

Prevalence of Respirator/Dust Mask Use Among U.S. Primary Farm Operators with Asthma

Analysis of the 2006 Farm and Ranch Survey

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Introduction

In 2006, an estimated 2.1 million farm operations existed in the United States, and at least one primary farm operator managed the day-to-day decisions on these farms.

Many agricultural studies have shown elevated rates of respiratory symptoms and diseases, and their findings have suggested that these respiratory effects are attributed to exposures from activities involving farming operations.

The use of respiratory protective equipment can be used to protect individuals from exposure to dusts, fumes, smoke, gases, and vapors found on a farm. However, there is very little information about the use of respirators among farm operators, especially among those with a respiratory condition such as asthma.

Objectives

- > To estimate prevalence of respirator/dust mask use among U.S. primary farm operators with asthma.
- > To estimate this prevalence by operator and farm characteristics.

Methods

Data source

The 2006 Farm and Ranch Safety Survey conducted by the U.S. Department of Agriculture, National Agricultural Statistics Service.

- Survey sample included 25,000 farms and information from 14,159 (57%) farms was collected; 12,278 (87%) were actively farming and included in this analysis. Adjusted survey response rate was 75%.

Definitions

- > **Current asthma** (coded as yes/no)
 - Have/Has you or the farm operator ever been told by a doctor, nurse, or other health professional that you or he/she had asthma? AND Do you or the farm operator still have asthma?
- > **Asthma attack while doing farm work** (coded as yes/no)
 - Did you or the farm operator have one or more asthma attacks requiring the use of an inhaler, or other medical treatment in the last 12 months? OR Did you or the farm operator have a serious asthma attack that required an emergency room visit, hospitalization, or other professional medical attention in the last 12 months? AND Did any such asthma attack occur while doing farm work?
- > **Respirator/dust mask use** (coded as yes/no)
 - In the last 12 months, have (you/the farm operator) used a respirator or dust mask on your farm or ranch?
- > **Second job** (coded as yes/no)
 - Do you/Does the farm operator have a second job in addition to (your/their) farming to supplement the farm income?
- > **Region**
 - North: Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont
 - Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin
 - South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia
 - West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming
- > **Farm type**
 - Crops: Grains; Tobacco; Cotton & cotton seed; Vegetables, melons, potatoes & sweet potatoes; Fruit, tree nuts & berries; and Other crops
 - Livestock: Hogs & pigs; Cattle & calves; Milk & other dairy products; Sheep, goats & their products; Horses, ponies & mules; Poultry & eggs; and Other animals & animal products
 - Other: Aquaculture; Nursery, greenhouse, floriculture & sod; and Cut Christmas trees & short rotation woody crops

Analysis

Estimated population percent (%), estimated prevalences, prevalence differences (PD) between groups, and corresponding 95% confidence intervals (CI) were calculated. Sample weights were used to account for the complex sample design. SAS® software version 9.2 (SAS Institute Inc., Cary, NC) was used. PROC SURVEYREG with an ESTIMATE statement was used to test whether the PD=0. Statistical significance was achieved if P-value<0.05.



The findings and conclusions in this poster are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

Results

Table 1. Operator and farm characteristics, and prevalence of current asthma and respirator/dust mask use

Characteristics	Survey respondents	Estimated %	Prevalence (95% CI)		Characteristics	Survey respondents	Estimated %	Prevalence (95% CI)	
			Current asthma	Respirator/dust mask use				Current asthma	Respirator/dust mask use
Operator					Farm				
All operators	12,278	100.0	4.9 (4.4–5.4)	37.2 (36.1–38.3)	Region				
Age group (years)¹					North	2,869	6.3	5.2 (4.3–6.2)	35.3 (33.4–37.3)
16–34	286	2.3	4.4 (1.6–7.3) ²	46.9 (39.3–54.4)	Midwest	2,998	37.5	4.9 (4.0–5.7)	40.0 (38.2–41.8)
35–64	8,081	66.1	4.7 (4.1–5.4)	40.7 (39.3–42.1)	South	3,340	42.2	4.4 (3.6–5.3)	33.7 (31.8–35.6)
≥65	3,609	29.3	5.5 (4.6–6.5)	30.0 (28.1–31.9)	West	3,071	14.1	6.0 (5.1–6.9)	41.1 (39.2–42.9)
Gender¹					Farm type				
Male	10,885	88.1	4.5 (4.0–5.0)	38.9 (37.8–40.1)	Crops	5,735	46.3	5.2 (4.4–5.9)	40.5 (38.8–42.1)
Female	1,381	11.8	8.1 (6.0–10.1)	24.4 (21.4–27.4)	Livestock	5,905	50.8	4.6 (3.9–5.3)	33.7 (32.2–35.3)
Second job¹					Other	638	2.9	5.4 (2.7–8.0)	45.5 (40.1–50.8)
Yes	5,554	49.5	4.5 (3.8–5.2)	36.9 (35.3–38.5)	Farm size (value of sales)				
No	6,663	50.0	5.3 (4.6–6.0)	37.8 (36.3–39.2)	<\$100,000	9,164	83.8	4.9 (4.3–5.5)	33.3 (32.1–34.5)
					≥\$100,000	3,114	16.2	4.7 (3.8–5.5)	57.3 (55.3–59.3)

Table 2. Prevalence of respirator/dust mask use by operator and farm characteristics

