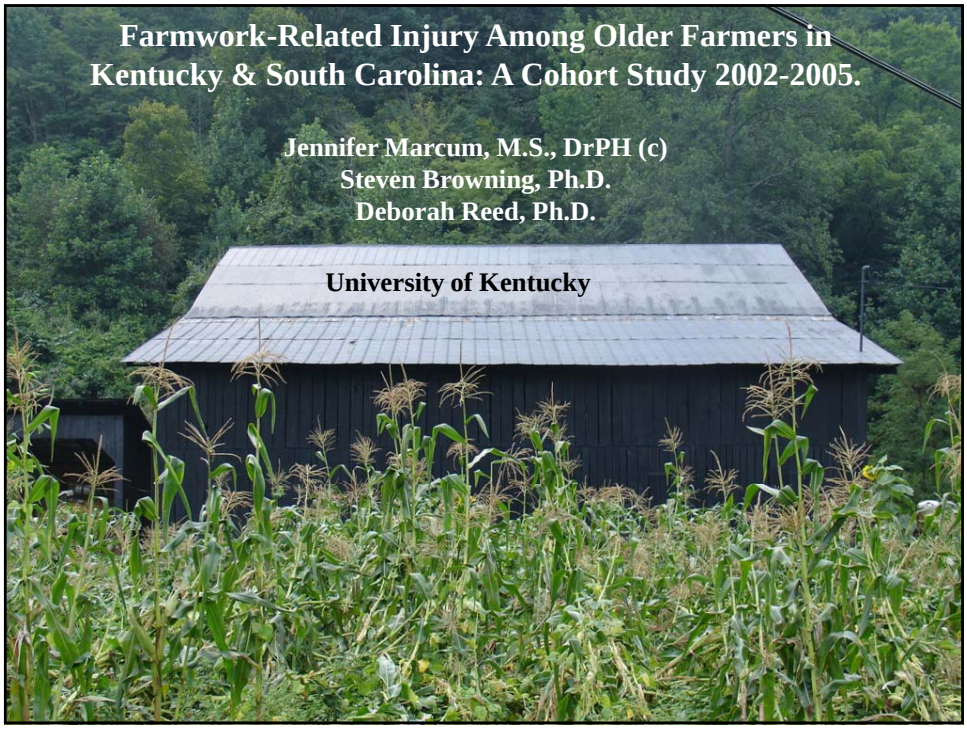

Presenter Disclosures

Jennifer Marcum

(1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

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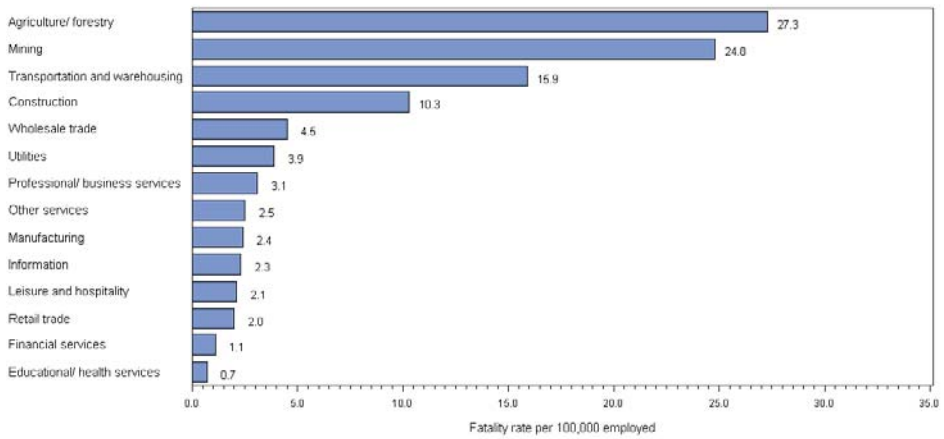
Background/ Significance

