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Non-fatal Animal-Related Farm Injuries to Youth in the United States - 1998

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Abstract

Objective: To provide data on the magnitude of animal-related farm injuries to youth in the United States.

Data Source: A youth farm injury survey of 26,000 farm households conducted for the National Institute for Occupational Safety and Health (NIOSH) by the United States Department of Agriculture (USDA) in 1998.

Subjects: Youth less than 20 years of age.

Results: There were an estimated 6438 animal-related farm injuries to youth less than 20 years in 1998 (injury rate = 1.7/100 farms). Seventy percent of the injuries occurred to youth farm residents. Sixty-nine percent of animal-related farm injuries were work related. Males accounted for 64% of the animal-related farm injuries. Approximately 41% of the injuries occurred to youth under the age of 10. Thirty-seven percent of the injuries involved horses, and 31% involved cattle. The remainder of the cases either involved some other animal or the animal was not specified. While the majority of horse-related injuries occurred to females, the majority of the cattle-related injuries were to males.

Conclusions: Results from this study show that one out of every five youth farm injuries in the U.S. is animal-related. These animal-related injuries were due to both work and nonwork-related exposures, although a higher proportion of the injuries were work-related. Because youth farm residents accounted for the majority of the farm animal-related injuries, they should be the focus of any intervention strategies. Further research is needed to better understand existing risk factors for animal-related injuries to youth on farms.

Introduction

Farming is widely recognized as a hazardous occupation for both adults and youth [1-3]. Youth are exposed to farm hazards from a variety of mechanisms [4], and unique hazards exist simply by virtue of these youth living, working, visiting and playing on the farm. Although the exact number of youth exposed to farming hazards is unknown, available data indicate an average of 104 youth less than 20 years of age die on farms annually [5]. In 1994, the national estimate of lost-time injuries to youth farm workers under the age of 20 was 10,173 [6].

Previous studies of injuries in agriculture have often focused on farm machinery and tractors [7-8]; however, farm animals have also been identified as a major source of injury [9-11]. Data specific to youth in Wisconsin has shown that for injuries requiring hospital admission, farm animals were the cause of 40% of the injuries. This study has also shown that the type of injuries most often caused by farm animals include, injuries to the head, upper extremity, maxilla, leg, and thoracoabdominal region [4].

The problem of animal-related injuries to youth on farms has also been noted beyond the United States [12-16]. A study of youth on farms in Australia indicated that 86% of the youth reported working with farm animals, with 55% experiencing an injury. In 44% of the cases, the injury was caused by a farm animal. Additionally, 72% of the youth surveyed perceived working with animals as the most dangerous activity on the farm [13].

Horses have been identified as a major cause of animal-related farm injuries [14-17]. Horses are

found on many different types of farms and are used by youth for both recreation and farm work which may increase the risk of injury [17]. A study conducted in Great Britain found that horseback riding results in more injuries per hour than motorcycle riding [14]. In the U.S., research using the National Electronic Injury Surveillance System (NEISS), a hospital emergency department surveillance system, estimated 7,500 farm injuries to youth resulting from horseback riding on farms between 1990 and 1993 [5]. Studies have shown young females to be at an increased risk for horse-related injuries, with an injury rate three times higher than males [13-14]. Falls are the predominant type of injury for those engaged in riding activities, while being kicked or stepped on is the most frequent injury for those on the ground who are in close proximity to the horse [15-16]. Falls from horses result almost exclusively in head and upper extremity injuries, with studies indicating that fractures, lacerations and contusion are the most frequent type of outcomes associated with these horse-related injuries [18].

Working with cattle was identified as hazardous more than twice as often as horses by youth (10-14 years) living on farms in Australia [13]. Studies conducted in Vermont and Wisconsin found that a large proportion of injuries on farms involved contact with cattle [10-11]. In a study of two rural Vermont hospitals, more than one-third of all injuries that occurred on dairy farms involved contact with cattle, with 5% occurring to youth less than 15 years of age [10]. Cattle-related injuries were most commonly the result of being kicked or pushed by the cattle [10,19]. The extremities have been identified as the most frequent site of injury [11].

National frequency and incidence estimates of animal-related farm injuries among youth in the

U.S. are limited in the literature. To address this gap in the literature, a national farm operators' survey on youth farm injuries was conducted. This analysis focused on all on-farm animal-related injuries to youth less than 20 years of age identified in the survey.

