

11-2017

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Moses New-Aaron

University of Nebraska Medical Center, moses.newaaron@unmc.edu

Jessica Semin

University of Nebraska Medical Center, jessica.semin@unmc.edu

Risto Rautiainen

University of Nebraska Medical Center, rrautiainen@unmc.edu

Murray Madsen

Central States Center for Agricultural Safety and Health

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Recommended Citation

New-Aaron, Moses; Semin, Jessica; Rautiainen, Risto; and Madsen, Murray, "Factors Associated with Fatalities in Production Agriculture" (2017). *Posters and Presentations: College of Public Health*. 3.
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Factors associated with Fatalities in Production Agriculture



Moses New-Aaron¹, BMLS, AMLS; Jessica Semin¹, RN, BSN; Risto Rautiainen¹, PhD and Murray Madsen



¹University of Nebraska Medical Center College of Public Health
Central States Center for Agricultural Safety and Health

Background

Agriculture is the most hazardous industry in the United States¹. Unlike most other sectors, the fatality rate in agriculture has not declined in the past two decades¹. Agriculture also has the highest rate of non-fatal injuries in the US². Common sources of injuries include livestock, agricultural machinery, vehicles (tractors, trucks, and ATVs), grain bins, silos, confined spaces, manure pits, ladders, and pesticides³. An agricultural injury can have a major impact on the farm operation and the family if a member of the household requires medical care and is not able to work. In the US, self-employed farmers may not have insurance coverage for medical care, lost work time, and productivity losses. Hence, agricultural fatalities and injuries constitute a public health challenge which requires further research, surveillance, and more effective prevention efforts. This study aims to identify factors associated with agriculture-related fatalities.

Methods

Data Collection

The Central States Center for Agricultural Safety and Health (CS-CASH) created a database using Microsoft Access software. Injury data were obtained from electronic and print media sources and entered continually into the database.

Print media incident reports were collected and tabulated by Mr. Murray Madsen via contract with press clipping services. Google Alerts were collected by CS-CASH staff based on key words including: "farm accident", "farm incident", "farm death", "ranch accident", "ranch incident", "ranch death", "ATV farm death", "ATV ranch death", "livestock death", as well as other descriptors. Verifiable electronic and print media reports were also collected from agricultural safety and health experts in the field. Relevant articles were analyzed, and data were then extracted and added to the database.

Data analysis

Incidents in seven states (IA, KS, MN, MO, NE, ND, SD) from 2012 to June 2017 were selected for analysis. Data were analyzed using SAS 9.4 statistical software. All variables were treated as categorical variables. Pearson's chi-squared test and logistic regression analyses were used to identify associations between injury severity (fatal vs. not) and characteristics of the media source, farmer age and gender, and incident time, location, and source.

Example of an article collected via Google Alert

Man killed in tractor rollover accident near Preston, Iowa

PRESTON, Iowa (KWQC) — A man was killed when the tractor he was operating rolled over and pinned him.

The Jackson County Sheriff Department was called to scene, around four miles west of Preston, Iowa, around 3:32 p.m. on Wednesday afternoon, May 17.

Sheriff's officials say 78-year-old John Charles Voss was operating an International 706 tractor and disk on a hillside when the tractor overturned and pinned him. Voss died at the scene.



Results

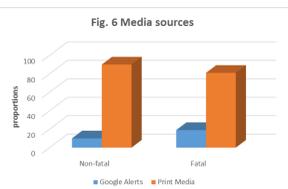
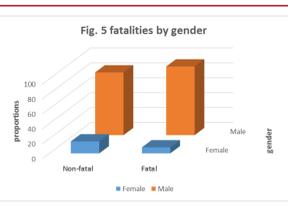
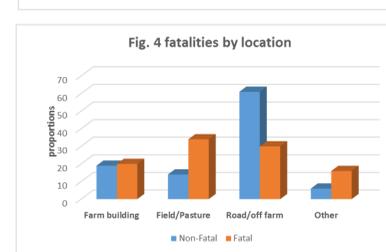
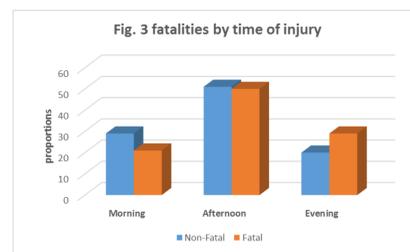
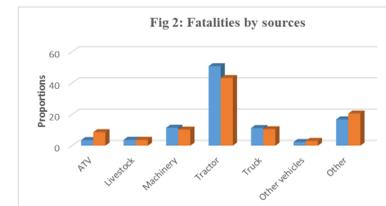
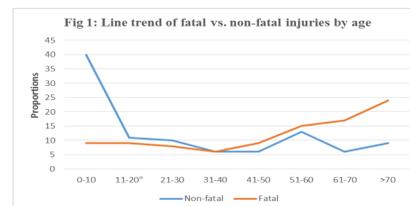


Table 1: Likelihood of reported injuries to be fatal

Effects	Crude Odds ratio	95% Confidence Interval		Adjusted Odds Ratio	95% Confidence interval	
		Lower	Upper		Lower	Upper
Age group						
0-10 versus >70	0.23	0.13	0.43	0.23	0.12	0.44
11-20 versus >70	0.37	0.19	0.72	0.46	0.22	0.96
21-30 versus >70	0.32	0.16	0.63	0.51	0.24	1.08
31-40 versus >70	0.51	0.22	1.18	0.57	0.22	1.47
41-50 versus >70	0.44	0.20	0.95	0.68	0.29	1.59
51-60 versus >70	0.57	0.31	1.04	0.61	0.32	1.19
61-70 versus >70	1.03	0.53	2.01	1.26	0.60	2.63
Place of injury						
Farm versus Road injuries	4.80	3.31	6.96	5.00	3.31	7.53
Time of the day injury occurred						
Afternoon versus Morning	1.29	0.84	1.99	1.12	0.69	1.81
Evening versus Morning	1.75	1.10	2.81	1.81	1.10	3.10
Media source						
Print media versus google alerts	0.55	0.34	0.89	0.71	0.42	1.23
Gender						
Female Vs. Male	0.42	0.25	0.72	0.69	0.38	1.27

Discussion

- The majority of cases captured in the CS-CASH database were non-fatal.
- The majority of cases were obtained from a press clipping service (Fig 6).
- Studies indicate that greater age is a risk factor for agricultural fatality^{4,5}; same was observed in this study (Fig 1). The effect of age is unclear for non-fatal injuries.
- Tractor is the number one source of fatalities in production agriculture⁶; this was observed in our data for both fatal and non-fatal cases (Fig 3).
- Print media is more effective than electronic media in reporting non-fatal injuries (Fig 6).
- Injuries on the farm had higher odds of being fatal than injuries occurring on roads (Fig 1). Non-fatal incidents on private property are less likely to be covered by media.
- Injuries that occur in the evening were more likely to be fatal when compared to injuries that occur in the morning (Table 1).
- Males are more likely to experience fatal and non-fatal injuries compared to females⁷; same was observed in this study (Fig 5).

Conclusion and Future Directions

Reported cases from electronic (google alerts) and print media provide valuable information on non-fatal and fatal injuries. These news sources provide rich case-based information that can be used in crafting prevention strategies and messages.

In this study we examined the associations of four factors to fatalities. The results of revealed age, gender, place of injury and time of injury as predictors of fatality. Further research should be directed towards prevention strategies targeted at older male farmers.

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