# A Study of the Impact and Efficacy of Health Fairs for Farmers

L. Rydholm, S. R. Kirkhorn

**ABSTRACT**. *The purpose of this study was to evaluate the effectiveness of two regional multi-disciplinary farm health fairs, pairing cardiovascular and agricultural health and safety risk factor assessments and education, in agricultural regions in southern Minnesota in 1999 and 2001. This study explores the rationales and motives cited as having an influence on: (1) work practice and lifestyle adaptations, (2) resistance to such changes, and (3) compliance with health fair recommendations. Evaluation took the form of standardized telephone surveys and callbacks with an open-ended component administered by a parish nurse interviewer and conducted six months following each of the fairs. Participants had received individualized work practice and lifestyle recommendations based upon their medical results and questionnaire responses. Of the 378 total attendees at the two farm health fairs, 272 (72%) participated by filling out on-site questionnaires, and 284 (75%) completed a post-fair interview. Participants who were actively farming totaled 237 (63%) of all participants. A majority of those interviewed on callback (78%) reported either work safety or lifestyle changes, while 47% of those actively farming claimed varying work safety changes as a result of the fair. The conclusions drawn from the follow-up interviews include: (1) the two farm health fairs resulted in a substantial number of participants positively modifying lifestyle and work practices, (2) the stand-alone farm health fairs were effective in attracting farmers, and (3) low-level stressors identified in the participants could be effectively addressed by knowledgeable rural health care resources such as parish nursing.*

***Keywords.*** *Agricultural health and safety, Health fairs, Health promotion, Medical screening, Rural health.*

Farming has long been considered to be a dangerous occupation that exposes the farming community to multiple health hazards. Extensive literature has reported increased mortality and morbidity from mechanical and animal injuries; increased prevalence of hearing loss, pulmonary disease, arthritis, and skin cancer; and concern about certain other occupational-related cancers (Frank et al., 2004; Rautiainen and Reynolds, 2002). A common method of disseminating information regarding agricultural health and safety has been to "piggyback" with agricultural trade shows and add medical screening as a component of such efforts. Anecdotal and common wisdom indicates that the farm community will not participate in stand-alone health screenings in sufficient numbers and utilization of other events commonly attended by farmers is more effective. Health fairs have been considered to be a community health promotion strategy (Bryan et al., 1991; Carter, 1991; Clark, 1985). While previous assessments of health fairs have

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The authors are **Laura Rydholm,** RN, MS, Health Ministries Facilitator, Immanuel St. Joseph's-Mayo Health System, Mankato, Minnesota; and **Steven R. Kirkhorn,** MD, MPH, Medical Director, National Farm Medicine Center, Marshfield Clinic, Marshfield, Wisconsin. **Corresponding author:** Steven R. Kirkhorn, National Farm Medicine Center, Marshfield Clinic, 1000 North Oak Ave., Marshfield, WI 54449; phone: 715-389-3545; fax: 715-389-4996; e-mail: kirkhorn.steven@mcrf.mfldclin.edu.

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looked at pretest and posttest score differences, they have not incorporated extensive follow-up interviews to assess behavioral changes and barriers to implementation of recommendations. Health fairs continue to be used in the agricultural community, for example the health fairs for agricultural migrant workers promoted by CalAgrAbility (CalAgrAbility, 2005). Jones and Siegrist (1999) reported a decentralized effort to reach the farm population at locations where farmers gather and combine the approach with community nursing education.

Such strategies have been used to assess respiratory disease (Von Essen et al., 1999), skin cancer screening (Marlenga and Lee, 1996), and hearing loss, but there are limited published reports regarding the effectiveness of such interventions for other diseases. Other rural agricultural health concerns include access to health care, obesity, and mental health issues.

The prevalence of obesity is increasing throughout the United States, including in the farm population. Obesity is considered to be a significant cardiovascular health risk by contributing to the development of hypertension, diabetes, and impaired lipid metabolism. Cardiovascular diseases, including heart disease and strokes, are still leading causes of mortality in the United States. Goal 12 of the Public Health document "Healthy People 2010" recommends improving "cardiovascular health and quality of life through the prevention, detection, and treatment of risk factors" (Healthy People, 2000). Due to the latency period associated with the development of cancer, cardiovascular disease risk assessment was felt to be a more appropriate public health issue to pair with an educational and screening intervention. In addition, a previous study reported that obtaining a blood biochemical profile was the sole reason for attending health fairs for 47% of participants at community-based health fairs (Heath et al., 1991). The investigators of this study believed that it was necessary to have an additional incentive to draw a farm population to attend the health fair. Therefore, health and safety messages, audiometry, spirometry, and blood pressure assessment were augmented by lipid and glucose screenings.

