

RURAL AGRICULTURAL WORKERS AND FACTORS AFFECTING RESEARCH RECRUITMENT

Key words: Rural Agricultural Worker, Research Recruitment, Barriers Rural Research, Rural Health Disparities.

Linda Prinz, BSN, RN^{1*}
Margaret Kaiser, PhD, APRN-CNS²
Katherine L. Kaiser, PhD, APRN-CNS³
Susanna G. Von Essen, MD, MPH⁴

¹Nursing Instructor, Northeast Community College, lindap@northeastcollege.com

²Assistant Professor, [College of Nursing](#), University of Nebraska Medical Center, mkaiser@unmc.edu

³Associate Professor, [College of Nursing](#), University of Nebraska Medical Center, kkaiser@unmc.edu

⁴Professor, [College of Medicine](#), University of Nebraska Medical Center, svonessa@unmc.edu

* Contact Author

ABSTRACT

Health disparities exist in rural populations calling for more research in this area, yet rural research recruitment presents obstacles. The aim of this descriptive research was to describe a population of rural workers exposed to grain dust and to determine factors that influence recruitment of rural workers for research studies. This qualitative study involved 82 rural agricultural workers (RAW) in eastern Nebraska. After completing a demographic questionnaire these RAWs answered open questions regarding factors that contributed to their decision to participate in the research study along with qualities that distinguish them from other occupations. Rural agricultural workers participated primarily because of the desire to know/learn, and altruism. Barriers to research participation included a dislike of the time consumed during research. Descriptors of self-identified characteristics included having unique environmental conditions, values and beliefs, skill set and capacity. Utilizing healthcare professionals with community connections was the key recruitment strategy for this study.

INTRODUCTION

Rural communities often have unique environmental and cultural factors that potentially increase the risk of health disparities (Hartley, 2004). Health disparities between rural, urban, and suburban areas call for a better understanding of health and residence (Eberhardt & Pamuk, 2004). Many research studies of rural agricultural workers suffer from inadequate sample size (McCauley et al, 2006) which can lead to misleading or inconclusive results (Polit & Beck, 2004). The rural agricultural population is not homogeneous and consists of multiple subgroups including farmers, livestock farmers, grain farmers, migrant farmworkers, seasonal farmworkers, and rural agricultural workers who may work in an agriculturally related industry. For this study the terms farmworker and rural agricultural worker (RAW) are synonymous.

There are documented difficulties in analyzing the overall size of the U.S. RAW population due to the movement of seasonal and migrant workers (McCauley et al., 2006; Villarejo, 2003), but the population is estimated to be from 2.5 to 5 million (Hansen & Donohoe, 2003; McCauley et al., 2006). Actual RAW numbers in Nebraska are difficult to ascertain but the overall rural population in Nebraska is 756, 613 (United States Department of Agriculture

[USDA], 2007). Information about the occupational health and safety issues of RAWs is inadequate (Hons, 1998) and statistics indicate that health outcomes are worse for rural residents (Eberhardt & Pamuk, 2004).

Research is an important step in the process of reducing health disparities. Recruitment of rural agricultural participants into research is essential in order to reduce rural health disparities. Research results are essential to evidence based practice that seeks to improve population health outcomes. The U.S. Department of Health and Human Services (USDHSS) encourages research in order to achieve the *Healthy People 2010* goals of facilitating improved quality of life and life expectancy, and eliminating health disparities between populations (USDHSS, 2000). Adequate recruitment of rural populations into research would help to develop the evidence needed to reduce rural health disparities.

Little has been written about research recruitment and research recruitment strategies for RAWs. There is also a void in the literature about the population characteristics of RAWs. In order to increase rural research participation, there needs to be an awareness of rural population attitudes, knowledge and beliefs, (Coyne, 2004). As an attempt to fill these gaps, the aim of this qualitative research was to describe a population of RAWs exposed to grain dust and to assess for factors that influence recruitment of rural workers for research studies.

BACKGROUND

Rural Agricultural Worker

Rural populations have been described as having a solid work ethic, strong spiritual belief, solid values, strong sense of place, and strong family ties, (Coyne, Demian-Popescu & Friend, 2006; Phillips & McLeroy, 2004). Additional descriptors include kind, outgoing, openhearted, helpful, hospitable, loyal, dependable, trust worthy and dedicated (Coyne, et al., 2006).

