

An Analysis of Farm Injuries and Safety Practices in Mississippi

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ABSTRACT. In Mississippi, agriculture is the most dangerous industry employing over 30% of the state's workforce. Records from the Mississippi Cooperative Extension Service indicated that 18 tractor deaths occurred in 1997, a new all-time record. Also, there were two additional deaths involving other farm machinery. This study was designed to determine the magnitude of farm injuries, safety practices, and educational programs used to reduce farm injuries in Mississippi.

The study targeted 34 counties in the state with an African-American population of 40% or more. Nearly 51% of the farmers surveyed completed the questionnaire. Major findings were: forty-nine percent of the respondents were Caucasians and 45% were African-Americans; ninety-three percent of the respondents had medical insurance and 46% had liability insurance; sixty-eight percent of the respondents sustained abrasions; and based on the number of deaths and injuries that have occurred on farms, there is a need for educational programs promoting farm safety practices. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: <getinfo@haworthpressinc.com> Website: <<http://www.HaworthPress.com>>]*

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INTRODUCTION AND THEORETICAL FRAMEWORK

In 1995, the National Safety Council reported that agricultural workers are involved in more accidents per 100,000 workers than

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workers of any other industry. It was also reported that tractor overturns are the leading cause of fatalities on farms and that over 50% of tractor related deaths are overturns.¹ Another national study revealed that 20,000 children are injured every year on farms.² The Mississippi Cooperative Extension Service reported a new all-time record of 18 deaths involving tractor accidents in Mississippi in 1997. Other records from the Mississippi Cooperative Extension Service indicated that there is an average of 12 to 13 tractor deaths in Mississippi each year and a similar number of deaths from other types of farm equipment.³

Farming is a dangerous occupation with a large number of accidents and deaths that occur on farms. Tractors and farm power machinery are the leading causes of death on farms. This fact may be mainly attributed to poor safety practices and outdated equipment.⁴ Doss cited 116 deaths in Michigan from 1988-1992 which were agriculture related, and every tractor death reported over the five-year period was without the recommended rollover protective structure (ROPS) safety device.⁵

One of the major concerns facing farmers is that nearly one-half of tractors in operation are equipped with very few safety devices. Tractors are the most widely used machines and they rank as the leading cause of injuries and deaths on farms. Murphy reported that the types of fatal tractor accidents have not changed over the past twenty years, with overturns and run-overs accounting for over half of the accidents.⁶ According to the National Safety Council, tractor overturns accounted for an average of 51% of tractor related fatalities from 1985 to 1995 with an annual rate of 5.4 deaths per 100,000 tractors in 1995.⁷

Agencies such as the Cooperative Extension Service, National Safety Council, State Farm Bureau Federations, and the National Institute for Occupational Safety and Health have developed farm safety programs designed to reduce farm accidents and illnesses. These programs are helpful in educating farmers and family members on the dangers that may exist and the prevention measures that should be taken to avoid injuries and accidents.

PURPOSE AND OBJECTIVES

A review of literature reveals that there has been limited research conducted on farm injuries and illnesses among minority farm groups

such as African-Americans, Native Americans, Asian Americans, Hispanics, and migrant workers. The purpose of this study was to gather data on farm injuries, safety practices, and educational programs in Mississippi counties having a large African-American population. More specifically, the objectives of the investigation were to:

1. determine the demographic characteristics of respondents;
2. identify the magnitude of farm injuries that have occurred on farms in Mississippi;
3. identify the types of safety practices as perceived by farmers using tractors and other farm equipment in Mississippi; and
4. assess the effectiveness of farm safety programs as perceived by farmers in Mississippi.

METHODS AND PROCEDURES

The sample population in this study consisted of eight counties in Mississippi where the African-American population was 40% or greater in each county. The Small Farm Development Center at Alcorn State University assessed all 82 counties in Mississippi to determine the African-American population. From the assessment, 34 counties were identified as having a 40% or greater African-American population. The selection consisted of random sampling 8 of the 34 counties previously identified as having a 40% or greater African-American population in Mississippi. Two hundred and forty farmers (30 participants per county) were chosen to participate in the study.