## Conceptual Framework

According to Aquilera and Messick (1989), people in distress need three things to regain their equilibrium: (1) a realistic perception of the life events that are jeopardizing their well being, (2) situational support, and (3) adequate coping mechanisms. With this in mind, we sought to create a therapeutic learning opportunity for farmers called "Because we care: A winter fair." Our goal was to present the health hazards of farming within a supportive atmosphere where healthy coping suggestions would be better received. We sought to minimize accessibility barriers to healthy behavior and to create a motivating cadre of "mentors" whose opinions were valued. In our effort to do this, we felt that it was important to involve as many stakeholders who already had relationships with this population as possible. The specific goals of the study were to: (1) build multi-disciplinary community support for prevention and health promotion activities to complement agricultural health and safety efforts; (2) utilize screening to decrease disability in the agricultural community by decreasing cardiovascular risk factors and adverse health effects from agricultural injuries and illness; (3) utilize sustainable rural health resources such as parish nurses, who are trusted members of various rural communities; and (4) assess the effectiveness of a stand-alone farm health fair on a farm population's lifestyle and agricultural work practices.

# Methods

Planning strategies were similar in both 1999 and 2001. Input was sought from stakeholders who serve this population in the planning of these health fair events. Our stakeholders included physicians, parish nurses, health promotion practitioners, university faculty, county public health safety specialists, University Cooperative Extension safety specialists, the Minnesota Farm Bureau, farm creditors, farm-based insurance agents, agricultural service providers, veterinarians, and rural media contacts. Multiple sponsorships were obtained from the involvement of these institutions. Designated business sponsors in the communities helped defray costs and made it possible to offer many gifts and services, which were purchased at a discount through a safety supply dealer. Collaboration enabled us to widely market the event through print and radio as well as mailings to those on the Cooperative Extension mailing list in the appropriate regions. There was no charge for screening tests except for a $10.00 fee for cholesterol testing.

Active participants were required to register and were requested to complete both a letter of research consent prior to participation in interviews and an extensive health history/farm exposure/agricultural work practice questionnaire. Participants were verbally reminded that completion of the questionnaires and signing consents were not required to attend the health fair. Upon completion of the entry forms, participants were invited to go through the screening /educational stations, which were staffed by physicians, family practice residents, respiratory therapists, laboratory technicians, and registered nurses from area congregations, public health departments, and an occupational health clinic. Scheduled presentations by appropriate content experts pertaining to the hazards of farming, risk-reducing work practice strategies, trauma response, respiratory exposures, pesticide safety, toxic exposures, and stress management resources were included as additional educational strategies. A luncheon was served to encourage participation and dialogue.

All participants were invited to complete a lifestyle and work practice questionnaire upon the required registration and were assigned a study number for the questionnaire and medical tests. The questionnaires included demographics, size of farm and commodity, cardiovascular risk factors, health history related to injuries, work practices and use of personal protective equipment, children working on farms, previous injuries related to farming, health insurance, status of physical and mental health, and preventive services. Medical screening involved voluntary cholesterol and blood sugar, spirometry, audiometry, blood pressure, height and weight in order to determine body mass index (BMI), and vision.

Individualized recommendations for work practice or lifestyle changes, based on questionnaire responses and test findings, were mailed to participants after the event. The standardized follow-up interview addressed changes in lifestyle and work practices, personal protective equipment, and compliance with personal recommendations. Telephone callbacks were conducted by the parish nurse coordinator roughly six months after each health fair.

Data from the questionnaires were entered in Microsoft Excel and later analyzed with SPSS 9.0. Fisher's Exact Test two-sided probability p values was used for comparison of the 1999 and 2001 health fair study participants farm practices, lifestyle cardiovascular risks, and behavioral changes. The format of the initial questionnaire and callback process was modified between the 1999 and 2001 health fairs. Contact was attempted for all participants in 2001. In 1999, only those who completed the initial questionnaire were contacted. The study was approved by the Institutional Review Boards (IRB) of both

Immanuel St. Joseph's-Mayo Health System and the University of Minnesota Family Practice and Community Medicine.