Demographics. National RAW demographic statistics may differ from State statistics. In the U.S., the average RAW age is 33 years of age with 79% being men, 75% being born in Mexico, 81% being Spanish speaking with the median level of education being 6th grade (US Department of Labor, [USDL], 2005). In 2002, there were 57,971 hired Nebraska farm laborers (USDA, 2002) where Spanish, Hispanic, or Latino ethnic origins represent only 1% and women represent 3% of Nebraska farm operators (Centers for Public Affairs, Research, 2002). Nationally, the mean annual average wage of the RAW is \$20, 630 which is comparable with the Nebraska mean annual average wage of \$20,260 (USDL, 2006).

Health statistics. Rural areas have higher death rates from unintentional injuries, suicide, chronic obstructive lung disease, cardiovascular disease, and cancer (Eberhardt, Ingram & Makuc, 2001; Eberhardt & Pamuk, 2004). Risky health behaviors of rural populations include smoking more, exercising less, and having less nutritional diets than suburban populations. These risky health behaviors of rural populations may be cultural health determinants rooted in strong social networks (Hartley, 2004). In a study with rural New Mexico families, participants described themselves as suffering from drug and alcohol abuse, domestic violence, and teenage pregnancy (Harris, 2006).

Hazards and risks. Rural agricultural workers encounter hazardous work environments. As the second most dangerous occupation in the US (Morgan, Cole, Struttman & Percy, 2002), RAWs are not only at risk for injuries, they are also exposed to chemical and environmental

hazards. Prolonged agricultural work exposures to pesticides, dust, pollens, and molds can lead to respiratory illness (Larson, 2002; Von Essen, & McCurdy, 1998). Rural agricultural grain workers are exposed to air borne hazards such as grain dust and other endotoxins that negatively affect respiratory health (Von Essen & Auvermann, 2005). This can be compounded by risky health behaviors such as tobacco use and the failure to wear a mask while working with grain.

Rural Agricultural Worker Research Recruitment

A major task of research is recruitment of a sample representative of the population (Polit & Beck, 2004). Validity and interpretation of the results are dependent on an adequate sample size. Gaps in rural and minority research participants recruited for research have been noted (Baquet, 2006; Polit & Beck, 2004). A search of the literature reveals little in regards to recruitment of rural agricultural workers, but rather addresses more broadly successful strategies and barriers for research recruitment of various rural populations.

Known successful strategies. Healthcare professionals who have gained the trust of the community are considered key stakeholders in rural research recruitment (Coyne, 2004; Loftin, Barnett, Bunn, & Sullivan, 2005; Parra-Medina et al., 2004; Weinert & Long, 1991). The existence of trusting relationships such as family, friends, and community members were found to be successful rural recruitment strategies in a study of recruitment and retention of rural African Americans with type 2 diabetes (Loftin et al., 2005). In a study conducted in Montana (Johnston & Herzig, 2006), Hispanic RAWs were recruited by utilizing investigators with prior associations such as sitting on the Montana Migrant Council. The use of small rural networks or community coalitions was the most successful research recruitment strategies for a study of first-generation Latinos in a rural community (Rodriguez, Rodriguez, & Davis, 2006). Coyne et al., (2006) successfully recruited rural Appalachians by utilizing community organizations and obtaining input on recruitment strategies by a local community advisory committee. Enlisting community members to help with participant accrual and enlisting community representatives to create a list of potential RAW research participants (Arcury, Quandt, & Russell, 2002) have been found to be successful research recruitment strategies (Arcury, Austin, Quandt, & Saavedra, 1999; McCauley et al 2006).

Utilizing community-based participative research (CBPR) (Arcury, et al., 1999; Arcury et al., 2007; Cartwright et al., 2006), a participatory research model (Yawn, 2004), and/or developing partnerships with community health centers (Parra-Medina, et al., 2004) have been reported to be successful rural research recruitment strategies. Community-based participatory research used by the National Institute of Environmental Health Sciences (NIEHS) encourages community involvement in the multiple steps of the research process, thereby promoting trust between the researchers and the community (O'Fallon, & Dearry, 2001). A similar model was used for successful recruitment of Hispanic RAWs in Idaho by using promoters from the community who had already established trusting relationships through prior health related projects. In this approval, the community was given flexibility as to how the research was conducted (Cartwright et al, 2006).