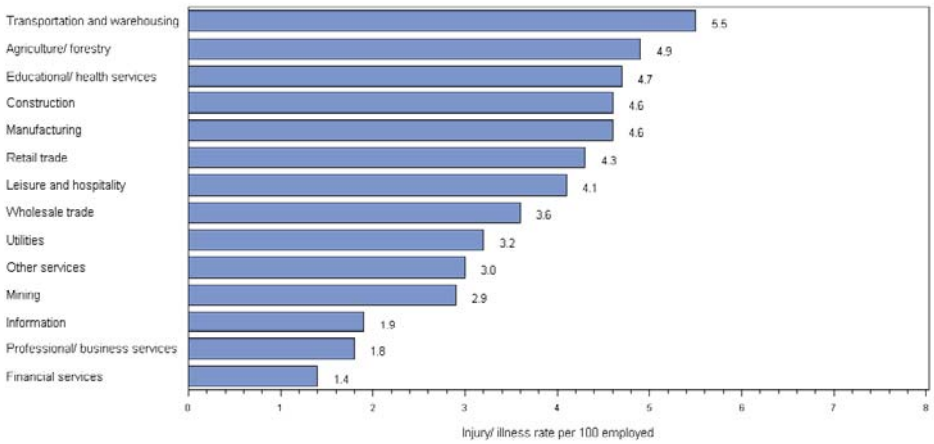
- Agriculture continually ranks among the most hazardous industries in the US.

Figure 1. Rate of fatal injuries, by industry sector, 2007.



Source: US Bureau of Labor Statistics, U.S. Department of Labor, 2008

Figure 2. Rate of nonfatal illness and injuries, by industry sector, 2007.

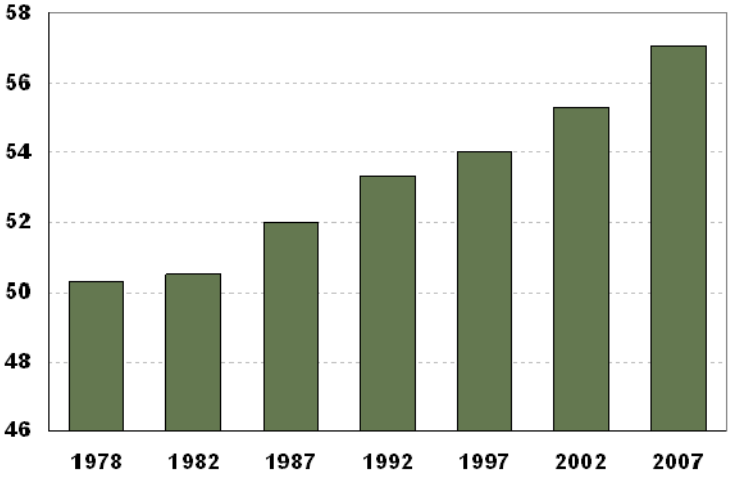


Source: US Bureau of Labor Statistics, U.S. Department of Labor, 2008

Background/ Significance

- Agriculture continually ranks among the most hazardous industries in the US.
- The principal operators of US farms are changing.
  - Gender
  - Race/ethnicity
  - Age

Figure 3. Average age of principal operators, 1978-2007.



*Source: 2007 USDA Census of Agriculture

Background/ Significance

- Agriculture continually ranks among the most hazardous industries in the US.
- The average principal operator on a US farms is changing.
  - Gender
  - Race/ethnicity
  - Age
- Older farmers are more likely to sustain more serious/ severe injuries.
  - Research has revealed that older farmers are more likely to be hospitalized for their injuries than younger farmers (Layne and Landen 1997).
  - Older farmers more likely to sustain permanently disabling or fatal injuries than younger farmers (Pickett, Hartling et al. 1999; Pickett, Hartling et al. 2001).
- Older farmers may be less capable of performing farm tasks due to limiting, chronic health conditions.
- Limited longitudinal data on farm injury in older farmers, especially for women and African American farmers.

Specific Aim

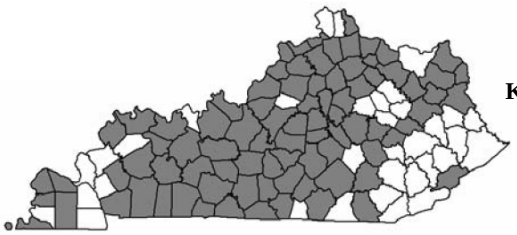
To describe and characterize a set of factors associated with farmwork-related injuries in adults 50 years of age and older.

