

**Non-Fatal Injuries: An Overview of Injuries to Youth Living on Racial-Minority Operated
Farms
in the U.S., 2000**

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Abstract:

The National Institute for Occupational Safety and Health (NIOSH) estimates that 32,808 non-fatal injuries occurred to youth under 20 years of age on U.S. farms during 1998. These data, however, do not allow for the identification of the race of the farm operator. Therefore, in 2001, the Minority Farm Operator Childhood Agricultural Injury Survey (M-CAIS) was conducted to provide an overview of the number of youth on minority operated farms and their associated farm-related injuries during 2000. M-CAIS was conducted by the United States Department of Agriculture (USDA) for NIOSH through a telephone survey of approximately 50,000 minority operated farms identified in the 1997 Census of Agriculture. These minority operated farms included four racial categories (Black, Asian, American Indian, and Other) and Hispanic ethnicity.

M-CAIS data indicate that approximately 416,088 youth under 20 years of age lived, visited, or worked on farms with a racial minority operator in 2000. Of this number, an estimated 28,577 (6.8%) lived on these farms. There were also approximately 7,435 youth directly hired to work on the operation, and 380,076 youth, including relatives, visiting the farm during 2000.

On these racial-minority operated farms, an estimated 531 non-fatal injuries occurred to youth less than 20 years of age during 2000. The majority of these injuries (348, 66%) occurred to youth identified as members of the household. Males accounted for 382 (72%) of the injuries. For the 200 (37%) injuries to household youth identified as work-related, 174 (87%) occurred to youth age 10 to 19 years. In addition, livestock operations account for the majority of all injuries (362, 68%). This paper will also present injury rates for specific sub-categories of the data to provide further insight into types of injuries and other factors which may impact these rates.

These data will provide researchers, injury prevention practitioners and farm families more detailed information on non-fatal injury events occurring on farms operated by racial minorities. This information may be used to assess the need for further study of specific sub-populations and the need for varied health and safety education within these populations.

Introduction:

The farm is recognized in occupational safety and health research as a hazardous environment for workers. However, the environment and mechanisms for farming present unique hazards to workers and non-workers alike, including those living on the farm. In addition, many individuals living and working on farms are under 20 years of age. According to Rivara (1997), "By virtue of the fact that children and adolescents live on farms, they are constantly exposed to hazards of farm equipment." The Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH) developed the Childhood Agricultural Injury Survey (CAIS) to provide detailed information on injuries sustained by the youth population on U.S. farms.

The 1998 CAIS provided data on an estimated 32,808 non-fatal injuries to youth under 20 years of age occurring on U.S. farms in 1998 (Myers and Hendricks, 2001). An estimated 13.3 injuries per 1,000 youth occurred on these farms in 1998, excluding injuries to visitors. The survey also provided data allowing for inclusion of demographic factors such as sex and age. However, the disproportionate number of farms operated by Caucasians in the U.S. does not allow for inferences to be made to minority farms from the 1998 CAIS sample.

Studies such as those by Richardson et al. (1997), Crandall et al. (1997), and Lyman et al. (1999) indicate that race may influence injury rates on U.S. farms. Crandall et al. indicated that American-Indians and Hispanics in New Mexico are more likely than Caucasians to die on U.S. farms. Richardson et al. found that, in North Carolina, fatalities to African-American farmers were increasing from 1977 to 1991. During this same time period fatalities to Caucasian farmers were decreasing. However, Lyman et al. found that the injury rate for African-American owner/operators in Alabama and Mississippi was approximately half that of Caucasian owner/operators. These studies, however, do not address injury to youth on farms operated by racial minorities. In addition, these studies were limited in their geographic scope. Additional work addressing the role of race in farm injury is certainly warranted. To address this need, NIOSH developed the Minority Farm Operator - Childhood Agricultural Injury Survey (M-CAIS).

Methods:

The M-CAIS data were obtained through a survey conducted for NIOSH by the United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS). Using the USDA 1997 Census of Agriculture as a sampling frame, 47,658 minority operated farm households nationwide were selected for inclusion. A farm was selected if the operator fit one of four racial categories (Black, Asian, Native American, and Other) or the operator's ethnicity was Hispanic. There were farms selected which were classified as Hispanic ethnicity and a racial minority. This analysis, however, includes only farms operated by racial minorities regardless of ethnicity.

Of the 47,658 farms operated by racial minorities, 35,084 were contacted for the M-CAIS sample. The crude response rate for the racial minority operator segment of the survey was approximately 54%, providing 19,083 total observations for analysis.

The data collected for the M-CAIS include demographic information on the farm and members of the farm household. Demographic data were also collected on youth under 20 years of age visiting and/or working on the farm. In addition, information was collected on all non-fatal injuries occurring to youth during the 2000 calendar year, and their exposure to specific farm hazards.