The instrument used in this study was a mailed questionnaire developed by the investigators after an extensive review of literature on farm injuries and safety educational programs. The instrument is included in the publication as "Appendix A." The survey instrument was pilot-tested for content and face validity using nineteen graduate students and five faculty members. The instrument was designed to determine the types and nature of injuries sustained, and safety practices on farms in Mississippi and was divided into four parts. Part I contained a checklist of 17 items in which the respondents were to indicate the types of injuries sustained from selected hazards. Part II contained a checklist of 36 items in which the respondents were to indicate the safety devices present on their tractors and other farm equipment, safety clothing utilized, sources used to gather safety in-

formation, and general safety practices. Part III identified attitudes toward safety programs. A numerical rating scale of one to five (1 = not effective, 3 = somewhat effective, and 5 = very effective) was used for the nine items. In addition, two spaces were provided for the respondents to suggest which safety program they felt was most needed in their community. Part IV contained 12 multiple choice questions used to gather data on demographic characteristics (see Appendix).

The collection of data involved county extension agents contacting farmers to complete the questionnaire in the following counties: Bolivar, Lincoln, Jefferson, Yazoo, Madison, Copiah, Holmes, and Jones. The investigators provided the county extension agents with instructions outlining the purpose of this study and requesting their cooperation in distributing the survey instrument to thirty farmers in his/her county. The method of selection was left up to the county agents to encourage participation. The investigators made telephone calls and mailed follow-up letters encouraging the county extension agents to identify farmers to complete the survey. There were 240 original mailings and 122 farmers completed the survey instrument representing a 50.8% response rate. According to Brinkerhoff, a sample population that has a response return rate between 55 to 70% is considered an adequate response rate for data collection.⁸ The Statistical Package for Social Science (SPSS) Version 8.0 was used to analyze the data.

FINDINGS

The *first objective* was to determine the demographic characteristics of farmers in Mississippi. Among the respondents surveyed, 40.2% indicated that they owned between 100-500 acres, 24.6% owned 50 acres or less, 23.8% owned more than 500 acres and 11.5% owned between 50 to 100 acres. It was also observed that 38.5% of the farmers had 10 or less years of farming experience, 27.9% had between 11-20 years, 18.9% of the farmers had between 21-30 years, and 14.8% had more than 31 years of farming experience.

The ethnicity groups represented in this study were: Caucasians 49.2%; African-Americans 45.1 percent; Hispanic 3.3%; and other 2.5%. Forty-one respondents or 33.6% were college graduates, 40 respondents or 32.8% were high school graduates, 24 respondents or 19.7% had some college or technical school training, 10 respondents or 8.2% had less a high school education; and 7 respondents revealed that they

had other than educational experiences. Fifty-one percent of the respondents were full-time farmers, while 47% were part-time.

The *second objective* of the study was to identify the types of injuries that have occurred on farms. Table 1 revealed "scrapes" (abrasions) as the leading injury sustained on farms and "amputations" as the least common kind of injury inflicted on farms.

Data in Table 2 indicated that the highest hazard on farms was "slips/falls" with 57% or 70 farmers, whereas the lowest hazard was "PTO entanglement" with 7% or 9 farmers. The second highest hazard on farms was "animals" with 26% or 32 farmers. The National Institute for Occupational Safety and Health (NIOSH) in 1994 indicated that livestock caused 19% of the injuries sustained on farms.⁹

TABLE 1. Frequencies of the Types of Injuries Sustained on the Farm

<u>Item</u>	<u>Frequency</u>	<u>Percent</u>
	N = 122	
Scrapes	83	68.0
Sprains/strains	68	55.7
Burns	40	32.8
Open wounds	39	32.0
Fractures/dislocations	15	12.3
Internal injuries	7	5.7
Injury to nerves	4	3.3
Amputations	2	1.6

TABLE 2. Frequencies of Farm Injuries Sustained Due to Selected Hazards

<u>Item</u>	<u>Frequency</u>	<u>Percent</u>
	N = 122	
Slips or Falls	70	57.4
Animals	32	26.2
Pesticides	19	15.6
Gasoline	17	13.9
Chain saws	16	13.1
Noise	14	11.5
Jump starting	14	11.5
Tractor rollovers	10	8.2
PTO entanglement	9	7.4

One out of every six injuries that occur involves animals in Iowa.¹⁰ It was noted that injuries sustained by the respondents is consistent with national trends gathered by NIOSH.

