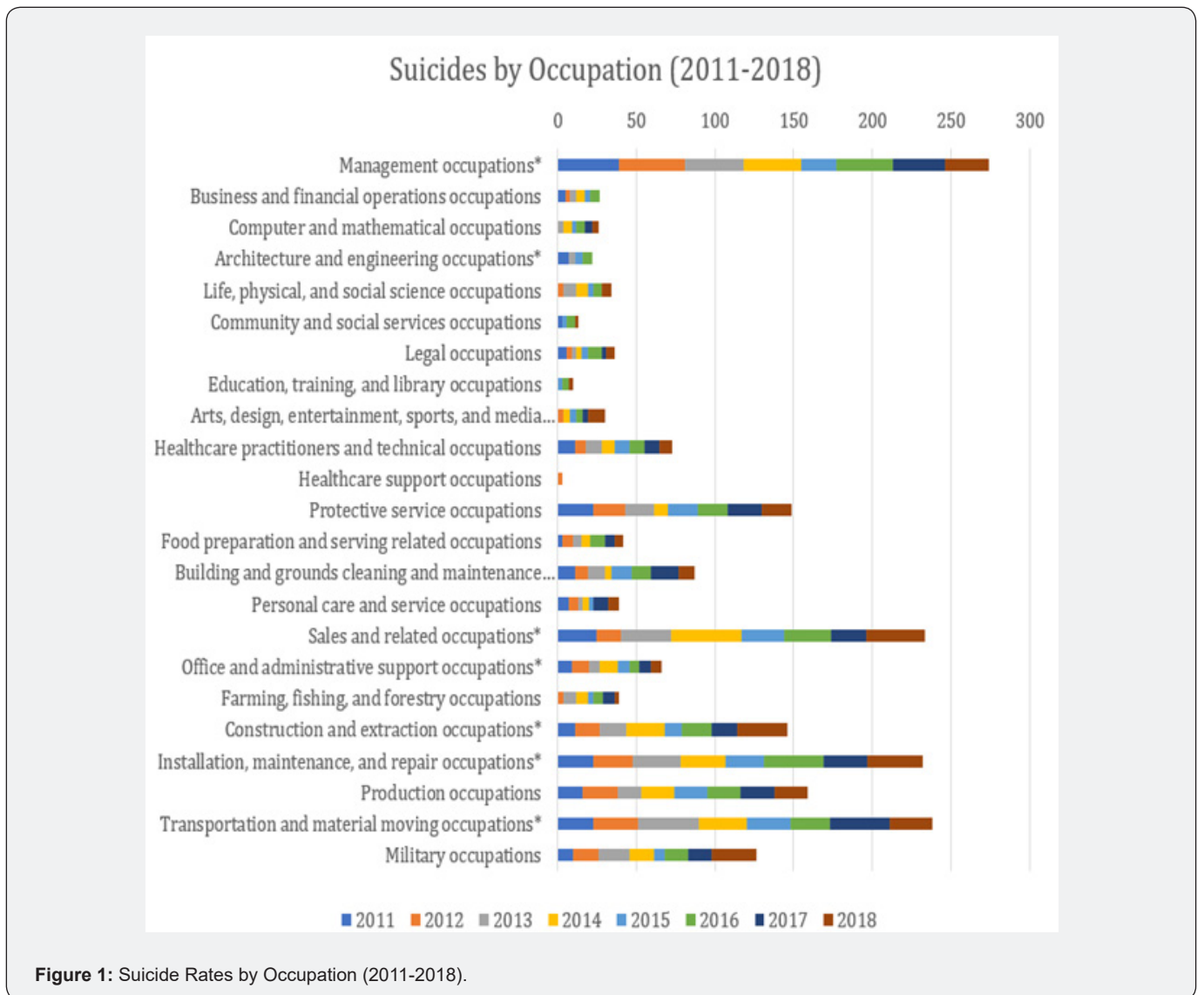


Figure 1: Suicide Rates by Occupation (2011-2018).

Conclusion

The construction industry holds a strong role in most economies which is why the focus of this research was to bring attention to a prevalent problem: suicide in construction. While it is morally important to focus on this regardless, there are economic benefits from investing in suicide prevention programs in this industry. Due to various limitations, future research on this topic is crucial. There were very limited resources to pull from and most of the research had only been done in countries like Australia. The United States had very few resources on the topic and even the data from the Census of Fatal Occupational Injuries (CFOI) did not provide background on the collection of their data or where the numbers were pulled from. The research on this topic requires a lot of time to complete but is worth it in every sense of the way in order to better the community of the construction industry within the United States.

Acknowledgments

My sincerest gratitude goes out to the Ronald E. McNair Scholars Program for providing me with the resources and funding I needed to complete my research.