# Results

The two farm health fairs attracted 378 attendees, all of whom were white. Of the 378 total attendees at the two farm health fairs, 272 (72%) participated by filling out questionnaires, and 284 (75%) completed a post-fair interview. Participants traveled from nine surrounding counties at each of the two separate locations but were predominately from the county that hosted the health fair and, to a lesser degree, from two or three adjacent counties. Direct costs of the 2001 health fair were estimated to be $3500, excluding personnel time for the 2001 health fair. Donations defrayed $2700 of the expenses. Records of the 1999 health fair expenditures were not available to determine costs.

Table 1 presents selected results from the combined health fairs. Participants reporting actively farming totaled 237 (63%) of all participants. A slight majority of the participants were males (58%) and over age 55 (60%). There were no significant differences ($P > 0.05$) between the two health fairs in such variables as: gender, age, size of farm, personal respirator use, pesticide and anhydrous ammonia application practices, abnormal medical tests, farm-related injuries to self or family, allergies, health adversely affected by farming, follow-up participation in those actively farming, work practice, or all combined lifestyle changes. Significant differences ($P < 0.05$) between the health fairs favoring the 1999 health fair included: initial study participation, live on farm, work on farm, raise grain, wear hearing protection, and positive dietary changes. The 2001 participants were more likely ($P < 0.05$) to be retired and raise hogs (borderline for all animals, $P = 0.0527$). Grain production (82%) occurred on the majority of farms, while 59% of the farms raised animals, which included swine, dairy, and beef cattle. The majority of the participants (82%) lived on farms. A majority of participants reported back/joint pain (57%), demonstrated abnormal audiometry (52%) of those tested, and reported farm-related injuries requiring treatment to the respondent or family member (65%). In addition, 94% carried health insurance, but 48% lacked preventive health services.

Participation in medical screening varied from 30% to 60%, depending on the test. The length of the wait was very influential in affecting participation in medical screening. Abnormal audiometry of moderate to severe hearing loss was found in 26%, and an additional 26% had mild loss. Elevated blood pressure and cholesterol was identified in slightly less than one-third of those tested, while 8% had elevated fasting blood glucose consistent with diabetes. Subjectively, 19% stated their health was negatively affected by farming, 14% experienced emotional problems, and 12% had physical problems that affected their work status somewhat or quite a bit.

A majority (78%) of the callback participants reported either work safety or lifestyle changes (tables 2 and 3). Of those actively farming, 47% claimed varying work safety changes as result of the fair, and 39% of all participants claimed positive lifestyle changes. The changes reported included improved diet, more exercise, and better stress management. Recommendations for follow-up with physicians or audiologists for treatment were made for 32%. Of those who were referred, 70% sought and received the care they needed in a timely manner. New prescriptions were obtained by 12% of participants, and improvement in health status attributed to the health fair was reported by 22%. Work practice changes in those actually farming (table 3) included appropriate use of two-strap or chemical cartridge personal respirators (40%), hearing protection

**Table 1. Selected outcomes of initial questionnaire/medical tests.**

| Variable | Percent | N[a] |
|---|---|---|
| Male gender | 58% | 218 |
| Age over 55 | 60% | 226 |
| Currently live on farm | 81% | 305 |
| Currently work on farm | 66% | 248 |
| Retired | 21% | 80 |
| Raise grain | 82% | 311 |
| Raise animals | 59% | 224 |
| Respiratory symptoms | 25% | 94 |
| Hearing loss | 36% | 138 |
| Back/joint pain | 59% | 222 |
| Physical health adversely effects work | 12% | 47 |
| Inappropriate use of respirators | 17% | 51 |
| Wear hearing protection | 35% | 135[b] |
| Self/family member farm injury treatment | 65% | 246 |
| Elevated blood pressure | 30% | 54[c] |
| Elevated cholesterol | 33% | 70[c] |
| Elevated glucose | 9% | 20[c] |
| Abnormal spirometry | 9% | 14[c] |
| Abnormal audiometry | 52% | 76[c] |
| Farming negative effect upon health | 19% | 72 |
| Emotional health adversely effect work | 14% | 54 |

[a] Total participants N = 378.
[b] Significant at the 0.05 level between health fairs.
[c] Percentage of those actually tested.

**Table 2. Selected outcomes from callback interviews.**

| Lifestyle Variable | Percentage | N[a] |
|---|---|---|
| Reported change | 39% | 111 |
| Diet | 32% | 91[b] |
| Exercise | 24% | 68 |
| Stress reduction support systems | 9% | 35 |
| Medical follow-up | 32% | 90 |
| Prescription change | 7% | 21 |
| Health status improved | 22% | 62 |

[a] Total interviewed N = 284.
[b] Significant at the 0.05 level between health fairs.

