

Construction Mortalities in the State of Florida based on Causes & Age Group

Pragadeeshwaran B¹

¹M.Tech Student, Dept. of Civil, Valliammai Engineering College, Kattankulathur, Tamilnadu, India

Abstract - The study focuses on assessing construction related mortalities in the state of Florida to determine the major causes & age group which are affected the most. Data ranging from 2011 to 2018 was obtained from U.S Bureau of Labor Statistics to perform the analysis. Results indicated from 2011 to 2018 there were 2123 overall deaths in the State of Florida in all sectors, out of which construction related accounted for 540 deaths. The major causes of construction related fatality was fall from height accounting for 209 out of the 540 deaths. In addition, the age group ranging from 45-54 are most vulnerable & have accounted for 24.07% of the overall deaths. The least vulnerable are people aged 20-24 & people aged 65 & over accounting for 4.26% & 8.70% respectively.

Key Words: Construction Safety, Hazard Recognition, Occupational Fatality

1. INTRODUCTION

(Bureau of Labor Statistics, 2008) stated, in the United States construction industry accounts for more than 20% of the workplace fatalities. (Albert & Hallowell, 2012) stated that each year between 1995 to 2008, in addition to 1000 fatal injuries have been documented in the United States. Although this number reduced to an average of 879 deaths in the next decade, it is still pertaining to be a major issue to be addressed (Bureau of Labor Statistics, 2018; Venugopal, 2020a).

Primary sources of these construction associated deaths are fall from heights (Chan et al., 2008; Chi, Chang, & Ting, 2005; Wong, Wang, Law, & Lo, 2016), crushed by objects (Al-Humaidi & Tan, 2010; McCann, 2006), struck by vehicles & equipment (Esmaeili & Hallowell, 2012; Hinze, Pedersen, & Fredley, 1998; Lipscomb, Dement, & Rodriguez-Acosta, 2000), fire, explosion, harmful substances (Hinze et al., 1998; Lipscomb et al., 2000). However, (Perlman, Sacks, & Barak, 2014) stated that human factors tend to be the foremost reason of these incidents. In addition, (Garavan & O'Brien, 2001) stated, accidents & injuries have been a result of unsafe acts rather than unsafe working conditions.

The study is focused on investigating the construction related deaths in the state of Florida from 2011 to 2018. Results of the study will help in determining the percentage of deaths in construction industry in comparison with overall fatalities, major causes of these incidents, & the age group which is more susceptible to these incidents. In addition, it will also aid in contributing to the literature about construction related deaths in the state of Florida.

2. METHODS & DATA COLLECTION:

Dataset used for the analysis was obtained from United States Bureau of Labor Statistics. The data set consisted of fatal injuries in all sectors, causes & age groups affected in the State of Florida from 2011 to 2018. In depth analysis was performed on the construction related fatalities based on the factors mentioned pertaining to the scope of study.

Table 1 shows us the total number of fatalities across all sectors & in construction sector in the State of Florida between 2011-2018. From this, the percentage of construction fatalities in respect to total number of fatalities in the State of Florida for each individual year & average across 2011-2018 was determined.

Table 1: Percentage of construction related deaths to overall deaths between 2011-2018

Year	Construction Fatalities	Overall Death	Percentage
2011	42	226	18.58%
2012	56	218	25.69%
2013	54	239	22.59%
2014	63	228	27.63%
2015	68	272	25.00%

2016	78	309	25.24%
2017	78	299	26.09%
2018	101	332	30.42%
Sum	540	2123	25.44%

Table 2 & Figure 1 shows us the major causes of fatalities in construction sector & percentage of deaths respective to each cause in the State of Florida between 2011-2018. The percentages were calculated by dividing the summation of number of deaths for each major cause to the overall fatalities across the 8-year period.

Table 2: Causes of Construction Related Fatalities between 2011-2018

Year	Fire & Explosion	Fall from Height	Struck by Vehicles & Equipment	Hit by Objects	Harmful Substances	Other	Sum
2011	-	15	12	7	4	4	42
2012	-	21	14	14	4	3	56
2013	-	22	15	7	9	1	54
2014	-	27	13	5	16	2	63
2015	-	22	21	11	10	4	68
2016	-	29	22	11	11	5	78
2017	1	33	13	9	14	8	78
2018	3	40	23	13	20	2	101
Sum	4	209	133	77	88	29	540