Cultural competence is important in the recruitment process for rural research (Loftin et al, 2005; Parra-Medina et al, 2004). If rural communities are considered to have ethnic diversity then the research and recruitment strategies of ethnic minorities should be considered. The National Institutes of Health (NIH) recommend that research investigators: 1) understand the research population, 2) establish a clear outreach plan, 3) ascertain a consensus on research plans

and design, 4) obtain evaluations, and 5) establish and preserve communications (NIH, 2002). Phillips and McLeroy (2004) contend that a clear recognition of rural populations should be considered a contextual matter that requires special attention due to the differences in public resources, social capital, and social networks that differ from other populations.

Barriers. Rural communities may have atypical research recruitment factors as rural populations have strong social ties (Coyne, et al., 2006) and frequently are not accepting of outsiders (Bigbe, 1993; Loftin, et al., 2005). Mistrust issues (Paskett et al., 2002) and a rural prejudice against outsiders (Debartolo & McCrone, 2003; Loftin et al., 2005) has been found to be recruitment barriers for select rural populations. Rural research may present unique challenges including a lack of resources (especially of personnel), geographical dispersion of recruits spread over several counties, and ethnic diversity (Rodriguez et al., 2006). Each rural community may have unique historical and cultural customs (Harris, 2006). In a Nebraska study of breast cancer survivors, rural areas were unique as to which research recruitment strategy worked over others, indicating various research recruitment needs from diverse rural areas (Ott, Twiss, Waltman, Gross, & Lindsey, 2006) The use of newspaper ads and family/friends were the two most successful research recruitment strategies in this Nebraska study of both rural and urban populations, but the third successful recruitment strategy varied among select rural areas. One rural area required flyers/posters while another rural area responded to radio ads.

Paskett et al. (2002) also discussed time issues as a rural research recruitment barrier. In a rural/urban study of medically underserved elderly diabetics using telemedicine, reasons given by the 28% who did not participate were that they were too busy (23%) and that they were uncomfortable with the technology (22%) (Palmas, 2006). Ninety percent of the people who did not participate in this rural/urban study were from rural areas suggesting the difficulty of recruiting rural participants.

Research recruitment is essential in order to obtain adequate sample size that ensures data analysis interpretation with integrity. The literature portrays some successful research recruitment strategies for rural populations and outlines barriers to rural research participation. However, the literature lacks clarity in regards to specific research recruitment strategies and barriers for the RAW.

METHODS

This qualitative study was part of a larger biomedical quantitative study of agricultural workers exposed to grain dust. The study was approved by the Institutional Review Board of the University of Nebraska Medical Center (UNMC) and Colorado State University (CSU). Both the Colorado and the Nebraska State Grain and Feed Associations were consulted and were supportive of the research.

Sample

Inclusion criteria for the study included participants that were grain workers from cattle feedlots or grain elevators/feed mills. The grain workers handled corn and soy beans on a daily basis in a grain elevator/feed mill or in a cattle feedlot. The majority of the participants were recruited from rural communities familiar to the research investigators who were physicians and nurses. Two investigators lived in or formerly lived nearby a county that held one of the highest concentrations of cattle feedlots in the state of Nebraska and subsequently many grain

elevators/feed mills. Two investigators lived or had lived in a community with one of the largest cooperative grain elevator/feed mills in Nebraska. These investigators were the main contact people for recruitment in their own communities.

Procedures

The grain elevator/feed mill or cattle feedlot was contacted initially for permission to conduct the research at the site; after which a date, time, and place were scheduled for data collection. Investigators with local ties were able to contact key supervisors or owners at each site who would in turn provide access to agricultural workers or potential research participants. Investigators contacted sites that agreed to participate anywhere from one to four weeks before potential research data collection. Investigators also called each site one to two days before as a reminder of the scheduled data collection.

Research investigators planned data collection times before the participants began their workday and after their workday was completed. The research study was explained to potential participants, questions answered, and consent forms signed prior to data collection. Participants were given \$20 as compensation for their time at the completion of data collection.

Data Collection

Pre and post-shift self-administered, paper questionnaires were given to all participants that worked the day shift. The pre-shift questionnaire was completed by participants just prior to the beginning of the work shift and included questions pertaining to work history and respiratory health. A post-shift questionnaire was completed at the end of the work shift and included questions pertaining to post-shift respiratory symptoms and three open ended questions. Two of the open ended questions asked participants to explain positive and negative factors that contributed to their decision to participate in the research study. The third question asked participants to explain what qualities distinguish the rural, agricultural worker from other populations.