**Table 3. Selected work practice outcomes from callback interviews.**

| Work Practice Variable | Percentage | N[a] |
|---|---|---|
| Reported change | 47% | 111 |
| Appropriate respirator usage | 40% | 96 |
| Hearing protection | 21% | 50 |
| Safer pesticide practices | 16% | 37 |
| Increase sunblock-appropriate shade hat | 38% | 108 |
| Replace SMV signs/shield PTO | 5% | 13 |
| Add ROPS | 0.8% | 2 |

[a] Total actively working on farm N = 237.

(21%), wearing gloves, wearing sun block and/or hats that cover the neck and ears, and safer pesticide application. Two participants reported adding a rollover protective structure (ROPS), while 5% reported shielding the power take-off unit (PTO) or replacing SMV signs. During callbacks, only 5% of the 237 active farmers who were interviewed said that they had already been doing these work practice behaviors, while initial questionnaires reported use of personal protective equipment varying from 20% to 64%.

### Qualitative Impressions

The follow-up interviews offered an opportunity for further discussion and amplification of the standardized questionnaire responses. None of the respondents we spoke to seemed to regard the interview as an unwelcome telemarketer call. All took the time to complete the interview and chat about their stressors and successes. Many respondents sought praise and affirmation for their positive changes in lifestyle and work practices. The fair was regarded as a show of genuine support. Feedback revealed that the masks and earplug gifts were being well utilized, and were much appreciated. The gifts were regarded as an encouraging show of concern. Bandanas and cotton balls repeatedly emerged as frugal substitutes when the earplug and mask resources wore out. Accessibility to refills of the safety equipment was an issue.

Although the follow-up questionnaire was not designed to identify barriers to improved work safety practices, the interviewer became aware of several recurrent themes that became evident in the open-ended conversations that commonly occurred. These potential barriers to modifying behaviors included childhood role modeling, frugality, habituation, the need for ease, spousal power struggles, perceptions of invincibility, lack of self-attentiveness, and helpless resignation. Comments pertaining to lifestyle behaviors suggested that accountability to a caring professional audience helped promote lifestyle changes. Respondents repeatedly sought affirmation for changes they had made and apologized for changes they had not been successful in pursuing, despite not knowing the interviewer. Some claimed to be exercising to relieve stress and tension, with minimal concern for the health benefits of this practice. Those who did not make behavioral changes appeared to be too despondent to be concerned with their self-care. These people expressed the most appreciation for callbacks. Many respondents used humor and reframing to justify their lifestyle choices. Family dynamics appeared to be very influential in successful behavior changes. A few were simply at a loss for how to integrate new self-care behaviors into their already stressed interpersonal family dynamics. A recent turn to herbal remedies, such as garlic as a means to prevent cardiovascular disease, turned up as a repeated practice. None of the participants exhibited indicators severe enough to justify immediate referral, but the parish nurse interviewer had the impression of existing marital and spiritual stressors when interviews were extended by the call receivers. Nearly every one of the respondents knew a nurse friend whom they could call on for informal advice, whether this was a relative, a neighbor, or an acquaintance from church.

## Discussion

A unique feature of this study was an assessment of behavioral and work practice changes over a six-month period of time rather than a pretest/posttest assessment at the time of the health fairs. A persuasive impact on help seeking behaviors (accessing health care) was observed. In a few instances, participant (or spousal) symptom disregard appeared to put the individual with symptoms or signs of medical illness at risk for

adverse consequences from untreated farming- and stress-related illnesses. Participants who presented immediate serious health concerns were few in number.

Some discrepancy was noted between the farm fair interview and the callback interview. What the farmers reported they had been doing on the health histories that they completed at the health fair did not always coincide with what they said they were doing on the callbacks. Many confessed that they had not been protecting themselves as well as they now recognized they should. In the initial health histories, far more of those actively farming had reported that they had already been using masks or hearing protection than those (5%) reporting such usage on the callback interviews. Some may have over-reported on the health histories to say what they thought was appropriate. Conversely, phone respondents may have under-reported what they had already been doing in an effort to validate the importance of the fair. This discrepancy may be a result of increased use of personal respirators and hearing protection, as well as a desire to please the fair sponsors.