Methods

In February of 1999, the National Institute for Occupational Safety and Health (NIOSH), through an interagency agreement with the United States Department of Agriculture (USDA), sponsored a regionally stratified telephone survey of 26,000 farm households across the U.S. on farm-related injuries to youth less than 20 years of age that occurred during the calendar year of 1998. Sampling strata for the survey were the Bureau of the Census geographic regions. For this study, an injury was defined as any injury event occurring on the farm operation that required at least four hours of restricted activity or required the individual to seek professional medical attention. Information was collected on both work and non-work injuries occurring to youth who were either living on the farm, visiting the farm, or hired directly to work on the farm. Injuries to contract laborers were excluded. A work-related injury was defined as any injury that occurred to a youth while performing activities that had a direct impact on the farming operation as a business, regardless of whether the activity was performed for pay.

General injury information, such as source, event, nature, body part, work-relatedness of the injury, and an injury narrative were collected for up to four injuries per farm. For farms with more than four injuries for 1998, respondents were asked for information on the four most recent

injuries. More detailed questions, such as protective equipment use, were asked for horse-related injuries. Demographic information was also collected for the farm household and for any youth hired to work on the farm. Since demographic information was available only for household youth and hired workers, estimates of injury rates were calculated excluding any injuries to visitors that may have occurred.

On-farm animal-related injuries were subset from the data by selecting respondents who answered positively to the questions asking if a horse or any other livestock or animal was involved in the injury. In some instances an injury could involve multiple animals such as a person being injured while riding a horse and herding cattle. In these cases, the animal which was the primary source of injury was selected.

Sampling weights were calculated based on the total number of farms responding by geographical region (i.e., stratum) and the number of farms reported in the 1997 Census of Agriculture for each region. All estimates and variances for both the injury and the demographic data were obtained using the unbiased estimators for a stratified simple random sample [20]. Estimates and 95% Confidence Intervals are presented where the standard error does not exceed 33% of the estimate. Age groups presented in tables are not consistent in order to meet the above standard for reportability.

Results

During the calendar year of 1998, there were 32,808 (95% confidence interval [CI]: 28416 to 37200) injuries to youth under the age of 20 that occurred on farms (injury rate=1.7/100 farms). Of these on-farm injuries, 6438 were animal-related. Forty-six percent (2958) of the animal-related injuries occurred to males, and 25% to females (1635; Table 1). In approximately 1800 cases, sex was not reported. An estimated 4484 (70%) injuries occurred to youth who were living on the farm, with 1954 occurring to non-residents, which would include hired workers and visitors to the farm.

Table 1 also shows the distribution of animal-related farm injuries by age group. Over forty percent (2658) of the injuries occurred to youth under the age of 10, 1864 injuries occurred to youth age 10-15, and 1917 to youth 16-19. Sixty-nine percent of the injuries (4427) occurred while the youth was completing work on the farm, with 2011 injuries resulting from recreational activities.

The types of on-farm animal-related injuries that most frequently occurred were scrapes and abrasions (26%), cuts and lacerations (18%), fractures (17%) and contusions (15%; Table 1). The body parts most frequently injured were the head/skull (1580; 95% CI: 798-2362) and the hand/wrist/fingers (1408; 95% CI: 687-2129). A majority of the injuries involved either horses (37%) or cattle (31%). In the remaining cases (2069; 95% CI: 1160-2978) either some other animal (e.g., pig, dog, etc.) was involved or the animal was not specified.

HORSES

In an estimated 2382 of the on-farm animal-related injuries, a horse was the primary source of injury. The majority of the horse-related injuries (46%) occurred to females. Approximately 38% percent of the horse-related injuries occurred to youth under the age of 10 (Table 2). In 1466 of the injuries, the youth were living on the farm at the time of the injury. In an estimated 1560 cases the injury occurred while the youth was involved in non-work activities. Table 3 shows the injury rate for horse-related injuries for household and hired females is more than twice the rate for males.

In 1505 cases, (95% CI: 815-2195) the horse-related injuries occurred while the youth was riding the horse, with 969 (95% CI: 414-1524) injuries resulting from being thrown from the horse. Three-quarters (1132; 95% CI: 528-1736) of the youth who were injured while riding were not wearing a protective helmet.