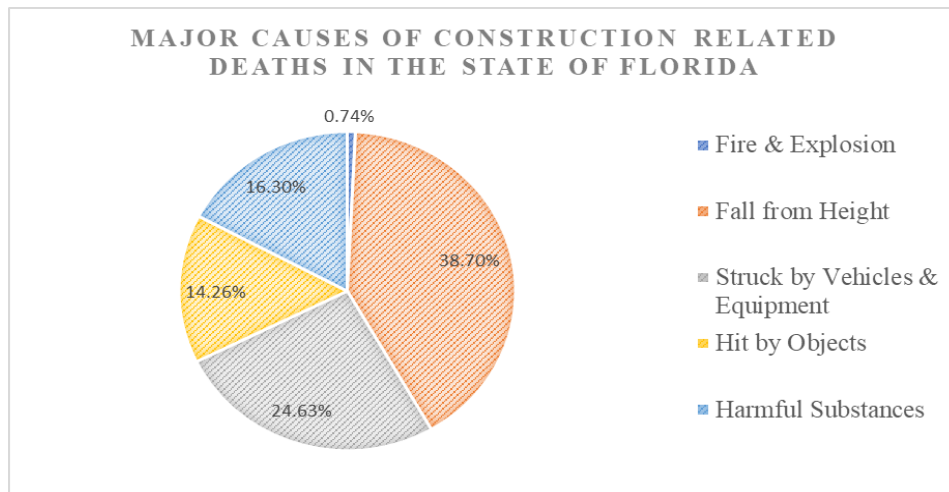


Figure 1: Percentage of Construction Related Fatalities based on Different Causes

Table 3: Number of Construction Related Deaths in each Age Group

Year	Age Group						
	20-24	25-34	35-44	45-54	55-65	65 & Over	Other
2011	-	4	12	11	10	-	5
2012	4	9	10	14	15	4	-
2013	-	11	13	8	17	4	1
2014	5	11	11	16	11	7	2

2015	4	12	14	14	12	11	1
2016	4	10	14	22	22	5	1
2017	3	19	14	20	16	6	-
2018	3	19	26	25	17	10	1
Sum	23	95	114	130	120	47	11
Average	3	12	14	16	15	6	1

Table 3 shows us the overall mortalities in construction sector in the State of Florida between 2011-2018. From this, the percentage of construction fatalities in respect to total number of fatalities in the State of Florida for each individual age group was determined.

Table 4: Percentage of Construction Related Deaths in each Age Group

Age Group	Total Deaths	Percentage
20-24	23	4.26%
25-34	95	17.59%
35-44	114	21.11%
45-54	130	24.07%
55-64	120	22.22%
65 & Over	47	8.70%
Other	11	2.04%

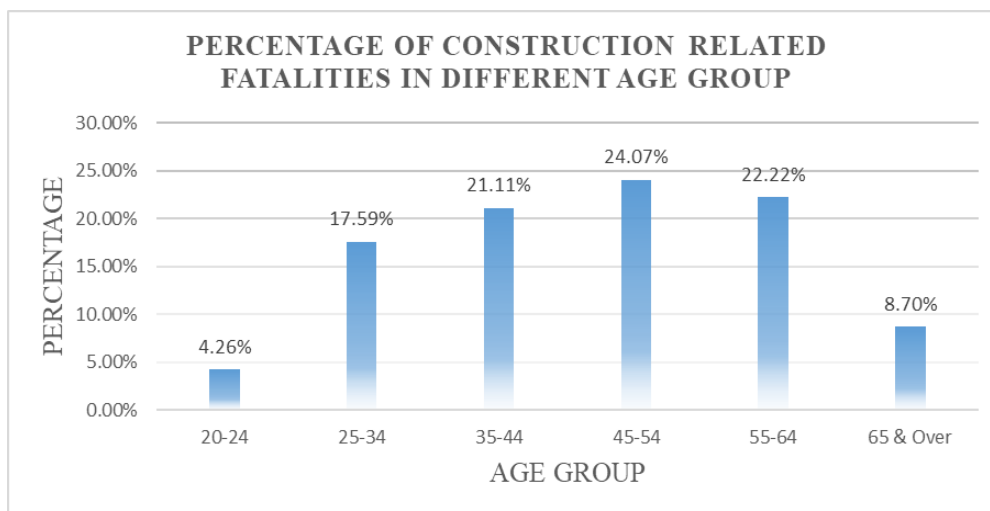


Figure 2: Percentage of Construction Related Fatalities in Different Age Group between 2011-2018

Table 4 & Figure 2 shows us the percentage of fatalities based upon each of the six age groups across 2011 to 2018. The percentages were calculated by dividing the summation of number of deaths for each age group to the overall fatalities across the 8-year period.

3. RESULTS & ANALYSIS:

- From Table 1 it was evident that construction related deaths in the State of Florida had increased 11.84% from 2011 to 2018. In addition, in 2018 constructions sector accounted for 1/3rd (30.42%) of the overall deaths. On an average, construction deaths have accounted for 25.44% of all the fatalities across the 8-year period.