Data Management and Analysis

The pre and post-shift questionnaires which were free from identifiable information were filed by respondents' identification number into notebooks. A database dictionary code was made of the participants' responses. Data was entered into Excel format and reviewed by at least two or more investigators for accuracy before demographic data were analyzed using descriptive statistics. The three open ended questions were thematically analyzed, synthesized, and reviewed by the investigators.

RESULTS

Population Characteristics

A total sample of 82 RAWs from eastern Nebraska agreed to participate in the research. Analysis of the demographic statistics utilized 81 of the 82 tested because of deletion of an identified outlier. Out of the 81 participants, 79 were white (98%) and 78 (96%) were men.

Women and minorities were included in the research despite being few in number. The rural worker age range was from 18-72 years of age with the mean age of 41 years of age (SD=13) (Table 1). Forty two percent of this RAW study had more than a high school education. Only 3.7% of this RAW sample had not gone farther than 8th grade in school. Thirty one percent of this RAW population reported income less than \$30,000 while 64% reported income between \$30,000 and \$100,000 a year.

Table 1
Demographic and Health Behavior Variables and Responses

<u>Demographic and Health Behavior Variables</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>N (%)</u>
Age	41 (13)	18-72	
Gender			
Male			78(96%)
Female			3 (4%)
Race (Q1.4)			
White			79 (98%)
Other			2 (2%)
Currently lives on a farm (Q1.7)			
Yes			34 (42%)
No			47 (58%)
Type of Employee			
Feed lot			33 (41%)
Grain elevator/feed mill			48 (59%)
Years worked in the job listed (Q2.3)	10.3 (11.6)	0.25 - 48	
Smoking status			
Never			59 (73%)
Ex-smoker			9 (11%)
Current smoker			13 (16%)
Pack-years for ex- and current smokers	12.3 (11.4)	0.60 – 43	
Pack-years for ex- and current smokers			
<10			11 (50%)
>= 10			11 (50%)
Uses tobacco in any form			
Yes			17 (21%)
No			64 (79%)
Did you wear a dust mask at work today (P6.5)			
No mask was worn			60 (74%)
Mask was worn			18 (22%)
Other			3 (3%)
Have you been trained to use and fit a respirator (P7)			
Yes			38 (47%)
No			42 (52%)
88			1 (1%)

Note. From “Endotoxin exposure and genetic factors in organic dust,” by L. M. Smith, 2006, UNMC Memorandum. Nebraska’s Health Sciences Center, received September 1, 2006. Used with permission from L.M. Smith.

The work history of the participants included 41% who worked in feedlots while 59% worked in a grain elevators/feed mills. The mean years that the participants worked with grain was 10.3 years (SD=11.6) (Table1).

Health behaviors important to decreasing the health effects of grain dust were use of tobacco and wearing of a respirator/mask during work hours. Tobacco use of the RAWs included 73% who never smoked, 11% who were ex-smokers, and 16 % who currently smoked tobacco. Seventy four percent of the RAWs did not wear a mask the day the study was conducted; 52% had never been trained to use and fit a respirator; and 52% were not concerned that breathing grain dust at work or at home may cause health problems (Table1).

Qualitative Themes

The major themes that emerged from the qualitative data gathered in response to three open ended questions asked of each of the participants were perceived benefits to participation in research, perceived barriers to participation in research, and unique self-identified qualities of RAWs. The two major perceived benefits to participation in research included: (1) gaining knowledge/learning, and (2) altruism.

The first perceived benefit of wanting to gain knowledge or learn included wanting knowledge about three aspects of grain dust exposures. The first aspect included gaining knowledge about the biological or health effects of grain dust:

I would like to see how much dust I breathe in every day
 Would like to know the effects of grain dust on a person
 I've wondered about the dust, I can definitely tell the days when I've been exposed a lot

The second aspect involved gaining knowledge about the status of the workplace in relation to grain dust exposure:

To help find any problems that cause lung problems
 Curious to see my exposure to dust in the workplace
 Interested in how much dust I am exposed to

The third aspect described wanting to learn about personal risk to their health because of exposure to the grain dust:

Wanted to see what effect the grain dust has on my lungs
 After 40+ years wanted to know condition of lungs, and I wanted to know if there are side effects to dust exposure

The second major perceived benefit of altruism was described by the RAW as a feeling of helping to support the research, the researchers, and the agricultural industry:

Help agricultural industry
 Good for health and medical problems now and in the future

To help with research for a good cause
 Help in a study to improve working conditions

Perceived barriers to participation in research were identified retrospectively to participation in the current study. Participants identified equipment used for data collection of the quantitative part of the study and length of time of data collection (the entire workday) as reasons that may affect their future participation in similar research studies. These RAWs wanted to work and felt that the equipment and the time it took to participate in the research prevented them from doing the quality or quantity of work they desired:

Having the pump all day
 Machine too noisy
 Time consuming
 Just a little more time than I thought it would take

The unique self-identified qualities that participants thought distinguished them as RAWs and from other worker populations included: 1) unique environmental work conditions, 2) strong moral values and beliefs, and 3) their skill set and capacities. Participants referred to their unique environmental work conditions as setting them apart from other worker populations:

As a farmer in more dust
 Outside all day long
 Work under all weather conditions
 We work more in dust, around Diesel fumes and livestock

Participants felt that they possessed strong moral values and beliefs that differentiated them from other worker populations:

Work ethics
 Honesty, integrity
 More common sense
 Self-confidence
 We're tougher
 Long hours
 Active

Skill set and capacities identified by the participants that distinguished them from other worker populations included:

Knowledge of animals and agricultural crops
 I feel we are diversified in our abilities
 Knowing equipment
 The ability to perform many tasks

DISCUSSION

The sample from this study indicated that 96% of the RAWs were men which is similar to the 97% of the Nebraska farm operators who are men (Centers for Public Affairs Research [CPAR], 2002), but differs from the rate of 79% of RAWs that are men on the national level (USDOL, 2005). The 4% of the RAWs that were women in this study is comparable with the rate of 3% of women farm operators in Nebraska (U.S. Census Bureau, 2006) but is much lower than the national rate of 21% for RAWs who are women (USDOL, 2005). The mean age of participants of this study was 41 years of age as compared to the national average RAW age of 33 years (USDOL, 2005). Thirty one percent of this RAW population made less than \$30,000 annually and 64% made from \$30,000 to \$100,000 annually as compared to the Nebraska mean annual wage of the RAW at \$20,260 and the national mean annual wage of the RAW of \$20,630 (USDOL, 2006). Also 96% of the RAWs in this study completed more than the 8th grade in school with 42% receiving some sort of post high school education which is greater than 31% of Nebraska rural residents completing some college (USDA, 2007) and the 6th grade median level of education for the national RAW (USDOL, 2005). The data suggests that this RAW population consisted of older, more educated, and better paid workers, consisted of more men and fewer migrant rural workers than the national RAW.

Hartley's (2004) suggestion that risky health behaviors of rural populations are a cultural health determinant that may be reflected in the 74% of grain workers in the current study who did not wear a mask and 52% who were not concerned that breathing grain dust at work or at home may cause health problems. However, 73% of the RAWs in this study never smoked as compared with Hartley (2004) who contends that rural populations smoke more.

Almost one third of the participants in this study were altruistic and participated because they wanted to help with the research. This is consistent with Paskett et al. (2002) who found altruism as one of the motivators that increased accrual of rural research participants into research studies.

A perceived barrier to participation in the current research study was that some participants felt the equipment they had to wear as a part of the quantitative study was cumbersome. Also, the RAWs of this study did not like the amount of time it took to participate in the study which impedes the normally autonomous and demanding work environment of many RAWs. Palmes (2006) also found that reasons given for not participating in research included those who were uncomfortable with the equipment (22%) and those who were too busy (23%) (Palmes, 2006).

The findings in this study regarding identification of the unique self-identified qualities of strong values and beliefs and skill set and capacities were similar to findings from Harris's (2006) study of rural workers. In Harris's study, rural families of New Mexico described themselves as having a solid work ethic, hardiness, determination, and an acceptance of life's challenges.