The *third objective* was to determine the safety practices of farmers using tractors and farm equipment. Table 3 shows that the most widely used safety device on tractors were "emergency lights," followed by "safety reflectors," "safety decals," and "ROPS." ROPS were found to be on 62% of the respondents' tractors. A study in Pennsylvania revealed that about a third of all tractors in the U.S. are equipped with ROPS.¹¹ Seventy-four farmers indicated that PTO shields were installed on their tractors. The Occupational and Safety Health Administration (OSHA) requires that all rotating shafts and drive lines be guarded to protect against operator contact.¹²

Data in Table 4 reveals that "gloves" were the most used protective clothing and the least used protective clothing was "knee pads." The data reveal that respondents wear protective clothing such as gloves, hard toe shoes and goggles to prevent and reduce minor injuries while working on the farm.

The *fourth objective* was to assess the effectiveness of farm safety programs. Data in Table 5 revealed that the most widely used sources of information on safety practices were farm magazines and the Coop-

TABLE 3. Frequencies of the Safety Devices and Features Installed on Tractors

<u>Item</u>	<u>Frequency</u>	<u>Percent</u>
	N = 122	
Emergency lights	83	68.0
Safety reflectors	80	65.6
ROPS	76	62.3
Safety decals	75	61.5
PTO shield	74	60.7
SMVS	70	57.4
Seatbelts	67	54.9
Starter protective cover	64	52.5
First-Aid kit	43	35.2
Fire extinguisher	43	35.2
OPSS	38	31.1

OPSS (Operator Presence Sensing System), ROPS (Rollover Protective Structure), and SMVS (Slow Moving Vehicle Signs)

TABLE 4. Frequencies of the Types of Safety Clothing and Devices Utilized

<u>Item</u>	<u>Frequency</u>	<u>Percent</u>
	N = 122	
Gloves	108	88.5
Steel toe shoes	63	51.6
Goggles	52	42.6
First-Aid kit	41	33.6
Back supports	34	27.9
Ear plugs	26	21.3
Hard hat	18	14.8
Knee pads	7	5.7

TABLE 5. Frequencies of Sources Used to Gather Information on Farm Safety Practices

<u>Item</u>	<u>Frequency</u>	<u>Percent</u>
	N = 122	
Farm magazines	86	70.5
Cooperative Extension	81	66.4
TV and radio programs	67	54.9
Farm supply stores	67	54.9
Newsletters	65	53.3
USDA agencies	56	45.9
Other farmers	52	42.6
World Wide Web	13	10.7

erative Extension Service (CES). Other sources used often were farm supply stores, newsletters, and TV and radio programs. Farm magazines, CES, and equipment dealers were found in an Iowa study to be the most frequently utilized sources of safety information. Other findings revealed that 75% of the respondents had owner manuals for tractors and farm equipment and 66% indicated that they followed the instructions listed in the manual. It was noted also that 71% of the respondents performed visible checks of equipment before using and 60% indicated they received training for operating equipment. Moreover, when asked if extra riders were allowed on tractors, 67% indicated "No" and 71% indicated they shut off their tractor motor when

changing implements. Forty-five percent of the respondents indicated they had first-aid training.

CONCLUSIONS

Based on the findings in this study and literature reviewed, it appears that agencies such as Cooperative Extension, National Safety Council, State Farm Bureau Federations, and the National Institute for Occupational Safety and Health have provided leadership in disseminating information on preventing farm injuries and illnesses. However, it is clear from the data gathered in this study that the number of fatalities from tractor accidents in Mississippi is higher than the national average. Tractor overturns remain a serious problem in the agriculture industry and there is a need to reduce these kinds of accidents. This study attempted to survey a large number of African-American farmers; however, their response rate of 45% was less than that of the Caucasian farmers (49%). Therefore, the survey results represent the farmers who used the Cooperative Extension Service (CES). It is not feasible to differentiate results based on ethnicity.