Injuries were defined as an event occurring on the farm operation that resulted in at least four hours of restricted activity or required the individual to seek professional medical attention. Both work and non-work injuries to youth living, working, or visiting the farm (excludes contractor laborers or laborers hired by contractors working on the farm) were included in these data. A work-related injury was defined as any injury that occurred while performing activities that had a direct impact on the farming operation as a business, regardless of whether the activity was performed for pay. Injuries incurred as the result of another individual's work were not defined as work-related.

The unbiased estimators for a stratified simple random sample were used to obtain estimates for both the injury and demographic data (Cochran, 1977). All results were benchmarked to the 1997 Census of Agriculture. The type of injury, body part, and a narrative description of the injury were collected for all reported injuries. Standardized coding of source of injury and event was completed per the Occupational Injury and Illness Classification System (OIICS) (BLS, 1992). Injury rates per 1,000 youth were calculated as the estimated number of injuries, divided by the estimated number of youth obtained from the M-CAIS.

Results:

All Youth on Racial-Minority Operated Farms:

On farms operated by racial minorities in 2000, there were an estimated 416,088 youth under 20 years of age living, working, or visiting. Table 1 provides a distribution of the relation of these youth to the farm, including whether or not they worked on the farm in 2000. Each of these youth, working or not, may have been exposed to hazards associated with the occupation of farming.

Table 1

Youth on Racial-Minority Operated Farms by Relation to Farm and Work Status, U.S; 2000		
	Population	Working
Household	28,577	11,753
Hired	7,435	7,435
Relative Visitors	191,848	15,338
Non-Relative Visitors	188,228	0
Total	416,088	34,526

On these farms in 2000, there were an estimated 531 (1.3 injuries per 1,000 youth) non-fatal injuries to youth less than 20 years of age. Native Americans experienced 38.8% (206) of all injuries, and 42.5% (85) of all working injuries. Table 2 provides the distribution of the overall injuries and working injuries by the race of the injured youth. This table is based upon the race of the injured youth; therefore white youth injured on farms operated by a racial-minority are included. Males accounted for 71.9% (382) of all injuries. Almost half (42.8%, 233) of all injuries were found in youth aged 10 to 15 years, while 31.3% (166) were to youth less than 10 years of age and 24.1% (128) were to youth 16 to 19 years of age. In addition, the majority of these injuries were to household youth (348, 65.5%, 12.2 per 1,000 youth). In general, non-fatal injuries to youth on these farms were not work-related (331, 62.3%).

Table 2

All Injuries to Youth on Racial-Minority Operated Farms by Youth's Race and Working Status, U.S; 2000		
Race	Injury Estimates	
	All Youth	Working Youth
White	92	38
Black	78	27
Native American	206	85
All other races/unknown*	155	50
Total	531	200

*All other races/unknowns includes "Asian", "Other", and "Unknown"

Although injuries on livestock operations accounted for over two-thirds (68.2%, 362) of all injuries to youth less than 20 years of age (Table 3), the actual difference between livestock and crop operations was minor when injury rates are considered. Approximately 1.1 injuries occurred for every 1,000 youth on crop operations, while 1.4 injuries occurred per 1,000 youth on livestock operations. Within these broad categories of farm-type, sheep (4.0/1,000), equine (2.1/1,000), poultry (2.0/1,000), and grain (1.8/1,000) operations had injury rates higher than the overall category rate.

The most common types of injuries were cuts/lacerations (130, 24.5%) and broken/fractured bone (121, 22.8%)(Table 3). In general the injured body parts were the extremities: the arm (91, 17.1%), the hand/wrist/finger area (79, 14.9%) and the leg (77, 14.5%). These injuries were consistent with the most common types of injury events reported. One hundred and sixty-three (30.7%) of the reported injuries were classified as occurring when the youth made contact with an object, which includes being struck by an object (78) and striking against an object (53). Also, 147 (27.7%) of the reported injuries were the result of falls. When one considers work status, it appears that contact with objects was more a result of work activities, while falls were more common with non-work injuries. For contact with objects injuries, 90 (55.2%) of the 163 injuries in this category were work related, while 106 (72.1%) of the 147 fall injuries occurred when the youth was not working. The most common source of injury overall was structures/surfaces. This source (which includes elements such as the ground, floors, and fences) accounted for 164 (30.9%) of the total injuries. Non-work incidents accounted for 67.7% (111) of all injuries sustained by structures/surfaces.