Limitations of the study include the lack of a denominator for determining prevalence and a control population to assess comparisons with non-participants. It is uncertain whether the health fairs reach a representative body of the farm population and if the findings can be generalized to other regions, farm operations, and ethnicities. Waller et al. (1998) indicated that health fair attendees might have better health and a greater health responsibility, including involvement in exercise and dietary precautions, than non-attendees. The accuracy and sustainability of the self-reported lifestyle and work practice changes are also uncertain. The follow-up interview protocol was modified between the two health fairs. Callback interviews were pursued more aggressively in 2001 than in 1999, and a greater proportion of attendees were included in follow-up interviews in 2001. However, work practices of those actively farming did not vary significantly by Fisher's Exact Test. Benefits of the study include: strengthening community collaboration in delivering an agricultural health and safety message, providing a valuable tool in teaching rural family practice residents about health screening and agricultural health and safety, and the satisfaction of an enjoyable and beneficial interaction with the farm community.

# Conclusions

Winter Health Fairs for the farming community, although costly if they are not subsidized by health professionals with in-kind provision of services and by community businesses with financial support, are effective in modifying work practice and lifestyle behaviors in farmers and spouses, who are at risk for many health problems by virtue of their vocation. Callbacks are an essential component of the intervention because they positively reinforce new risk-reducing behaviors and support a population in need of improved access to health care. More trust is needed to overcome cultural barriers to accessing health care. Health promotion components can be easily integrated into any gathering of rural people. The role of parish nurses should not be overlooked in this endeavor, as they may serve in a therapeutic as well as health consultant role.

Finally, it would be advantageous to consider the impact of the influences cited by these respondents in any campaign to promote their health. Influences included factors such as health care costs, high deductibles, unavailability of personal protective equipment, habits learned from childhood role models, the need for ease of use of personal protective equipment, perceptions of invincibility, pride, chore demands and expectations, spiritual resignation, lack of affirmation, an affinity for denial, culture-based stoicism, preoccupation with work demands, fear of being devalued, the comfort

of routine, and fear of the implications of diagnosis (loss of freedom). A more formalized tool to gather such information is necessary in order to determine whether the qualitative impression that these influences are important can be accurately assessed.

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# References

Aquilera, D. C., and J. M. Messick,. 1989. *Crisis Intervention: Theory and Methodology.* 6th ed. St Louis, Mo.: CV Mosby.

Bryan, J. M., J. M. Deveraux, M. L. York, and R. J. Schoh. 1991. How effective are health fairs? Quantitative evaluation of a community health fair. *American J. Health Promotion* 6(2): 85-88.

CalAgrAbility. 2005. California Agrability Project: Latino Festivos de Salud serve migrant farmworkers and their families. Available at: http://calagrability.ucdavis.edu/pages/fairs_events.html. Accessed 10 April 2005.

Carter, K. F. 1991. The health fair as an effective health propmotion strategy. *AAOHN J.* 39(11): 513-516.

Clark, M. J. 1985. The health fair: An effective approach to health promotion? *Public Health Nursing* 2(1): 33-42.

Frank, A. L., R. L. McKnight, S. R. Kirkhorn, and P. Gunderson. 2004. Issues of agricultural safety and health. *Ann. Rev. Public Health* 25: 225-245.

Heath, J. M., K. S. Lucic, D. Hollifield, and J. R. Kues. 1991. The health beliefs of health fair participants. *J. Community Health* 16(4): 197-203.

Healthy People. 2000. Healthy People 2010: Understanding and improving health. 2nd ed. Washington D.C.: U.S. Department of Health and Human Services. Available at: www.healthypeople.gov/document. Accessed 30 March 2005.

Jones, S. M., and B. Siegrist. 1999. Health promotion for farmers at the country market. *Nurse Educator* 24(5): 16-18.

Marlenga, B., and B. C. Lee. 1996. Barriers to skin cancer screening follow-up in farmers. *J. Agromedicine* 3(1): 5-16.

Rautiainen, R. H., and S. J. Reynolds. 2002. Mortality and morbidity in agriculture in the United States. *J. Agric. Safety Health* 8(3): 259-276.

Von Essen, S. G., J. Fryzek, B. Nowakowski, and M. Wampler.1999. Respiratory symptoms and farming practices in farmers associated with acute febrile illness after organic dust exposure. *Chest* 116(5): 1452-58.

Waller, P. R., C. Crow, D. Sands, and H. Becker. 1988. Health-related attitudes and health-promoting behaviors: Differences between health fair attendees and a community comparison group. *American J. Health Promotion* 3(1): 17-24.