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Where Do Agricultural Producers Get Safety and Health Information?

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ABSTRACT. There is little empirical guidance regarding communication sources and channels used and trusted by agricultural producers. The goal of this study was to characterize frequency of use and levels of trust in agricultural safety and health information sources and channels accessed by agricultural producers. A sample of 195 agricultural producers was surveyed at county fairs in Iowa. Information was collected about the frequency of use and level of trust in 14 information sources and channels. Associations between age, gender, and education level and use and trust of each information source or channel were estimated using logistic regression. The sample consisted of 72% men with a mean age of 50.1 (SD = 15.6) years. Newspaper and magazine articles were the most commonly used agricultural safety and health information source or channel; 77% ($n = 140$) of respondents reporting using them at least monthly. Among those reporting monthly or more frequent use, 75% reported trusting mostly or completely, compared with 58% using and 49% trusting the Internet. High levels of use and trust of newspaper and magazine articles did not vary significantly by age, gender, or education level. Age in the highest tertile (57–83 years) was marginally associated with lower odds of using, as well as using and trusting, all the information sources and channels studied except for medical clinics (use only: odds ratio [OR], 3.51, 95% confidence interval [CI], 0.79–15.64; use and trust: OR, 5.90, 95% CI, 0.91–38.42). These findings suggest that traditional media may be more effective than digital media for delivering agricultural safety and health information to agricultural producers. Medical clinics may be an untapped venue for communicating with older agricultural producers.

KEYWORDS. Agriculture, communication, health, safety

INTRODUCTION

In the United States and internationally, agricultural workers are at substantially higher risk of injury and illness than workers in other economic sectors. According to the US Department of Labor, 5,816 agricultural workers died from work-related injuries in the United States between 2003 and 2011. The rate of fatal

occupational injury among agricultural workers in the United States was seven times greater than the overall rate for workers in private industry. Nonfatal injury is also a major public health problem among agricultural workers, with an injury rate more than 40% higher than the rate for all workers in the United States.¹ In addition to injury, agricultural workers are also at elevated risk of numerous chronic illnesses,

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including sensorineural hearing loss, contact dermatitis, skin cancer, respiratory conditions, and musculoskeletal disorders.

In many regions of the United States, agricultural commodities are produced by relatively small enterprises that are not subject to direct oversight by federal occupational safety and health regulatory authorities. These small farms, which represent a majority (88%) of US farms, are often owner-operated with unpaid family members.² Unfortunately then, the vast majority of US agricultural operations likely have no regulatory incentive to promote safety and health activities for owner-operators or their workers.

In the absence of regulatory authority, agricultural health and safety specialists have applied health communication and social marketing principles in an effort to disseminate safety and health information directly to farm operators and farm workers at risk of agricultural injury and illness.³ Multiple information delivery channels have been used for delivery of agricultural safety and health messaging, including print mass media^{4–7}; person-to-person communication^{4,5,8}; classroom-based safety training exercises and simulations⁹; direct mailing of multiple modalities of information (e.g., video, fact sheet, booklet)¹⁰; radio and television advertising^{6,7}; displays and presentations at farms shows and agricultural safety events^{4–6}; and even live theater presentations.¹¹

Although many methods are used to disseminate agricultural safety and health information, little empirical evidence is available about the extent to which each is used and trusted by agricultural workers. We are aware of only three peer-reviewed studies of this question. In 1997, a sample of Iowa farmers reported nearly universal use of print media for agricultural safety information and substantial use of radio and television.¹² A more recent survey among nursery, dairy, berry, and fresh market vegetable producers reported high frequencies of print media use and relatively low frequencies of Internet use.¹³ In addition, in 2010, Ohio grain producers ranked demonstration or field days, talks with farmers, and farming publications as the three more important communication channels, whereas Internet was ranked 13 out of 22.¹⁴ The non-peer-reviewed 2014 Media Channel Study

conducted by the Agri Media Council of the Association of Business Information and Media Companies (ABM; New York, NY, USA) found that traditional media channels remain highly used despite increasing use of digital media.¹⁵ Given the dramatic rise of Internet-based electronic communications, we suspect that Internet use is especially likely to vary across studies conducted during the past decade, and that the use of traditional media such as newspapers, magazines, television, and radio may also change over time.