Although safety education programs are available, there is a need for farmers and family members to participate in farm safety programs. The planning of educational programs requires a broad base of participants and teamwork. Families, equipment dealers, manufacturers, and researchers play significant roles in helping each other in making the program work. When planning an educational program, the question that should be addressed is whether the participants understand the major problems and behaviors that exist. Injuries can be prevented when farmers are more aware and alert of their surroundings, medical conditions, and the safety features of their farm equipment. Potential hazards on farms can be eliminated when wearing protective clothing and following instructions in operator manuals.

RECOMMENDATIONS

Based on the findings and conclusions in this study, the following recommendations were made:

1. Based on the number of deaths and injuries that have occurred on farms, there is a need for educational programs promoting farm safety practices.

2. There is a need for continued research on farm injuries and safety practices to determine the magnitude of farm injuries and illnesses on the state and regional levels for minority populations.
3. More emphasis should be placed on encouraging farm families to wear protective clothing. Outreach agencies such as the Cooperative Extension Service and the National Safety Council should play a greater role in informing farmers of the potential dangers that may exist. Extension agents should develop annual programs of work on farm safety practices for all farm family members.
4. Incentives such as community partnership grants from the federal government should be made available to farm equipment manufacturers and dealers for the purpose of recalling defective farm machinery to make sure that the machinery meets federal safety mandates.

REFERENCES

1. National Safety Council. Accident facts 137. Itasca, IL: National Safety Council, 1995.
2. Purschwitz, MA. Fatal farm injuries to children. Marshfield, WI: Wisconsin Rural Health Research Center, 1990.
3. Mississippi State University Extension Service, Internet Address: <http://ext.msstate.edu/ppe/news/news/agnews/980908hw.htm>
4. Ford, CL, Walson, FO, and Owens, JP. Safety practices among limited resource farmers in North Carolina. *J Agromedicine* 1997; 4(3/4):217-221.
5. Doss, HJ. Michigan tractor fatalities. East Lansing, MI, Michigan State University Cooperative Extension Service Safety News 1995.
6. Murphy, DJ. Trends in twenty years of tractor accident statistics. Proceedings, 1990 International Winter Meeting, Am Soc of Ag Engineers, 1990.
7. National Safety Council. Accident facts. Chicago, IL. National Safety Council, 1996.
8. Brinkerhoff, RO, and Associates. Program evaluation: A practitioner's guide for trainers and educators. Boston: Kluwer-Nijhoff, 1983.
9. NIOSH. Preventing scalping and other severe injuries from farm machinery. Department of Health and Human Services, Center for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication NO. 94-105. Washington, DC, 1994.
10. Schwab, CV, Beno, J, and Miller, L. Know your livestock and be safe. Ames, IA: Iowa State Extension Service Safe Farm Series; Fact Sheet PM-1265b, 1992.
11. Heffernan, JB. A Rural Sociologist's Perspective. Papers and Proceedings of the Surgeon General's Conference on Agricultural Safety and Health 1991; Des Moines, IA: Apr. 30-May 3; 419-431.
12. Occupational Safety and Health Administration. Guarding of farm field equipment, farmstead equipment, and cotton gins. CFR title 29, Part 1928: 57. Washington, DC: GPO, 1989.

APPENDIX

ALCORN STATE UNIVERSITY
FARM SAFETY QUESTIONNAIRE**Directions:**

Please answer each question to the best of your ability. All information provided will be kept confidential.

Part I. Demographic Data

- 1) Please circle your age range.
 - A. 20 to 35
 - B. 36 to 50
 - C. 51 and older

- 2) Please circle your gender.
 - A. Male
 - B. Female

- 3) Please circle your ethnicity (optional).
 - A. African American
 - B. Caucasian
 - C. Hispanic
 - D. Other_____

- 4) Please circle your annual salary or income from farming. (For statistical study only)
 - A. \$0-\$1000
 - B. \$1001-\$19,999
 - C. \$20,000-\$30,000
 - D. \$30,001-\$39,999
 - E. \$40,000 and above

- 5) Do you have the following insurance?