- From Table 2 and Figure 1, it was evident that the major cause of mortality in construction was fall from heights accounting for more than 1/3rd (38.70%) of the fatalities. Followed by struck by vehicles & equipment which accounted for 1/4th (24.63%) of the deaths. Fire & explosion accounted for the least amount of deaths accounting to a mere 0.74%. In addition, deaths related to hit by objects & harmful substances accounted for 14.26% & 16.30% respectively.
- From table 3, it was also clear the age group ranging from 45-54 are most vulnerable & have accounted for 24.07% of the overall deaths. Followed by age group ranging 55-64 which accounted for 22.22%. The least vulnerable are people aged 20-24 & people aged 65 & over accounting for 4.26% & 8.70% respectively.

4. CONCLUSIONS:

Results indicated the trend on the annual number of construction industry related fatalities have been increasing in the State of Florida. As indicated, in terms of recent 2018 data, the industry accounted for 1/3rd of the overall deaths in all industries. (Venugopal, 2020a) stated in comparison to other industries, construction industry alone accounts for 1/5th (18.17%) of fatalities in the United States between 2009-2018. Results indicate the trend in Florida had been worse as the construction industry alone has accounted for 1/4th (25.44%) of the overall deaths.

In the United States, (Venugopal, 2020a) stated, from the years of 2009 to 2018 fall from height, struck by objects, & crushed by objects have accounted for approximately 1/3rd, 1/4th, & 1/6th of the construction related fatalities. This trend has been clearly similar in the state of Florida as indicated on the results. Results also indicated 2/3rd of these fatalities was from fall from height & struck by objects & equipment. (Venugopal, 2020b) stated in a similar study for the state of North Carolina were these two causes alone accounted for 3/4th of the construction related deaths.

Results also indicated 1/4th of the people aged 45-54 were more vulnerable to the fatal injuries in comparison with other age groups. This trend clearly shows us that even with experience & training construction workers are still highly vulnerable to fatal injuries. This shows us that, as stated earlier by (Perlman et al., 2014) human errors have been the major cause of construction related fatalities. Therefore, in addition to the mandatory usage of fall protection devices, personal protective equipment, safety meetings, & trainings it is necessary to teach the construction workers about hazard recognition.

References:

1. Al-Humaidi, H., & Tan, F. H. (2010). Construction safety in Kuwait. *Journal of Performance of Constructed Facilities*, 24(1), 70-77.
2. Albert, A., & Hallowell, M. R. (2012). Hazard recognition methods in the construction industry. Paper presented at the Construction Research Congress 2012: Construction Challenges in a Flat World.
3. Bureau of Labor Statistics, U. (2008). Construction Fatality Data 2003 to 2008. Retrieved from <https://www.bls.gov/iif/oshcfoi1.htm>
4. Bureau of Labor Statistics, U. (2018). Construction Data. Retrieved from <https://datausa.io/profile/naics/construction-group>
5. Chan, A. P., Wong, F. K., Chan, D. W., Yam, M. C., Kwok, A. W., Lam, E. W., & Cheung, E. (2008). Work at height fatalities in the repair, maintenance, alteration, and addition works. *Journal of Construction Engineering and Management*, 134(7), 527-535.
6. Chi, C.-F., Chang, T.-C., & Ting, H.-I. (2005). Accident patterns and prevention measures for fatal occupational falls in the construction industry. *Applied ergonomics*, 36(4), 391-400.
7. Esmaeili, B., & Hallowell, M. (2012). Attribute-based risk model for measuring safety risk of struck-by accidents. Paper presented at the Construction Research Congress 2012: construction challenges in a flat world.
8. Garavan, T. N., & O'Brien, F. (2001). An investigation into the relationship between safety climate and safety behaviours in Irish organisations. *Irish Journal of Management*, 22(1), 141.
9. Hinze, J., Pedersen, C., & Fredley, J. (1998). Identifying root causes of construction injuries. *Journal of Construction Engineering and Management*, 124(1), 67-71.

10. Lipscomb, H. J., Dement, J. M., & Rodriguez-Acosta, R. (2000). Deaths from External Causes of Injury Among Construction Workers in North Carolina, 1988? 1994. *Applied Occupational and Environmental Hygiene*, 15(7), 569-580.
11. McCann, M. (2006). Heavy equipment and truck-related deaths on excavation work sites. *Journal of Safety Research*, 37(5), 511-517.
12. Perlman, A., Sacks, R., & Barak, R. (2014). Hazard recognition and risk perception in construction. *Safety Science*, 64, 22-31.
13. Venugopal, M. (2020a). "Construction Fatalities in the United States between 2009-2018". *International Journal for Research in Applied Science & Engineering Technology*, 8(IV), 1129-1133.
14. Venugopal, M. (2020b). "Construction Related Deaths in the State of North Carolina in the Recent Decade Based on Causes, Races & Cities". *International Journal of Civil Engineering and Technology*, 11(3), 35-40.
15. Wong, L., Wang, Y., Law, T., & Lo, C. T. (2016). Association of root causes in fatal fall-from-height construction accidents in Hong Kong. *Journal of Construction Engineering and Management*, 142(7), 04016018.