In order to more effectively disseminate agricultural safety and health messaging to agricultural producers in the US Midwest, we conducted a study of frequencies of use and levels of trust in 14 sources and channels of agricultural safety and health information among agricultural producers in Iowa. Based on the communication-persuasion model, the term “channel” is used to reflect how information is conveyed, whereas “source” is the perceived communicator of a message.¹⁶ In addition to these descriptive results, we also examined how use and trust of the sources and channels were associated with age, gender, and level of education. This information is essential for effective delivery and adoption of safety and health promotion messages—which are a key strategy to prevent injuries and illnesses among agricultural workers.

METHODS

Study Sample and Survey

Self-identified farmers attending three county fairs in East-Central Iowa in 2013 were recruited to participate in this cross-sectional study. Participants were asked to complete an anonymous, self-administered questionnaire in order to collect information on the frequency of using each of four sources (Internet, newspaper and/or magazine articles, radio, and television) and 10 channels (product manufacturer’s information; local equipment or implement dealers, agribusiness supply stores, or grain elevators; insurance providers; commodity trade associations; community college; university;

agricultural extension agent; 4-H and/or Future Farmers of America [FFA]; medical clinic; and community and/or family members) of agricultural safety and health information in the prior year. Participants were asked to rate their frequency of use as *never*, *at least once per year*, *at least once per month*, or *at least once per week*. For the same 14 sources and channels of information, participants were asked to rate their level of trust in agricultural health and safety information obtained through each as *not at all*, *a little*, *mostly*, or *completely*. The questionnaire also included questions about participant characteristics, such as year of birth, age, education, ethnic background, number of individuals in the household, and number of individuals under 18 years of age in the household, as well as farm characteristics, such as the participant's role in the farm operation, location, duration of farming, whether it was his or her primary occupation, type of farming, gross sales, and type of commodities produced.

Statistical Analysis

Means and standard deviations were calculated for demographic and farm characteristics of the study participants. Age was categorized into tertiles. Due to small cell sizes, responses for frequency of use were collapsed into mutually exclusive categories of *never*, *at least once per year*, and *at least once per month*. High use was defined as *at least once per month*. Responses for level of trust were dichotomized into *not at all/a little* versus *mostly/completely*. High trust level was defined as *mostly* or *completely*. For each information source or channel, the proportion of respondents reporting each category of use frequency was calculated, as well as the percentage of respondents trusting the source or channel mostly or completely at each level of use frequency.

Associations between (1) high use frequency and (2) high use frequency *and* high trust level and participant age, gender, and education were examined with logistic regression models. For the logistical regression analysis, use frequency was dichotomized as high use (*at least once per month*) or less often (*at least once per year* or *never*). Farm or demographic characteristics

such as owner-operator status, employer, primary occupation, grain producer, and presence of children in the household were investigated as potential covariates in the multivariable logistic regression model in an iterative manner if there were more than five observations in each cell. For each information source or channel, a logistic regression model for high use or use and trust was generated with age, gender, and education and all the potential covariates and compared with a model that did not include the potential covariate with the highest *P* value. If (1) the odds ratio (OR) for age, gender, and/or education level differed by 10% or more or (2) the Akaike information criterion decreased by 2 units or more, the potential covariate was retained in the final multivariable logistic regression model. This process was repeated with the potential covariate with the next highest *P* value until all the potential covariates were examined. All statistical analyses were performed using Stata, version 13 (StataCorp, College Station, TX).

RESULTS

Subjects

A total of 195 participants completed the self-administered questionnaire. Information on the demographic and farm characteristics of the study participants is presented in Table 1. The mean age of the participating farmers was 50.1 years (SD = 15.6), and 72% were male. Most were owner-operators (72%) and grain producers (75%), and there was a relatively even distribution of education level and farm gross sales.

How Frequently Are Information Sources and Channels Used and Trusted?