- Demographic
- Health-related
- Work practice

Study Design/ Sample

- A cohort of farmers were followed prospectively for four years beginning in September 2002 and ending in May 2005 from Kentucky and South Carolina.
- Four subgroups of farmers (white males, white females, African American males, and African American females) over 50 years of age were selected from three different data sources.
  - A listing from the Kentucky Farm Family Health and Hazard Surveillance Project (KFFHHSP) 1994-1996 contained 998 male farmers then over age 50, 741 farm women then engaged in farming, and an additional 747 persons classified as male part-time farmers. Persons aged 80 and over at the time of the KFFHHSP were purged from the list of eligible participants.
  - A listing of African-American farms surveyed by the Kentucky Agricultural Statistics Service in January 2000 contained 240 households who fit the criteria for this study and a mailed survey to these households yielded a potential 111 additional households eligible for the study.
  - The sample of African- American subjects was augmented through recruitment by the South Carolina Agricultural Statistics Service (SCASS). The SCASS had the most comprehensive and up-to-date list of farmers in the state containing 1,194 African-American principal operator-farmers. SCASS conducted a farm household demographic and enumeration survey (SC-FHADES) in April 2002 to identify all persons eligible for the study.

Figure 4. Kentucky and South Carolina counties included in survey (dark shading).

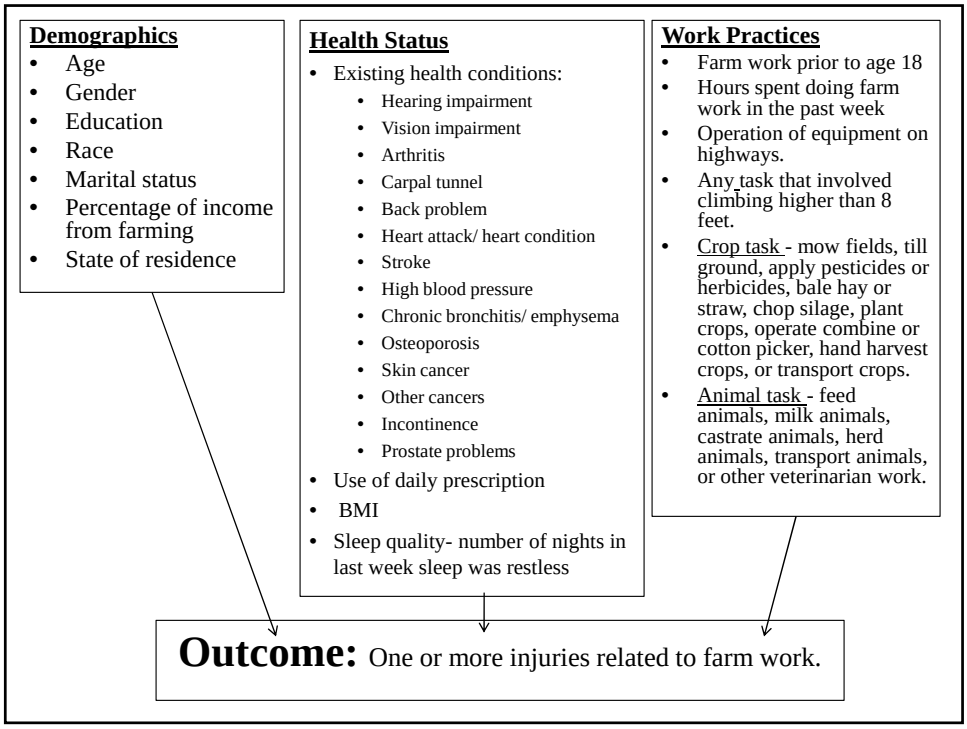


Kentucky: 86 of 120 counties participated.

South Carolina: 38 of 46 counties participated.

Data collection

- Survey data were collected each year from 2002 to 2005 using two different methods; a mailed survey was used in addition to a computer assisted telephone survey (CATI).
- Attrition = 32%
  - Total *n* at baseline= 1,381
  - Total *n* at wave 4= 945



Analysis

- Descriptive statistics, including means, frequencies, cumulative incidence rates, and percentages, were calculated to describe the distribution of injuries and potential risk factors in the cohort.
- The association between farmwork-related injury and potential risk factors was assessed by the generalized estimating equations (GEE) regression method for repeated measures in order to account for the within subject correlation and time dependent covariates.