Table 3

All, Household, and Working Injuries to Youth on Racial-Minority Operated Farms by Farm Type, Body Part, and Type of Injury. U.S; 2000			
Farm Type	All Injury	Household Injury	Working Injury
Livestock	362	247	151
Crop	163	101	49
Unknown	6	0	0
Total	531	348	200
Body Part			
Arm	91	58	25
Hand, wrist, fingers	79	48	39
Leg	77	54	34
Foot, ankle, toes	68	41	33
Head, skull	57	35	22
Face	50	36	***
Shoulder, chest, back	38	27	***
Other body parts	36	24	14
Multiple body parts	30	21	14
Unknown	5	3	0
Total	531	348	200
Type of Injury			
Cut, laceration	130	95	56
Broken bone, fracture	121	78	40
Bruise, contusion	61	47	20
Puncture, stab, jab	53	21	20
Other injuries	51	21	20
Scrape, abrasion	34	27	***
Sprain/Strain	31	20	***
Multiple injuries	31	28	19
Burn, blister, scald	12	7	***
Unknown	8	3	3
Total	531	348	200

***Estimate is not reported or suppressed because of a non-reportable cell

Household Youth on Racial-Minority Operated Farms:

Youth living on farms operated by racial minorities sustained an estimated 348 (12.2 per 1,000 youth) non-fatal injuries in 2000 (Table 4). Among these youth, 70% (245) of the injuries occurred to males. This rate of injury was 16.9 per 1,000 male household youth; more than twice the rate of injury for female household youth (7.9 per 1,000 youth). The majority (78.4%, 273) of non-fatal injuries occurred to youth less than 16 years of age. The rate of injury to household

youth less than 16 years of age was 13.7 injuries per 1,000 youth living on the farm. Household youth who worked on the farm sustained 11.7 injuries per 1,000 (138), while their non-working household peers sustained 12.5 injuries per 1,000 (210). As shown in Table 5, the injury rates by age for working household youth were relatively constant, while the rate jumps dramatically for 10 to 15 years of age non-working youth.

Table 4

Household Youth on Racial-Minority Operated Farms, Population and Injuries by Youth Race, U.S; 2000			
Race	Population Estimate	Injury Estimate	Rate per 1,000 Youth
Black	7,688	49	6.4
Native American	7,381	177	24.0
Asian	5,700	26	4.5
Other	7,808	96	12.3
Total	28,577	348	12.2

Table 5

Injury Rate per 1,000 Household Youth on Racial-Minority Operated Farms by Age and Work Status, U.S; 2000		
Age (Years)	Working	Non-Working
Less than 10	9.3	12.5
10 to 15	12.9	18.0
16 to 19	11.4	6.8
Total	11.7	12.5

Injuries to household youth on livestock operations (247) were twice as common as injuries to these youth on crop operations (101) (Table 3). Household youth on livestock operations sustained 16.8 injuries per 1,000, while on crop operations they sustained 8.2 per 1,000. When one considers work status and farm-type we find that household youth were injured at a rate of 4.6 per 1,000 working youth on crop operations; on livestock operations, however, this figure climbed to 16.2 injuries per 1,000 youth.

The most common injury events for household youth were falls (109, 31.3%) and contact with objects (108, 31.0%). Of the falls, only 30.3% (33) were work-related while 56.5% (61) of the contact with objects injuries were work-related. These results are similar to those found for the general youth population on these farms. Also, as we found for the overall population, the most common source of injury to household youth were structures/surfaces, accounting for 117 (33.6%) events with 65% (76) of these events being non-work related.

Work-related Injuries to Youth on Racial-Minority Operated Farms:

Although the majority (331, 62.3%) of all injuries were not work-related, 200 (37.8%) non-fatal injuries were sustained as the result of work (5.8 injuries per 1,000 youth). Most of these work-related injuries were to youth living in the household (138, 69.0%, 11.7 per 1,000

youth). The distribution of injury rates by relation to the farm is shown in Table 6.

Table 6

Work-related Injuries and Rates for Youth on Racial-Minority Operated Farms by Relation to Farm, U.S; 2000			
	Working Population Estimate	Injury Estimate	Rate per 1,000 Youth
Household	11,753	138	11.7
Hired	7,435	42	5.6
Relative Visitors	15,338	20	1.3
Non-relative Visitors	0	0	0
Total	34,526	200	5.8

Work-related injuries were primarily found in youth age 10 to 19 (174, 87.0%). This result is consistent with the findings for household youth.