The frequency of use and level of trust in the 14 information sources and channels are depicted in Figure 1. Newspaper and magazine articles were the most commonly used of all sources and channels of agricultural health and safety information, with 77% of respondents reporting use at least once per month, followed by community or family members (62%) and Internet (58%). Seventy-five percent of study

TABLE 1. Demographic and Farm Characteristics of Study Participants ($N = 195$)

Characteristic	<i>n</i>	(%)	Mean	(SD)
Age, years			50.1	(15.6)
Gender (male)	129	(72)		
Education				
Up to high school diploma	57	(31)		
Technical, trade, or some college	66	(36)		
College graduate	58	(32)		
Number of household members			3.5	(1.5)
Number of household members < 18 years			1.2	(1.4)
Operator type				
Owner operator	149	(76)		
Tenant operator	6	(3)		
Paid farm employee	18	(9)		
Nonpaid farm employee	9	(5)		
Other	12	(6)		
Employs others (Yes)	35	(18)		
Years engaged in farming			31.5	(15.5)
Does majority of work (Yes)	133	(68)		
Farming primary occupation (Yes)	107	(55)		
Type of farming				
Conventional	176	(92)		
Organic	2	(1)		
Both	13	(7)		
Gross sales				
<\$10,000	21	(13)		
\$10,000–\$49,999	27	(17)		
\$50,000–\$99,999	34	(21)		
≥\$100,000	50	(31)		
Don't know	23	(23)		
Refused to answer	31	(19)		
Commodity*				
Grain	147	(75)		
Forage crops	116	(59)		
Horticulture specialty	5	(3)		
Beef cattle	130	(67)		
Dairy cattle	14	(7)		
Hogs	53	(27)		
Poultry	23	(12)		
Other animals	55	(28)		
Food products (fruits, vegetables, etc.)	13	(7)		
Other (custom farming, seed, etc.)	3	(2)		

Note. Some percentages were calculated with $N < 195$ due to missing responses.

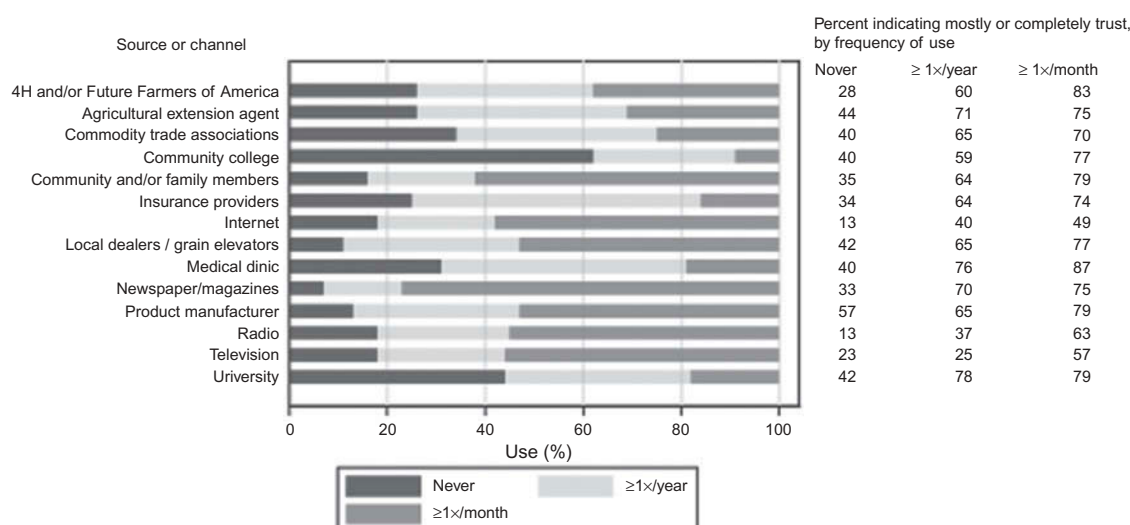
*Commodity frequencies are not mutually exclusive.

participants who used newspaper and magazine articles at least once per month reported trusting them mostly or completely, compared with 77% and 49% for community or family members and Internet, respectively. There were four information sources and channels with less than 20% use of at least once per month (medical clinic, insurance agent, community college, and university) that were also highly trusted, with >75% reporting mostly or completely trusting.

How Are Age, Gender, and Education Associated With Use, and Use and Trust of Information Sources and Channels?