Table 1. Demographic characteristics of farmers in KY & SC by wave* (2002-2005).

Demographic characteristics	Wave 1 Number (%)	Wave 2 Number (%)	Wave 3 Number (%)	Wave 4 Number (%)	Total Number (%)
Age, yr					
50-59	405 (29)	287 (26)	221 (23)	179 (19)	418 (30)
60-69	569 (41)	469 (43)	414 (42)	390 (41)	569 (41)
70-79	362 (26)	309 (28)	301 (31)	321 (34)	362 (26)
80+	45 (3)	32 (3)	40 (4)	55 (6)	45 (3)
Gender					
Female	670 (49)	536 (49)	477 (49)	454 (48)	681 (49)
Male	711 (51)	561 (51)	499 (51)	491 (52)	713 (51)
Education, yr					
0-12	967 (70)	760 (69)	671 (69)	649 (69)	972 (70)
13+	414 (30)	337 (31)	305 (31)	296 (31)	422 (30)
Race					
White	1089 (79)	874 (80)	780 (80)	763 (81)	1096 (79)
African American	268 (20)	202 (19)	176 (18)	167 (18)	274 (20)
American Indian/ Other	17 (1)	15 (1)	14 (1)	9 (1)	17 (1)
Marital Status					
Not Married	123 (9)	111 (10)	98 (10)	95 (10)	123 (9)
Married	1254 (91)	986 (90)	877 (90)	848 (90)	1267 (91)
Percentage of income from farming					
< 50%	939 (75)	748 (71)	677 (73)	646 (73)	949 (75)
>= 50%	318 (25)	304 (29)	249 (27)	244 (27)	321 (25)
Residence					
Kentucky	1188 (86)	954 (87)	850 (87)	830 (88)	1196 (86)
South Carolina	193 (14)	143 (13)	126 (13)	115 (12)	198 (14)

* Total numbers may exceed baseline as a small number of participants joined the study after wave 1.

Table 2. Cumulative distribution of farmwork-related injury type by gender across waves.

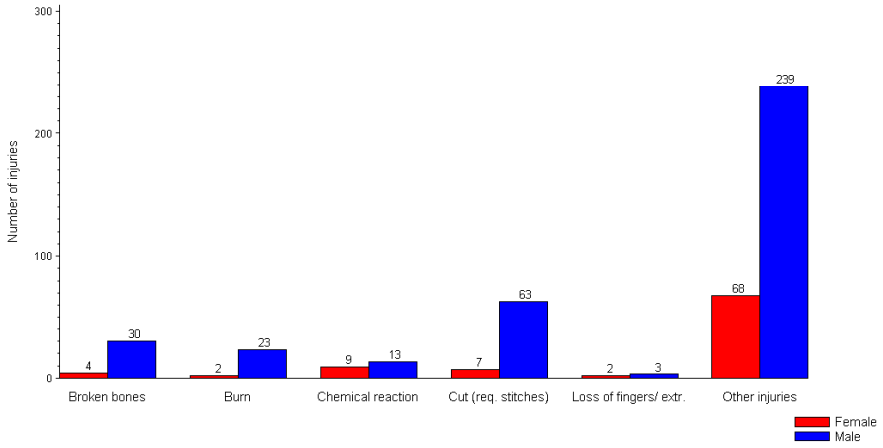


Table 3. Cumulative incidence rate of sustaining at least one farmwork-related injury across all waves and unadjusted parameter estimates, odds ratios, and 95% confidence intervals from univariate GEE regression analysis for demographic, health-related, and work practice factors.