References

- Chen Y, Shahi A, McCabe B, Hanna A, Safa M, et al. (2019) Benchmarking Construction Safety Performance At A Global Level: A Case Study of US, Canada, and New Zealand. CSE Annual Conference, CON11-1.
- Wei L, Yang R, Chen Y, Shahi A, Safa M, et al. (2020) Comparison of Safety Cultures and Performances between the Construction Industries in the United States and Canada: A Case Study of Texas and Ontario. In: Construction Research Congress 2020: Safety, Workforce, and Education American Society of Civil Engineers, Reston, Virginia, United States pp.346-355.
- Flaskerud JH (2020) Suicide and Occupational Risks: Edited by Jacquelyn H, Flaskerud, FAANSchool of Nursing, University of California, Los Angeles, California, USA. In: Janna Lesser, FAAN School of Nursing, University of Texas Health Science Center at San Antonio, Texas, USA. In: Issues in Mental Health Nursing. 41(1): 83-87.
- Safa M, Shahi A, Haas CT, Hipel KW (2017) Construction contract management using value packaging systems. International Journal of Construction Management 17(1): 50-64.
- Safa M (2013) An advanced construction supply nexus model. PhD Thesis, University of Waterloo, Canada.
- Fielden SL, Davidson MJ, Gale AW, Davey CL (2000) Women in construction: The untapped resource. In Construction Management and Economics. Routledge Journals 18(1): 113-121.
- Edwards T (2004) Cultures of masculinity. Routledge Journals.
- Burki T (2018) Mental health in the construction industry. The Lancet Psychiatry. Elsevier Ltd. 5(4): 303.
- Ness K (2012) Constructing Masculinity in the Building Trades: "Most Jobs in the Construction Industry Can Be Done by Women." Gender, Work and Organization 19(6): 654-676.
- Shafi M, Liu J, Ren W (2020) Impact of COVID-19 pandemic on micro, small, and medium-sized Enterprises operating in Pakistan. Research in Globalization 2: 100018.
- Peterson C, Sussell A, Li J, Schumacher PK, Yeoman K, Stone, et al. (2020) Morbidity and Mortality Weekly Report Suicide Rates by Industry and Occupation-National Violent Death Reporting System, 32 States, 2016.
- Ajdacic Gross V, Weiss MG, Ring M, Hepp U, Bopp M, et al. (2008) Methods of suicide: International suicide patterns derived from the WHO mortality database. Bulletin of the World Health Organization 86(9): 726-732.
- Yonemoto N, Kawashima Y, Endo K, Yamada M (2019) Gatekeeper training for suicidal behaviors: A systematic review. Journal of Affective Disorders, Elsevier B.V 246: 506-514.
- Pitman A, Kryszynska K, Osborn D, King M (2012) Suicide in young men. The Lancet 379(9834): 2383-2392.
- Murphy GE (n.d.) Comprehensive Psychiatry Why Women Are Less Likely Than Men to Commit Suicide 39(4).
- Rihmer Z, Rutz W, Pihlgren H, Pestaloty P (1998) Decreasing tendency of seasonality in suicide may indicate lowering rate of depressive suicides in the population. Psychiatry Research 81(2): 233-240.
- Wong YJ, Deng K, Lee CS, Grimes J, Jonah Li PF (2018) Asian Pacific Islander Americans' and White Americans' suicide methods. Asian American Journal of Psychology 9(4): 318-326.
- Ivbijaro G, Kolkiewicz L, Goldberg D, Riba MB, N'jie INS, et al. (2019) Preventing suicide, promoting resilience: Is this achievable from a global perspective? In: Asia-Pacific Psychiatry, Wiley-Blackwell 11(4).
- Sobba KN (2019) Correlates and buffers of school avoidance: a review of school avoidance literature and applying social capital as a potential safeguard. International Journal of Adolescence and Youth 24(3): 380-394.
- Ross V, Caton N, Gullestrup J, Kølves K (2020) A longitudinal assessment of two suicide prevention training programs for the construction industry. International Journal of Environmental Research and Public Health 17(3).
- Burnette C, Ramchand R, Ayer L (2015) Gatekeeper Training for Suicide Prevention. Rand Health Quarterly 5(1): 48.
- Milner A, Niven H, Lamontagne A (2014) Suicide by occupational skill level in the Australian construction industry: Data from 2001 to 2010. Australian and New Zealand Journal of Public Health 38(3): 281-285.
- Hails S (2018) Cutting construction suicides: what the industry is doing to address mental health issues. Proceedings of the Institution of Civil Engineers - Civil Engineering.
- Gullestrup J, Lequertier B, Martin G (2011) MATES in construction: Impact of a multimodal, community-based program for suicide prevention in the construction industry. International Journal of Environmental Research and Public Health 8(11): 4180-4196.
- King TL, Gullestrup J, Batterham PJ, Kelly B, Lockwood C, et al. (2018) Shifting beliefs about suicide: Pre-post evaluation of the effectiveness of a program for workers in the construction industry. International Journal of Environmental Research and Public Health 15(10).
- Baume PJ, Clinton ME (1997) Social and cultural patterns of suicide in young people in rural Australia. The Australian Journal of Rural Health 5(3): 115-120.
- Doran CM, Ling R, Gullestrup J, Swannell S, Milner A (2016) The impact of a suicide prevention strategy on reducing the economic cost of suicide in the new south wales construction industry. Crisis 37(2).
- M Doran C, Ling R (2016) The Economic Cost of Suicide and Non-fatal Suicidal Behaviour in the Australian Construction Industry. International Journal of Mental Health & Psychiatry 02(04).

29. Yang B, Lester D (2007) Recalculating the economic cost of suicide. *Death Studies* 31(4): 351-361.
30. Kinchin I, Doran CM (2017) The economic cost of suicide and non-fatal suicide behavior in the Australian workforce and the potential impact of a workplace suicide prevention strategy. *International Journal of Environmental Research and Public Health* 14(4): 1-14.
31. Krishnananthan R (2018) Health Differences in Australia and the United States: The role of Social Expenditures.
32. Census of Fatal Occupational Injuries (CFOI) - Current and Revised Data. (2019).



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/PBSIJ.2021.16.555930](https://doi.org/10.19080/PBSIJ.2021.16.555930)

**Your next submission with Juniper Publishers
will reach you the below assets**

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>