CATTLE

Cattle were the primary source of injury in an estimated 1987 of the on-farm animal-related injuries during 1998. Approximately 73% (1459) of the injures were to males. Almost half of the cattle-related injuries (986) occurred to youth under the age of 16 (Table 4). In 1279 cases (95% CI: 591-1967) the injured youth lived on the farm, with all of the cattle-related injuries occurring to either household members or youth hired to work on the farm. An estimated 1843

(95% CI: 1010-2676) of the injuries occurred while completing work. Moving or herding cattle was the task most commonly being performed at the time of injury (803; 95% CI: 242-1364).

Discussion

Information about the incidence and circumstances of animal-related injuries among youth less than 20 years on farms is needed to target and develop effective injury prevention strategies.

This study estimates that 6438 animal-related injuries requiring four hours of restricted activity or professional medical attention occurred to youth on farms in 1998, and further indicates that: (a) 70% of injuries were to youth who live on farms (b) more than 40% of injuries were to youth less than 10 years of age, and (c) 69% of injuries were to youth engaged in work on the farm.

The high proportion of animal-related injuries among youth living on farms indicates that animals are a hazard to this population. Previous studies have identified horses and cattle as the leading cause of animal-related farm injuries [4,21]. These two animals were also the leading cause of injuries reported in this study. Because an estimated 1,260,000 youth less than 20 years live on farms in the United States [22], prevention strategies targeted at farm residents hold the possibility of decreasing animal-related farm morbidity. Farm families are key players in any farm safety prevention initiative [23].

The age distribution of on-farm animal-related injuries shows youth less than 10 years of age contributing slightly more than 40% of the cases. The relatively high proportion of injuries to

these youth may reflect their early introduction to farm work. One study found that 77% of youth 4 through 7 years of age who live on farms participated in work activities in some manner, with feeding livestock as the leading activity for this age group [24].

Gender differences for horse-related injuries reported in this study are consistent with what has been previously reported in the literature [14,18]. Although the overall animal-related injury rates are similar for both sexes, horse-related injury rates for females are higher than males. We were unable to determine if female riders had taken safety classes, engaged in risky behaviors, or if there were other predisposing factors.

Herding or moving cattle were responsible for most of the cattle-related injuries in this study which included all farms with cattle. The relative risk of injuries for males to females from cattle was 2.0. Previous research on cattle-injuries has found handling cattle to be a contributor to injuries (8-9). The identification of hazardous work activities is essential for those who assign tasks and supervise youth at work.

In general, child labor laws for agriculture set forth under the Fair Labor Standards Act (FLSA) are less strict than those for nonagricultural occupations. Where youth under the age of 18 employed in nonagricultural occupations are prohibited from performing work tasks declared hazardous, regulations covering youth who work in agricultural occupations are less comprehensive and apply only to youth under 16. Among these Hazardous Orders for agriculture is one that prohibits youth less than 16 from working on a farm in a yard, pen or stall

occupied by: 1) a bull, boar, or stud horse maintained for breeding; or 2) a sow with suckling pigs, or a cow with a newborn calf. Another limitation of child labor regulations for agriculture is that they do not apply to minors who are employed by their parents or a guardian on a farm owned or operated by their parent or guardian [25]. Therefore, the regulations would not apply to the 70% of injuries reported in this study which occurred to farm residents.

The on-farm animal-related injuries reported in this research are both work and non-work-related incidences, although a higher proportion of the injuries were work-related. Many reasons have been cited in the literature as possible injury risk factors for youth. The lack of childcare arrangements and the farm location serving as both a place of residence and work have been cited as major exposure factors [5]. Increased activity and curiosity before the development of mature decision making among youth could also be a factor [4].

Efforts to reduce or eliminate on-farm animal-related injuries should be directed principally to farm residents. Efforts should be made to educate farm youth residents about the many dangers presented by farm animals. In addition to educational efforts, structural modification of barns to limit animal interaction, isolation of dangerous animals, adequate supervision of youth, and wearing protective gear in recreational and work activities are a few of the prevention strategies which can be employed to reduce animal-related farm injuries.

In a substantial number of the horse-related injuries, the injured youth were not wearing any protective headgear. This is particular troubling when paired with the fact that over a quarter

(29%) of the injuries in this study occurred to the face and head. Previous research has shown that without a protective helmet the injury severity and morality associated with an individual being thrown from a horse is comparable to being struck by a car (26). An educational campaign, similar to that used for bicycle helmets, could help to increase the use of protective headgear for horseback riding and possibly prevent many injuries.