Demographic risk factors	Rate per 100 (n)	Parameter estimate	OR estimate (95% CI)
Age, yr			
50-59	20.9 (85)	--	--
60-69	17.5 (100)	--	--
70-79	23.8 (87)	--	--
80+	19.6 (10)	--	--
Increase in 10 years		-0.17	0.85 (0.72, 1.00)
Gender			
Female (ref)	9.5 (65)	--	--
Male	30.4 (217)	1.37	3.94 (2.91, 5.33)
Education, yr			
0-12	19.0 (185)	--	--
13+	23.0 (97)	--	--
Increase in 10 years		0.30	1.35 (0.87, 2.10)
Race			
White (ref)	20.1 (220)	--	--
African American	19.7 (54)	0.04	1.04 (0.75, 1.45)
American Indian/ Other	41.2 (7)	0.50	1.64 (0.81, 3.33)
Marital Status			
Not married (ref)	20.8 (26)	--	--
Married	20.1 (255)	0.14	1.15 (0.75, 1.76)
Percentage of household income from farming			
< 50%	19.6 (185)	--	--
>= 50%	25.4 (83)	--	--
Increase in 25%		0.11	1.12 (1.01, 1.23)
Residence			
Kentucky (ref)	20.8 (249)	--	--
South Carolina	16.7 (33)	-0.20	0.82 (0.55, 1.23)

Table 3. Cumulative incidence rate of sustaining at least one farmwork-related injury across all waves and unadjusted parameter estimates, odds ratios, and 95% confidence intervals from univariate GEE regression analysis for demographic, health-related, and work practice factors..

Health-related risk factors	Rate per 100 (n)	Parameter estimate	OR estimate (95% CI)
Hearing problem			
No (ref)	17.6 (186)	--	--
Yes	26.0 (77)	0.49	1.63 (1.23, 2.16)
Vision problem			
No (ref)	18.2 (194)	--	--
Yes	24.9 (72)	0.32	1.38 (1.07, 1.77)
Arthritis, joint problem			
No (ref)	18.1 (138)	--	--
Yes	21.0 (126)	0.52	1.68 (1.32, 2.14)
Carpal tunnel			
No (ref)	18.1 (228)	--	--
Yes	37.6 (32)	0.47	1.60 (0.97, 2.63)
Back problems			
No (ref)	18.0 (188)	--	--
Yes	23.6 (73)	0.59	1.80 (1.37, 2.37)
Heart attack/ heart cond.			
No (ref)	18.9 (221)	--	--
Yes	24.1 (42)	0.18	1.19 (0.89, 1.60)
Stroke			
No (ref)	19.0 (246)	--	--
Yes	37.3 (19)	0.24	1.27 (0.86, 2.89)
High blood pressure			
No (ref)	19.0 (155)	--	--
Yes	20.4 (110)	0.06	1.06 (0.85, 1.32)
Chronic bronchitis/ emphysema			
No (ref)	18.4 (235)	--	--
Yes	35.7 (25)	0.86	2.36 (1.53, 3.62)

Table 3. Cumulative incidence rate of sustaining at least one farmwork-related injury across all waves and unadjusted parameter estimates, odds ratios, and 95% confidence intervals from univariate GEE regression analysis for demographic, health-related, and work practice factors.

Health-related risk factors	Rate per 100 (n)	Parameter estimate	OR estimate (95% CI)
Osteoporosis			
No (ref)	20.0 (252)	--	--
Yes	11.2 (10)	-0.30	0.74 (0.48, 1.14)
Skin cancer			
No (ref)	18.6 (242)	--	--
Yes	42.6 (20)	0.41	1.51 (0.98, 2.33)
Other cancers			
No (ref)	19.5 (255)	--	--
Yes	22.5 (9)	0.22	1.24 (0.76, 2.03)
Incontinence			
No (ref)	19.4 (246)	--	--
Yes	21.5 (17)	0.31	1.37 (0.84, 2.21)
Prostate problems			
No (ref)	18.4 (167)	--	--
Yes	32 (33.3)	**0.46**	**1.59 (1.03, 2.45)**
Daily prescription			
No (ref)	20.8 (66)	--	--
Yes	20.2 (216)	-0.00	1.00 (0.75, 1.32)
BMI			
Normal (ref)	18.8 (48)	--	--
Overweight	28.6 (74)	0.24	1.23 (0.88, 1.86)
Obese	24.9 (101)	**0.56**	**1.75 (1.17, 2.62)**
Number of days in the past week sleep was restless			
<1 day (ref)	19.2 (150)	--	--
1-2 days	22.4 (57)	0.26	1.30 (0.98, 1.73)
3-4 days	26.2 (34)	**0.63**	**1.88 (1.32, 2.66)**
5-7 days	23.0 (35)	**0.58**	**1.78 (1.25, 2.53)**

Table 3. Cumulative incidence rate of sustaining at least one farmwork-related injury across all waves and unadjusted parameter estimates, odds ratios, and 95% confidence intervals from univariate GEE regression analysis for demographic, health-related, and work practice factors.