Medical	Yes	___	No	___
Fire Policy	Yes	___	No	___

- 6) Do you have liability insurance to cover your farm workers?
Yes ___ No ___

- 7) Please circle your highest completed level of education.
 - A. Less than 12th grade
 - B. High school graduate
 - C. Some college or technical school
 - D. College graduate
 - E. Other, Please specify_____

- 6) Before operating, do you walk around the tractor making visual checks for bystanders and other objects?
Yes___ No___
- 7) Have all tractor operators on your farm received training on equipment and reviewed the operator's manual?
Yes___ No___
- 8) Is mounted equipment always lowered before leaving the tractor?
Yes___ No___
- 9) Are extra riders allowed on tractors or other machinery?
Yes___ No___
- 10) Do you shut off your tractor when engaging or disengaging an implement (disc, bush hog, etc.)?
Yes___ No___
- 11) Do any of your workers have first-aid training?
Yes___ No___

Part IV. Program Assessment

Indicate the effectiveness of the following farm safety programs. Please place one of the numerical numbers listed below by each of the farm safety programs that you participated in. Use the following rating scale.

1 NOT EFFECTIVE	3 SOMEWHAT EFFECTIVE	5 VERY EFFECTIVE
	Field days	___
	First Aid	___
	Protective clothing	___
	Chain saw	___
	Farm machinery	___
	Pesticides	___
	Animals	___
	Farm demonstrations	___
	Computer safety programs	___

Please indicate the two most needed farm safety programs in your community.

1) _____ 2) _____

Thank you for completing this farm safety questionnaire.

APPENDIX (continued)

Part III. Safety Information

1) Is your tractor installed with the following safety features?

- Operator Presence Sensing System (OPSS) Yes No
- Power Take Off (PTO) shield Yes No
- Safety reflectors Yes No
- Fire extinguisher Yes No
- First-Aid kit Yes No
- Rollover Protective Structure (ROPS) Yes No
- Seatbelts Yes No
- Slow moving vehicle signs Yes No
- Emergency lights Yes No
- Safety decals Yes No
- Starter protective cover Yes No

2) Check the following types of safety clothing and devices utilized while farming:

- Goggles
- Knee pads
- Hard hat
- Steel toe shoes
- Gloves
- Back supports
- Ear plugs
- First-Aid kit

3) Check the following sources that you used to gather information on farm safety practices:

- Cooperative extension
- World Wide Web (www)
- Newsletters
- Farm supply stores
- USDA agencies
- Television & Radio programs
- Farm magazines
- Other farmers

4) Did you receive an operator's manual with your tractors and farm equipment? Yes No

If yes, did you follow the maintenance and safety recommendations? Yes No

5) In order to prevent theft or unauthorized people from using the equipment, are keys removed from the tractor when not in use? Yes No

- 8) Please circle your status in farming.
 A. Part-time
 B. Full-time
 C. None
- 9) Do you have another occupation other than farming?
 Yes____ No____
 If yes, please explain. _____

- 10) Write in the number of acres you own and rent.
 Own_____ + Rent_____ Total_____
- 11) How long have you farmed? (Number of years)_____
- 12) Specify your type of farm operation. Please check all that apply.
- Row crop _____
 Produce _____
 Beef cattle _____
 Fish _____
 Poultry _____
 Swine _____
 Other _____

Part II. Farm Related Injuries

- 1) Have you or your farm workers been involved in injuries due to the following:

- | | | |
|-----------------------------|---------|--------|
| Tractor rollovers | Yes____ | No____ |
| Jump starting | Yes____ | No____ |
| Power take off entanglement | Yes____ | No____ |
| Chain saws | Yes____ | No____ |
| Pesticides | Yes____ | No____ |
| Gasoline | Yes____ | No____ |
| Slips or falls | Yes____ | No____ |
| Noise | Yes____ | No____ |
| Animals | Yes____ | No____ |

- 2) Check the following types, and number of injuries sustained on the farm in the past year:

Types		Number
Sprains/strains	_____	_____
Scrapes	_____	_____
Open wounds	_____	_____
Fractures/dislocations	_____	_____
Burns	_____	_____
Amputations	_____	_____
Internal injuries	_____	_____
Injury to nerves	_____	_____