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What about the Rest of Them? Fatal Injuries Related to Production Agriculture Not Captured by the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI)

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ABSTRACT

Surveillance of injuries in production agriculture is necessary to inform stakeholders about workplace hazards and risks in order to improve and advance injury prevention policies and practices for this dangerous industry. The most comprehensive fatal injury surveillance effort currently in the United States is the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI), which covers occupational fatalities in all U.S. industries, including production agriculture. However, this surveillance does not include many categories of fatalities that occur during agricultural work or on production agriculture worksites. To better capture the human cost of production agriculture, the authors of this paper call for the collection of additional data with a broader scope that supplements, not replaces, the current CFOI. This paper describes challenges in surveillance, highlights key procedural gaps, and offers recommendations for advancing national surveillance of fatal traumatic injuries associated with production agriculture.



KEYWORDS

Injury; fatality; surveillance; agriculture

Introduction

Statistics from the 2019 Census of Fatal Occupational Injuries (CFOI) report indicate that workers in the agriculture, forestry, and fishing (AFF) sector have a fatal work injury rate of 23.1 per 100,000 full-time equivalent workers, and are seven times more likely to die on the job than non-AFF workers.¹ Among youth workers, fatalities in agriculture have exceeded all other industries combined for more than a decade with AFF fatalities in youth aged 15–17 accounting for 81% of all occupational fatalities and those aged 18–24 accounting for 59%.^{2,3} Yet, these statistics may undercount the fatality risk in agriculture. Due to unique issues associated with defining both the numerator (injury count) and denominator (working hour count) for the agriculture worker populations at risk, injury rates are difficult

to calculate for this sector. The CFOI focuses on fatal injuries to people performing “work”, which is within the scope of the Bureau of Labor Statistics (BLS) mission and mandate.⁴ However, this principle is difficult to apply in production agriculture because, unlike other industries, children and non-working individuals are also exposed to farm work activities and worksite hazards. Also, many people working in production agriculture are primarily employed in other industries with agricultural work serving as a part-time or secondary form of employment. As a result, many fatalities that occur on farms and ranches are excluded from the CFOI count. Therefore, while BLS captures work-related fatalities in occupational agriculture, the reported cases alone do not tell the full story of lives lost due to agricultural activities.

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While annual BLS statistics of work-related fatalities are a vitally important part of surveillance, inclusion and exclusion definitions for agricultural injuries should be clarified to better characterize the nature and context of the incidents. Under the current classification system, to be considered a workplace fatality, an incident must: a) result from a traumatic injury, b) occur within the United States, and c) be related to work “ON the employer’s premises and the person was there to work”, or “OFF the employer’s premises and the person was there to work, or the event or exposure was related to the person’s work or status as an employee.”⁵ Types of workers covered under the CFOI include volunteers, “good Samaritans,” undocumented workers, and several other special categories. Farmers, farm houses, and hobby farms are briefly described, but many incidents in production agriculture that are clearly associated with farm work do NOT get captured.

Fatalities to young children (ages 0–6 years, for example) and non-working bystanders are generally excluded from CFOI, even if the fatality occurs under work-related circumstances (Table 1, cases 4–9).⁴ One reason is that death certificates, which are a major source document used by CFOI, ask about the usual occupation of the victim, and if the incident was related to work. Victims under the age of 18 and non-working bystanders are often not identified as having an agricultural occupation. CFOI definitions of occupational fatalities can encompass bystanders and agritourism visitors, but these individuals are often not accurately identified and categorized. Furthermore, it is often difficult to determine whether certain work-related fatalities involving farm machinery actually involve production agriculture activities. For example, a fatal tractor overturn that occurs to a rural resident with several acres, horses, and a tractor used for hauling hay and doing other chores would most likely not be counted by CFOI even if the individual was engaged in agricultural activities. Similarly, many victims of collisions with slow moving farm machines on public roadways (such as moving equipment from field to field or farmstead to field) would also not be counted by CFOI standards (Table 1, cases 1–3). These motor vehicle crash victims are directly involved in an agriculture-related incident, as

their vehicles come into contact with agricultural machines.