Characteristics	Current asthma		No asthma		PD	95% CI	P-value
	Prevalence	95% CI	Prevalence	95% CI			
Operator							
All operators	49.5	44.2–54.7	36.7	35.6–37.8	12.8	7.4–18.1	<0.001
Age group (years)							
16–34	46.1 ²	14.0–78.1	46.9	39.1–54.7	-0.8	-33.9–32.1	0.959
35–64	53.0	46.3–59.7	40.1	38.7–41.5	12.9	6.0–19.7	<0.001
≥65	42.8	34.0–51.5	29.2	27.3–31.2	13.2	4.5–22.5	0.003
Gender							
Male	53.1	47.4–58.8	38.4	37.2–39.6	14.7	8.9–20.6	<0.001
Female	34.4	21.7–47.0	23.6	20.6–26.6	10.8	-2.2–23.8	0.104
Second job							
Yes	50.6	42.4–58.7	36.3	34.7–38.0	14.3	5.9–22.6	0.001
No	48.6	41.7–55.4	37.2	35.7–38.7	11.4	4.4–18.4	0.002
Farm							
Region							
North	44.0	34.8–53.1	35.1	33.1–37.1	8.9	-0.5–18.2	0.063
Midwest	57.0	48.0–66.0	39.4	37.5–41.3	17.6	8.4–26.9	<0.001
South	45.9	36.1–55.6	33.2	31.3–35.2	12.6	2.7–22.6	0.013
West	43.2	35.6–50.9	40.9	39.0–42.8	2.4	-5.5–10.2	0.554
Farm type							
Crops	49.2	41.7–56.6	40.2	38.6–41.9	8.9	1.3–16.6	0.023
Livestock	49.6	41.9–57.3	33.1	31.5–34.7	16.5	8.7–24.4	<0.001
Other	52.1	26.5–77.7	45.1	39.6–50.6	7.0	-19.2–33.1	0.602
Farm size (value of sales)							
<\$100,000	45.5	39.6–51.5	32.8	31.6–34.1	12.7	6.6–18.8	<0.001
≥\$100,000	70.9	62.8–79.1	56.7	54.6–58.8	14.2	5.8–22.6	0.001

¹ Numbers may not add up to total due to unknown/refused/missing data (302 for age, 12 for gender, and 61 for second job). ² Relative standard error is ≥30%, estimate may be unreliable.

Table 3. Prevalence of respirator/dust mask use among operators with current asthma

Characteristics	Asthma attack at work		No asthma attack at work		PD	95% CI	P-value
	Prevalence	95% CI	Prevalence	95% CI			
Operator							
All operators	59.0	48.9–69.1	45.7	39.6–51.8	13.3	1.5–25.1	0.027
Age group (years)							
16–34	56.5 ²	2.5–110.6	33.0 ²	-1.4–67.4	23.5	-40.5–87.6	0.472
35–64	64.1	51.9–76.3	48.2	40.4–56.0	15.9	1.4–30.4	0.032
≥65	45.0	27.1–62.9	42.1	35.2–52.2	2.9	-17.6–23.4	0.785
Gender							
Male	63.6	52.8–74.5	49.1	42.4–55.7	14.6	1.9–27.3	0.025
Female	41.5 ²	17.0–66.1	31.5	16.9–46.1	10.0	-18.6–38.6	0.492
Second job							
Yes	59.6	44.3–75.0	46.9	37.3–56.4	12.8	-5.3–30.8	0.165
No	58.5	45.1–71.9	44.8	37.0–52.7	13.7	-1.8–29.2	0.084
Farm							
Region							
North	61.8	44.1–79.6	38.8	28.5–49.1	23.1	2.6–43.6	0.027
Midwest	76.9	62.2–91.6	49.2	38.7–59.7	27.6	9.6–45.7	0.003
South	47.1	28.5–65.7	45.4	33.9–56.8	1.7	-20.1–23.6	0.876
West	46.9	32.0–61.8	41.9	33.0–50.7	5.0	-12.3–22.4	0.571
Farm type							
Crops	59.8	45.1–74.5	45.0	36.4–53.5	14.8	-2.1–31.8	0.087
Livestock	58.6	44.2–73.0	46.0	37.0–55.1	12.6	-4.4–29.6	0.147
Other	51.7 ²	0.5–102.9	52.2	23.0–81.3	-0.4	-59.3–58.5	0.989
Farm size (value of sales)							
<\$100,000	55.4	43.8–67.1	41.7	34.8–48.6	13.7	0.2–27.2	0.046
≥\$100,000	77.9	64.2–91.6	68.1	58.1–78.1	9.8	-7.2–26.8	0.258

Summary

- > An estimated 2.1 million primary farm operators worked on active farms, of which 4.9% had current asthma and 37.2% used a respirator/dust mask.
- > Prevalence of respirator/dust mask use was significantly greater among operators with current asthma than among operators without asthma (P-value<0.001).
 - The prevalence of respirator/dust mask use was greater for specific subgroups (e.g., males, ≥35 year-olds, and South and Midwest operators) (Table 2).
- > Among operators with current asthma, the prevalence of respirator/dust mask use was significantly greater among those from farms with a value of sales ≥\$100,000 compared to those from farms with a value of sales <\$100,000 (P-value<0.001).
- > Among operators with current asthma, the prevalence of respirator/dust mask use was significantly greater among those who experienced an asthma attack while doing farm work than those who had not experienced an asthma attack (P-value=0.03).
 - The prevalence of respirator/dust mask use was greater for males, 35–64 year-olds, North and Midwest operators, and those from farms with value of sales <\$100,000 (Table 3).

Limitations

- > Data self-reported and not independently verified by "on-farm" hazard assessment.
- > No information on whether the respirator/dust mask was used at the time of exposure and/or prior to asthma attacks.
- > No information to distinguish between the use of a respirator versus a dust mask.

Conclusions

These findings contribute to the limited information on respirator use and asthma among farm operators. Further studies are needed to evaluate respiratory protection programs and asthma management among farm operators.