The most common types of work-related injuries were cuts/lacerations (56, 28.0%) and broken/fractured bone (40, 20.0%). In general the injured body parts were the extremities: the hand/wrist/finger area (39, 19.5%), the leg (34, 17.0%), and the foot/ankle/toes (33, 16.5%). These injuries were consistent with the most common types of injury events reported. Ninety (45.0%) of the reported work-related injuries were classified as occurring when the youth made contact with an object. Forty-two (21.0%) of the reported injuries are the result of falls. The most common source of injury was structures/surfaces. This source (which includes elements such as the ground, floors, and fences) accounted for 53 (26.5%) of the total work-related injuries. It must be noted that parts/materials was also common to work-related injuries. These sources of injury accounted for 34 (17.0%) of the work-related injuries, but only 12 (3.6%) of the non-work related injuries.

Discussion:

The 2000 M-CAIS provides a unique nationwide perspective on minority operated farms. Although the time period covered by M-CAIS data is not the same as the time period of the 1998 CAIS data (Myers and Hendricks, 2001), some comparison can be made to provide insight into differences between the overall population of U.S. farms and the sub-population of minority operated farms.

The M-CAIS data provides an overall injury rate of 1.3 injuries per 1,000 total youth on racial-minority operated farms. This rate appears to be ten times lower than the rate reported in the 1998 CAIS publication for all farm youth (Myers and Hendricks, 2001). However, M-CAIS allows for the inclusion of injuries to visitors and relatives, while CAIS does not. By including visitors and relatives the M-CAIS greatly increases the number of individuals exposed to hazards without a large increase in injuries. In fact, using the same criteria for the category “all farm youth” (household and hired workers only) the M-CAIS injury rate was 10.2 injuries per 1,000 youth, similar to the 13.3 injuries per 1,000 youth from CAIS. One may assume that relatives

and visitors are exposed to the hazards of farming at a more limited level than household and hired youth. Therefore, in terms of relative likelihood of injury, the minority operated farm appears to be very similar or slightly safer than the average U.S. farm. The patterns of injury are also quite similar. Being male, living in the household, and being younger all appear to increase the likelihood a youth will be injured on the farm. Although, particularly with regard to household youth, the minority operated farm youth is at a lower risk of injury according to these data.

Further comparison to the 1998 CAIS can be made with regard to household youth and working household youth. The 1998 data indicates that household youth were injured at a rate of 18.7 per 1,000 youth, while the 2000 M-CAIS data indicates an injury rate of 12.2 per 1,000 household youth. In addition, the injury rate for household youth by race in 2000 indicates that Native Americans were injured at a rate (24.0 per 1,000 youth) almost double that of the overall minority rate. Working household youth show a similar pattern. The rate of injury to working household youth in 1998 was 14.1 per 1,000, while the 2000 M-CAIS data show a rate of 11.7 per 1,000 youth. The lower rate of injury found with the 2000 M-CAIS data may indicate a downward trend in injury rates that is simply reflected in this sub-population. However, the rates by race indicate that the lower rate is a reflection of the variation by racial category. Table 4 provides the household youth population by race with their corresponding injury rates. It is important to note that the population sizes do not vary greatly, while the injury rates do. This indicates that the low M-CAIS rate may be the result of the very low injury rates experienced by Black and Asian household youth. Native American household youth, however, do appear to be at greater risk for injury than all other youth. This information is crucial to promoting safe farm work as it indicates specific audiences that may not be appropriately targeted.

Although the M-CAIS data provide a unique outlook into a specific sub-population in the farming community, there are limitations to its utility. First, data are only available for the year 2000. There is no direct comparison group to allow for inferences over time. Also, the data are not available for the general farming population during the same time period which would allow for direct comparisons using differing demographics. In addition, the determination of minority operated farms is difficult given the self-reported nature of the race and ethnicity variable. Assumptions must be made when multiple races are reported. It is also possible that individuals are not wholly accurate in reporting their race or ethnicity, and the race/ethnicity of the operator may not accurately reflect the race/ethnicity of the youth population on the farm. However, despite these issues, M-CAIS is an important first step in providing an accurate analysis of youth injuries on farms operated by racial minorities.

Conclusion:

In the U.S. over 36,000 youth live and/or work on minority operated farms. Since this population accounts for less than 3% of the total youth living and/or working on U.S. farms, this sub-population is often overlooked in agricultural injury research. Although the initial review of M-CAIS data does not indicate that these farms are more or less hazardous than the general population, the scope of the data will allow for further analyses using specific demographic and occupational factors. These analyses may show important differences in factors such as specific race of the operator or the farm-type. Future surveys of this population will also allow

researchers to monitor the change over time in the hazards faced by this sub-population and its relation to the hazards faced by the general farming population. This is an important contribution to agricultural production safety as the demographics of the nation and the farm are constantly changing in the United States. To ensure safety on the American farm, occupational safety and health experts must constantly consider the nature of not only the injuries occurring, but the cultural and ethnic systems in which safety messages are being applied. M-CAIS provides insight into both.

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