Despite these challenges, BLS continues to study labor-related issues and collects and provides data that are comparable across multiple industries, given the previously mentioned caveats. To provide a more complete picture of occupationally related lives lost in production agriculture and at agricultural work sites, the authors of this paper call for the collection of additional injury and fatality data with a broader scope and recommend changes to the current CFOI definitions of agricultural sites, operations, and operators. Additionally, to capture non-occupational injuries involving agriculturally related equipment, structures, livestock, tools, products, and landscapes, we encourage the use of the Farm and Agricultural Injury Classification (FAIC) Code by federal and state injury coders.⁶

In an effort to improve the surveillance of agricultural injuries, the authors of this paper are actively involved in the operations or advisement of the AgInjuryNews system, and have led or assisted with other agricultural injury surveillance projects and programs in the U.S. and abroad, often funded through the National Institute for Occupational Safety and Health’s (NIOSH) regional Centers for Agricultural Safety and Health.⁷ AgInjuryNews.org is a growing collection of agricultural injury reports primarily derived from news media, obituaries, and similar reports.^{8–10} Reports are collected, coded, and published for public use.^{11,12} Examples of publicly available reports extracted from the AgInjuryNews.org dataset are displayed in Table 1. In this paper, we describe and suggest recommendations for three important issues that help focus attention on shortcomings of current agricultural injury surveillance efforts nationally.

Issue 1: Who is working, and does it matter?

Surveillance is performed to inform prevention efforts. To this end, reporting and monitoring procedures should be directed toward preventing all deaths regardless of circumstance. This is especially true for youth (ages 0–19) (Table 1, cases 4–9). They are often capable of performing a surprising array of farm work tasks. Living on

Table 1. Examples of Fatal Cases – Data Extracted from AgInjuryNews.org⁷.

Case #	Summary	AgInjuryNews ID#	Exclusion Rationale	Date of Incident	State	Victim Occupation	Victim(s) Gender	Victim(s) Age(s)
1	67 y/o female fatally injured when the passenger vehicle she was riding in rear-ended a tractor pulling farm equipment on a public roadway	11,936	Victim not working	11/05/2019	ID	Unknown	F	67
2	39 y/o male fatally injured when the tractor he was operating on a public roadway turned left and a passenger vehicle attempting to pass struck the tractor. 3 others, including an 11 month old child were non-fatally injured	11,879	Only the working victim included; (had there been other fatalities, they would have been excluded because they were not working)	10/25/2019	MT	Unknown	Unknown, M, M, M	11mo, 39, 30, 25
3	45 y/o female non-fatally injured and a 9 y/o female fatally injured when a passenger vehicle attempted to pass a tractor operating on a public roadway and pulling a grain cart but struck the rear corner of the tractor	11,805	Victims not working	10/6/2019		Unknown Unknown	F, F	45, 9
4	14 month old girl fatally injured when struck by a wagon being moved in reverse in a barnyard	11,399	Victim not working	07/27/2019	WI	n/a	F	1
5	7 y/o female fatally injured and 5 y/o male non-fatally injured when playing on a farm trailer and they came in contact with faulty electrical wires and were electrocuted	11,386	Victims not working	07/23/2019	NE	n/a	F, M	7, 5
6	2 y/o female fatally injured when struck by a skid steer as a 12 y/o was operating it to feeding hay. She was not expected to have been in the work area	11,239	Victim not working	05/23/2019	WI	n/a	F	2
7	Father and 14 y/o daughter fatally injured when walking their dog on the shoulder of a public roadway and an approaching farm truck veered off the road and struck them	11,278	Victims not working	06/03/2019	MI	Unknown	M, F	Unknown, 14
8	11 y/o female fatally injured in ATV rollover when visiting family farm	10,895	Victim not working	10/13/2018	TX	Unknown	F	11
9	4 y/o female fatally injured when she fell from the tractor she been riding as a passenger on and was run over	11,951	Victim not working	11/11/2019	AL	n/a	F	4
10	70 y/o male fatally injured when the tractor he was operating on a public roadway was struck from behind by a passenger vehicle	11,666	Unknown if victim was working	9/12/2019	LA	Unknown	M	70
11	74 y/o male fatally injured when the tractor he was operating was struck by a passenger vehicle on a public roadway	11,911	Unknown if victim was working	11/01/2019	NY	Unknown	M	74

(Continued)

Table 1. (Continued).

Case #	Summary	AgInjuryNews ID#	Exclusion Rationale	Date of Incident	State	Victim Occupation	Victim(s) Gender	Victim(s) Age(s)
12	71 y/o male fatally injured when his tractor was struck from behind by a vehicle	11,875	Unknown if victim was working	10/23/2019	KY	Unknown	M	71
13	60 y/o male fatally injured while driving a tractor on a public roadway and he was struck from behind by a dump truck	11,005	Unknown if victim was working	12/11/2018	GA	Unknown	M	60

the farm or ranch, they may accompany their parents as they work, ride with someone who is operating farming equipment, or play in or near production agriculture work places or zones.¹³ Being more inclusive of injuries and fatalities reported as agricultural-related removes the judgment required by officials to determine whether a victim was working when the incident occurred.