Associations between high use and age, gender, and education are presented in Table 2. Compared with the youngest tertile (18–45 years), agricultural producers in the highest age tertile (57–83 years) tended to report less frequent use of all information sources and

FIGURE 1. Sources and channels used by agricultural producers to obtain information regarding safety and health, by frequency.



channels, except for medical clinics, although this difference was not statistically significant. Compared with female participants, males had more than double the odds of using television (odds ratio [OR], 2.30; 95% confidence interval [CI], 1.02–5.19); local equipment or implement dealers, agribusiness supply stores, or grain elevators (OR, 4.09; 95% CI, 1.82–9.18); and community or family members (OR, 2.38; 95% CI, 1.03–5.51). College graduates were more likely to use the Internet (OR, 3.13; 95% CI, 1.29–7.59) and universities (OR, 5.05; 95% CI, 1.50–16.96) at least once per month for agricultural health and safety information than participants who received a high school diploma or less education. There were no significant associations between combined high use and trust and age, gender, and education (data not shown). Interestingly, older farmers were less likely to report high use and trust of all information sources and channels, except for medical clinics (OR, 5.90; 95% CI, 0.91–38.42).

DISCUSSION

This study adds to the relatively small literature exploring frequency of use and level of trust of various sources and channels of safety and health information among agricultural

producers. Although three quarters of farms in Iowa have an Internet connection, newspapers and magazines were still the most frequently used channel of agricultural safety and health information. Despite its ubiquity, the Internet was ranked third in use frequency. Also striking was the level of trust reported for each source or channel. The proportion of participants reporting trusting mostly or completely was lowest for the Internet and highest for medical clinics.

Results comparing frequency of use and level of trust may have important implications for information dissemination. First, despite the enormous interest in Web-based dissemination of safety and health information, the observed results suggest that abandonment of traditional media is premature. Based on frequency of use and level of trust, newspapers and magazines may still be important channels of communication. Surprisingly, stratified analyses did not show large differences across age categories for either traditional media or the Internet. These results are consistent with those of the biennial Media Channel Study conducted by the ABM Agri Media Council.¹⁵ Specifically, in 2014, the council reported that agricultural magazines and newspapers as well as general daily newspapers were the most frequently used information channels, with 81% and 71% of respondents reporting use of at least once

TABLE 2. Odds Ratios for High Use of Sources and Channels for Occupational Safety and Health Information According to Age, Gender, and Education

Channel/source	Age			Male gender			Education				
	Middle tertile		Highest tertile			Technical or trade school, associate degree, and/or some college	College graduate	Covariates			
	OR	95% CI	OR	95% CI	OR	95% CI	OR		95% CI		
<i>Channel</i>											
Newspaper and/or magazine articles	1.48	(0.54, 4.09)	0.76	(0.23, 2.54)	0.77	(0.30, 1.96)	0.58	(0.22, 1.51)	0.97	(0.34, 2.78)	Owner, primary occupation, children
Radio	0.96	(0.39, 2.40)	0.52	(0.16, 1.65)	1.86	(0.83, 4.17)	0.96	(0.38, 2.41)	0.43	(0.17, 1.10)	Owner, employer, grain producer, children
Television	0.96	(0.40, 2.33)	0.48	(0.116, 1.44)	2.30	(1.02, 5.19)	1.20	(0.50, 2.84)	0.59	(0.25, 1.42)	Owner, employer, primary occupation, children
Internet	0.88	(0.39, 1.96)	0.81	(0.29, 2.25)	0.86	(0.39, 1.90)	1.04	(0.46, 2.35)	3.13	(1.29, 7.59)	Primary occupation, children
<i>Source</i>											
Product manufacturer's information	0.49	(0.20, 1.21)	0.50	(0.16, 1.55)	1.34	(0.61, 2.95)	0.43	(0.18, 1.02)	0.88	(0.36, 2.13)	Owner, grain producer, children
Commodity trade associations	0.61	(0.23, 1.57)	0.25	(0.08, 0.82)	2.52	(0.96, 6.60)	1.81	(0.68, 4.86)	1.73	(0.63, 4.72)	Children
Local equipment/implement dealers, agribusiness supply stores, grain elevators	0.79	(0.33, 1.87)	0.55	(0.23, 1.30)	4.09	(1.82, 9.18)	0.98	(0.43, 2.25)	0.77	(0.33, 1.81)	Owner, primary occupation
Insurance providers	0.72	(0.21, 2.43)	0.24	(0.06, 0.98)	1.86	(0.60, 5.82)	2.35	(0.70, 7.87)	1.79	(0.51, 6.31)	Owner, children
4H and/or FFA	0.82	(0.33, 2.02)	0.24	(0.07, 0.90)	0.72	(0.31, 1.66)	1.22	(0.45, 3.33)	0.94	(0.34, 2.61)	Owner, primary occupation, children
Community and/or family members	0.69	(0.27, 1.77)	0.29	(0.09, 0.94)	2.38	(1.03, 5.51)	0.80	(0.33, 1.94)	0.98	(0.39, 2.46)	Owner, primary occupation, grain producer, children
Agricultural extension agent	0.45	(0.17, 1.15)	0.15	(0.04, 0.58)	0.94	(0.39, 2.24)	0.85	(0.31, 2.36)	0.98	(0.36, 2.70)	Owner, primary occupation, children
University					1.52	(0.55, 4.25)	1.37	(0.36, 5.26)	5.05	(1.50, 16.96)	Owner, primary occupation, grain producer, children
Medical clinic	1.45	(0.46, 4.60)	3.51	(0.79, 15.64)	1.26	(0.44, 3.65)	1.32	(0.46, 3.78)	0.40	(0.11, 1.50)	Grain producer, children