Limitations for this study are minimal. Although the period of an injury was limited to one year, and information was requested for only the most serious injuries, there is still the potential for recall bias. Youth farm workers hired by a contractor, although an important part of the agricultural work force, were excluded from this study. Lastly, due to the small number of injuries in certain categories (e.g., cattle-related injuries to females), the standard errors exceed an acceptable level and were not reportable.

Conclusions

This research shows that youth farm residents experience a higher proportion of animal-related injuries and should be the main focus of any intervention strategies. The majority of the animal-related injuries sustained to youth on farms appear to be work-related. In order to decrease the incidence of animal-related farm injuries, intervention programs that emphasize awareness, adequate supervision and specify age appropriate activities for farm youth who are exposed to animals are needed.

Several non-regulatory approaches also have been recommended to prevent childhood work and nonwork-related injuries on farms [27]. The North American Guidelines for Childhood Agricultural Tasks (NAGCAT), which were recently established by the National Children's Center for Rural and Agricultural Health and Safety, present guidelines for parents and employers to follow in assigning tasks to children age 7-16 based on their development abilities (28). Ten of the 62 guidelines deal with animal care and handling.

Additional research is needed in the area of on-farm animal-related injuries to better understand the implications of these findings. Further investigation is also needed to uncover what risk factors exist for animal-related farm injuries, and to determine why females appear to be at an increased risk for horse-related injuries.

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Table 1. Animal-Related Farm Injuries to Youth Less than 20: U.S. 1998.

	Youth Injuries (%)	95% Confidence Interval
All Animal Injuries	6438	4892-7984
Sex		

Male	2958 (46)	1908-4009
Female	1635 (25)	910-2360
Unknown	1845 (29)	---

Age Group		
< 10	2658 (41)	1641-3675
10-15	1864 (29)	1062-2666

16-19	1917 (30)	1078-2756
Work Status		
Work	4427 (69)	3131-5723

Non-work	2011 (31)	1172-2850
Type of Injury		
Scrape/Abrasion	1670 (26)	849- 2491

Cut/Laceration	1158 (18)	493-1821
Broken Bone/Fracture	1057 (17)	432-1682
Bruise/Contusion	992 (15)	469-1515

Other	1561 (24)	820-2302
Residency		
Farm Resident	4484 (70)	3192-5776

Non-resident	1954 (30)	1107-2801
Horse-related	2382 (37)	1478-3286
Cattle-related	1987 (31)	1119-2855

Table 2. Horse-Related Farm Injuries to Youth Less than 20 by Sex and Age: U.S. 1998.

	Youth Injuries (%)	95% Confidence Interval
Horse-related Injuries	2382	1478-3286
Sex		

Male	950 (40)	372-1528
Female	1105 (46)	511-1699
Unknown	327 (14)	--
Age Group		
< 10	899 (38)	336-1462
10-19	1484 (62)	778-2190
Residency		
Farm Resident	1466 (62)	774-2158
Non-resident	916 (38)	344-1488
Work Status		
Work	822 (35)	295-1349
Non-work	1560 (65)	833-2287

Table 3. Animal-Related Injury Rates for Household and Hired Youth Less than 20 Injured on Farms: U.S. 1998.

	<i>Household and Hired Youth Only</i>		
Animal Injury, Gender	No. of Injuries (s.e.)*	Estimated No. of Youth (s.e)	Injury Rate per 100 youth (s.e.)
All Animal Injuries	6228 (783)	1930306 (23179)	0.32 (0.04)
Male	2844 (533)	1242599 (17675)	0.23 (0.04)
Female	1575 (369)	687707 (10372)	0.23 (0.05)
Horse-related Injuries	2172 (452)	1930306 (23179)	0.11 (0.02)
Male	837 (289)	1242599 (17675)	0.07 (0.02)
Female	1045 (301)	687707 (10372)	0.15 (0.04)
Cattle-related Injuries	1987 (443)	1930306 (23179)	0.10 (0.02)
Male	1459 (385)	1242599 (17675)	0.12 (0.03)
Female	384 (180)	687707 (10372)	0.06 (0.03)

* Standard Error

Table 4. Cattle-Related Farm Injuries to Youth Less than 20 by Sex and Age: U.S. 1998.

	Youth Injuries (%)	95% Confidence Interval
Cattle-related Injuries	1987	1119-2855
Sex		
Male	1459 (73)	704-2214
Female	**	---
Unknown	**	---
Age Group		
< 16	986 (49)	378-1594
16-19	1001 (51)	382-1620

** Cells too small to be reportable