Furthermore, the increasing numbers of agritourism operations provide an additional challenge to what is considered agriculture-related. Agritourism businesses include a wide variety of enterprises such as pumpkin patches, U-pick fruit farms and orchards, petting zoos, and Christmas tree farms with sleigh or hayrides. Non-working members of the public are drawn to these legitimate agricultural business operations for many reasons, including the purchase of agricultural products and recreation. These recreational activities are part of the operation, and if a visitor dies during such activities, the death is generally not counted in agricultural surveillance activities.

Issue 2: What are the boundaries of the agricultural workplace?

Not all farm work is done within the tightly-defined boundaries of a farm or ranch worksite. Production agriculture work often involves travel over public roads and highways. Most farms now require travel on roads as machines are moved from the farmstead or farm headquarters to various fields. Similarly, field-to-field travel is very common. This travel of large, heavy, slow-moving machines that are generally traveling no more than 20–30 miles per hour (~30–45 kmh) exposes members of the motoring public to the hazards of farm equipment of all types. The

operators of the farm vehicles are performing work, and for them, the farm worksite necessarily includes roads and highways. If they are killed in the course of such work, their deaths are included in agricultural fatality surveillance. If, however, the roadway is part of the work site for farm vehicle operators, it is also a farm worksite that exposes members of the non-farming public to agricultural hazards (Table 1, cases 1–3).

Issue 3: If a tractor operator dies, does it matter whether or not farm work was involved?

The use of farm tractors on non-farm properties is not new. In fact, with increasing numbers of people living on non-farm properties in rural areas, and with the increasing popularity of compact utility tractors, more people than ever are operating tractors for non-farm, non-production agricultural reasons. The question must be asked, if a person is killed while operating a tractor, does it matter whether or not such operation was for an agricultural purpose? A fatality involving a tractor overturn while mowing a pasture on a working farm is included in agricultural fatality surveillance. However, if that same tractor and mower are being used to mow horse pasture on rural non-farm acreage, or on what BLS considers to be a “hobby farm,” it falls out of the scope, as it does not meet the USDA farm definition. If a tractor is operated on a public road by a farmer or other agricultural worker, and a collision kills the operator, the fatality is included. If the same make and model tractor is being operated by a non-farmer, such as the owner of rural non-farm property, and the operator is killed, that fatality is not included (Table 1, cases 10–13).

Among other things, tractor manufacturers rely upon injury incident reports to improve safety engineering and design of tractors. Thus, missing non-agricultural tractor injuries misses the collection of potentially valuable feedback for improving the safety in the mechanical design of tractors. In order to serve surveillance's purpose of informing prevention efforts, an agricultural tractor, regardless of size, regardless of the purpose of operation, and regardless of the operator, should, for the sake of agricultural fatality surveillance, be considered an agricultural hazard and be covered by that surveillance.

Discussion

When performing surveillance work, it is important to recognize the objective and focus of this effort. In the case of agricultural work, it is about monitoring existing and emerging risks as a way to better target prevention and intervention activities – not just education, but design issues, needs for new engineering standards, or the need for new or revised laws and regulations as well. Surveillance data are also important in identifying unintended consequences of new practices, technologies, and regulatory schemes.

Implications and recommendations

National surveillance systems that apply uniform definitions and coding schemes provide value to stakeholders and facilitate collaborations between researchers nationally and internationally.^{12,14–17} Yet, gaps remain in national statistics, and support is needed to supplement current national surveillance to be more inclusive and comprehensive, recognizing the whole spectrum of agriculture-related injury and fatality cases.

The following are our recommendations for developing a more complete, accurate, and comprehensive surveillance system for agricultural injuries and fatalities. The NIOSH currently supports ten regional agricultural health and safety centers across the United States, plus the National Children's Center for Rural and Agriculture Health and Safety.⁷ Many of these centers have programs for conducting surveillance for agricultural fatalities and injuries in their regions. While there is

collaboration within these centers for sharing and analyzing surveillance data, the coverage does not include all states and the methods vary greatly between centers and surveillance projects.

We recommend that NIOSH lead and fund a collaborative effort with the agricultural health and safety centers, aiming to develop common surveillance systems for collecting agricultural fatality, injury, and illness data. Specific areas of development should include agriculture-related fatalities that are currently excluded from BLS CFOI as well as non-fatal agricultural injuries and illnesses to self-employed farmers and ranchers and their family members that are currently excluded from BLS Survey of Occupational Injuries and Illnesses. We also recommend that this work be coordinated with other groups such as Injury Prevention Research Centers, Fatality Assessment Control Evaluation programs, and state-based transportation and occupational health and safety surveillance to create a more robust system to capture agricultural injuries and fatalities. We further recommend that the newly developed agricultural surveillance system should have national coverage, be cost effective by utilizing existing infrastructure in CFOI and NIOSH Ag-Centers, and build on the expertise gained from national (internal NIOSH), regional (centers) and state-based surveillance systems.