Note. OR = odds ratio; 95% CI = 95% confidence interval; FFA = Future Farmers of America.

Age tertiles: lowest tertile, 18–45 years; middle tertile, 45–57 years; highest tertile, 57–83 years.

per week, compared with 43% reporting use of agricultural Web sites. Interestingly, high use of print media was relatively constant among respondents younger than 45 years, 45–64 years, and 65 years or older, as well as compared with their previous survey in 2012.

Also of interest was low use frequency of medical clinics and academic (university and community college) as information sources despite a relatively high level of trust associated with each. These observations suggest a potential untapped resource for disseminating trusted safety and health information.

Multivariable analyses suggested that older farmers are more difficult to reach than younger farmers. Specifically, for all sources and channels except medical clinics, the oldest tertile reported lower odds of use than the youngest tertile. Although not statistically significant, the odds of using medical clinics for agricultural safety and health information was three times greater for study participants in the oldest age tertile in comparison with those in the youngest age tertile. Again, these results may suggest that medical clinics are a potentially untapped resource for reaching this important and growing agricultural demographic.

The literature available for comparing results with the current study is small. A survey of preferred channels of information conducted in 1992 among 517 Iowa agricultural producers reported that 95% of respondents obtained agricultural safety information from newspapers and magazines, 82% from radio, and 77% from television.¹² Residential Internet connection was uncommon at that time, and no information was collected about use of digital sources. In a more recent study, nursery, dairy, berry, and fresh market vegetable producers were asked about 13 sources or channels of agricultural information.¹³ Print media was the most commonly used information source or channel, used by 41% to 84% of respondents. The Internet was not commonly used, with use frequencies ranging from 7% to 25%. Participants rated “other farmers” as the most *useful* source of information, with print media also scoring relatively highly. The Internet was scored lower than other farmers and print media as a useful channel of information. Although conducted among producers of

commodities quite different from those of the participants in the current study, the results are mostly consistent.

Although these results may assist those seeking to disseminate safety and health information to agricultural producers in Iowa and the US Midwest, several methodological limitations should be considered. First, the study sample was a convenience sample of agricultural producers in Iowa. The mean age of the sample was modestly lower than the mean age of all agricultural producers in Iowa of 57 years, suggesting possible differences between the sample and the target population.¹⁷ Furthermore, the results were self-reported and may differ from true use frequency and trust level.

In summary, because of the highly decentralized nature of agricultural production, effective communication of safety and health information to agricultural producers remains a challenge. The results of the current study suggest that traditional media continue to be of considerable potential value and that some sources, such as academic institutions and medical clinics, are underutilized. As methods of communication evolve over time and a larger proportion of agricultural producers embrace digital communication, repeated assessment of use frequency and trust level may be useful.

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