Work practice risk factors	Rate per 100 (n)	Parameter estimate	OR estimate (95% CI)
Farm work before age 18			
No (ref)	11.2 (34)	--	--
Yes	22.9 (248)	**0.83**	**2.29 (1.55, 3.39)**
Crop task			
No (ref)	5.6 (20)	--	--
Yes	24.1 (243)	**1.23**	**3.43 (2.31, 5.08)**
Animal task			
No (ref)	10.3 (52)	--	--
Yes	24.4 (211)	**0.84**	**2.32 (1.73, 3.12)**
Operation of equipment on highways			
No (ref)	10.5 (86)	--	--
Yes	32.2 (177)	**1.14**	**3.12 (2.39, 4.07)**
Any task that involved climbing higher than 8ft			
No (ref)	11.5 (89)	--	--
Yes	29.2 (174)	**1.07**	**2.90 (2.22, 3.80)**
Time doing farm work in the last week			
0	8.8 (35)	--	--
1-39	22.8 (178)	--	--
40+	42.7 (61)	--	--
Increase in 10 hours		**0.24**	**1.27 (1.21, 1.34)**

Table 4. Adjusted parameter estimates, odds ratios, and 95% confidence intervals from multivariate GEE regression analysis.

Main Effects	Parameter estimate	OR estimate (95% CI)
Age		
Increase in 10 years	-0.21	0.81 (0.67, 0.98)
Chronic bronchitis/ emphysema (yes vs. no)	0.45	1.57 (1.00, 2.46)
Back problems (yes vs. no)	0.31	1.37 (1.00, 1.87)
Arthritis (yes vs. no)	0.27	1.31 (1.02, 1.71)
Restless nights in past week		
<1 day (ref)	--	--
1-2 days	0.28	1.32 (0.96, 1.81)
3-4 days	0.70	2.02 (1.32, 3.09)
5-7 days	0.64	1.89 (1.28, 2.80)
Time doing farm work in the last week		
Increase in 10 hours	0.26	1.29 (1.13, 1.47)
Operation of equipment on highways	0.41	1.51 (1.08, 2.10)
Any task that involved climbing higher than 8 ft	0.53	1.69 (1.22, 2.35)
Gender-task interactions	**Parameter estimate**	**OR estimate (95% CI)**
Females		
Neither task (ref)	--	--
Crop task only	0.79	2.21 (1.04, 4.70)
Animal task only	1.10	3.00 (1.39, 6.48)
Animal and Crop task	1.89	6.62 (2.67, 16.44)
Males		
Neither task (ref)	--	--
Crop task only	-0.45	0.64 (0.30, 1.36)
Animal task only	0.05	1.05 (0.69, 1.58)
Animal and Crop task	-0.40	0.67 (0.33, 1.37)
Females, Neither task (ref)	--	--
Males, Neither task	2.75	15.63 (5.70, 42.83)

Conclusions

- Race has no effect on farmwork-related injury in this cohort.
- Increase in age decreases odds of farmwork-related injury overall.
- Chronic health problems prevalent among older farmers yet they continue to work.
- Poor sleep quality increases odds of injury; similar results reported (Spengler et Al., 2004; Choi et Al., 2006)
- Differences in injury among males and females are present even after controlling for hours worked.
  - Interaction between gender and certain farm tasks.

Strengths/Limitations

- Strengths
  - Model incorporates time dependent covariates for farm tasks and chronic health conditions.
- Limitations
  - Data collected based upon self report.
  - Little information on severity of injury (large proportion of injury in 'other' category).
  - Limitations on specific circumstance of individual injury events.

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