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Author contributions

All authors contributed to the conception or design of the work.

Institution and Ethics approval and informed consent

No human subjects were involved in this research, and the AgInjuryNews initiative is considered exempt for review by the Marshfield Clinic Research Institute's Institutional Review Board.

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References

1. U.S. Bureau of Labor Statistics. Graphics for Economic News Releases. Number and Rate of Fatal Work Injuries by Industry Sector, 2019. <https://www.bls.gov/charts/census-of-fatal-occupational-injuries/number-and-rate-of-fatal-work-injuries-by-industry.htm> Accessed April 1, 2021.
2. Centers for Disease Control and Prevention; National Institute for Occupational Safety and Health (NIOSH). *Analysis of the Bureau of Labor Statistics Census of Fatal Occupational Injuries Microdata*. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health; 2019.
3. Guerin RJ, Castillo D, Hendricks KJ, Howard J, Piacentino J, Okun AH. Preparing the future workforce for safe and healthy employment. *Am J Public Health*. 2020;110(1):69–71. doi:10.2105/AJPH.2019.305393.
4. U.S. Bureau of Labor Statistics. Census of Fatal Occupational Injuries. Handbook of Methods. <https://www.bls.gov/opub/hom/cfoi/pdf/cfoi.pdf>. Accessed July 19, 2020.
5. U.S. Bureau of Labor Statistics. Injuries, Illnesses, and Fatalities. Scope of the Census of Fatal Occupational Injuries (CFOI). <https://www.bls.gov/iif/cfoiscope.htm#Farms-farm-houses-and-hobby-farms>. Accessed November 12, 2020.
6. American Society of Agricultural and Biological Engineers (ASABE). Farm and Agricultural Injury Classification (FAIC) Code. ASAE S575. 2020. <https://elibrary.asabe.org/pdfviewer.aspx?GUID=CB4C4EC4-5707-4F52-BB9F-E042A15EDBB5>. Accessed April 5, 2021.
7. Centers for Disease Control and Prevention. *The National Institute for Occupational Safety and Health (NIOSH)*. Centers for Agricultural Safety and Health. <https://www.cdc.gov/niosh/oep/agctrhom.html>.
8. Weichelt B, Gorucu S, Jennissen C, Denning G, Oesch S. Assessing the Emergent Public health concern of all-terrain vehicle injuries in rural and agricultural environments: initial review of available national datasets in the United States. *JMIR Public Health Surveill*. 2020;6(2):e15477. doi:10.2196/15477.
9. Weichelt B, Heimonen T, Gorucu S, et al. Redesigning a sentinel surveillance system for collecting and disseminating near real-time agricultural injury reports: system usability study. *JMIR Form Res*. 2019;3(3):e13621. doi:10.2196/13621.
10. AgInjuryNews Welcome. *Ag Injury News Clippings*. Marshfield, WI: National Farm Medicine Center; 2020. <http://www.AgInjuryNews.org>.
11. Gorucu S, Weichelt B, Redmond E, Murphy D. Coding agricultural injury: factors affecting coder agreement. *J Safety Res*. 2020;75:111–118. doi:10.1016/j.jsr.2020.08.006.
12. Murphy D, Gorucu S, Weichelt B, Scott E, Purschwitz M. Using multiple coding schemes for classification and coding of agricultural injury. *Am J Ind Med*. 2019;62:87–98. doi:10.1002/ajim.22932.
13. Pate ML, Gorucu S. Agricultural work-related fatalities to non-working youth: implications for intervention development. *J Agric Saf Health*. 2020;26(1):31–43. doi:10.13031/jash.13691.
14. Weichelt B, Salzwedel M, Heiberger S, Lee BC. Establishing a publicly available national database of U.S news articles reporting agriculture-related injuries and fatalities. *Am J Ind Med*. 2018;61(8):667–674. doi:10.1002/ajim.22860.
15. Scott EE, Hirabayashi L, Krupa NL, Sorensen JA, Jenkins PL. Developing surveillance methodology for agricultural and logging injury in new hampshire using electronic administrative data sets. *J Occup Environ Med*. 2015;57(8):866–872. doi:10.1097/JOM.0000000000000482.
16. Scott EE, Krupa NL, Horsman M, Jenkins PL. Estimation of agricultural and logging injury incidence in Maine using electronic administrative data sets. *J Agromedicine*. 2015;20(2):195–204. doi:10.1080/1059924X.2015.1009668.
17. Patel K, Watanabe-Galloway S, Gofin R, Haynatzki G, Rautiainen R. Non-fatal agricultural injury surveillance in the United States: a review of national-level survey-based systems. *Am J Ind Med*. 2017;60(7):599–620. doi:10.1002/ajim.22720.