Enrollment of the participants into this study seemed to encounter few recruitment barriers. Eighty two participants were recruited and tested in 3 months. This recruitment process went quite well especially when the investigators could only test for 10 days with a maximum of 10 participants a day. The use of nurses and physicians with community connections was the key to the successful rural research recruitment of this study which is consistent with other studies that have found healthcare workers as key research recruitment stakeholders (Loftin, et al., 2005; Coyne, 2004; Parra-Medina et al., 2004; Weinert & Long, 1991). Nurses and physicians with

community connections would most likely have strong social ties (Coyne et al, 2006), would not be considered outsiders (Bigbe, 1993), would not be mistrusted (Paskett et al, 2002) would have an understanding of the research population (NIH, 2002), and have trusting relationships with recruiters and respondents (Cartwright et al, 2006; Loftin et al, 2005; NIH, 2002; O'fallon & Dearry, 2001; Paskett et al., 2002; Rodriquez et al, 2006). Also, the primary investigator had conducted research in one of the communities in the past. This correlates with a study that successfully used community members who had established trusting relationships through prior health related projects for rural research recruitment (Cartwright et al., 2006).

In addition, there were several grain elevators/feed mills and feedlots that allowed investigators to set up research where only one or two of their employee's participated while other employees from other feedlots or grain elevators drove to the testing site before and after work. This is consistent with other rural population descriptors of openheartedness, helpfulness, hospitality (Coyne et al., 2006).

A limitation of this study is that findings can be generalized only to the study sample of RAWs. A second limitation of this study was self selection of participants which may have caused bias of study results. For example, respondents who wanted to learn or were altruistic would be more likely to participate in the research. Self selection of participants also may display an under representation of rural workers with other values who did not participate.

IMPLICATIONS FOR NURSING RESEARCH

Recruitment of rural populations carries unique and sometimes diverse recruitment requirements (Ott et al., 2006). Research is suggested that would reveal why various rural populations respond to certain research recruitment strategies over others. Investigators need to take into consideration the skill set and value system of the rural population when conducting research recruitment. Rural agricultural workers may be reluctant to participate in research studies, yet may be interested in the research outcome. Therefore nurses need to educate the RAW that rural research would help to reduce rural health disparities.

In order to eliminate health disparities of RAWs and improve RAWs quality of life and life expectancy, more research needs to be done in rural agricultural populations. One implication would be that the RAW needs definitive terminology in order to compare groups. There should be an assessment of the rural population and a consideration of CBPR for future RAW research. Suggested future studies should address specific factors facilitating RAW education and compliance with health behaviors such as wearing a mask or a respirator while handling grain.

The identified perceived benefits of participation in this research may be helpful in recruiting rural workers in future research. Minimization of burden to participants such as use of equipment and time needed to complete the study procedures should be taken into consideration when planning future research studies. Utilizing physicians and nurses with community connections was the driving force behind the successful recruitment of participants for this study.

REFERENCES

- Arcury, T.A., Austin, C.A., Quandt, S.A., & Saavedra, R. (1999). Enhancing community participation in intervention research: Farmworkers and agricultural chemicals in North Carolina. *Health Education & Behavior*, 26, 563-578. [[MEDLINE](#)]

- Arcury, T.A., Grzywacz, J.G., Barr, D.B., Tapia, J., Chen, H., & Quandt, S.A. (2007). Pesticide urinary metabolite levels of children in eastern North Carolina farmworker households. *Environmental Health Perspectives*, 115(8), 1251-1260. [[MEDLINE](#)]
- Arcury, T.A., Quandt, S.A., & Russell, G.B. (2002). Pesticide safety among farmworkers: Perceived risk and perceived control as factors reflecting environmental justice. *Environmental Health Perspectives*, 110(S2), 233-240. [[MEDLINE](#)]
- Baquet, C.R. (2006). Recruitment and participation in clinical trials: Socio-demographic, rural/urban, and health care access predictors. *Cancer Detection and Prevention*, 30(1), 24-33. [[MEDLINE](#)]
- Bigbee, J.L. (1993). The uniqueness of rural nursing. *Nursing Clinics of North America*, 28(1), 131-144. [[MEDLINE](#)]
- Cartwright, E., Schow, D., Herrera, S., Lora, Y., Mendez, M., Mitchell, D., et al. (2006). Using participatory research to build an effective type 2 diabetes intervention: The process of advocacy among female Hispanic farmworkers and their families in southeast Idaho. *Women's Health*, 43(4), 89-109. [[MEDLINE](#)]
- Centers for Public Affairs Research, University of Nebraska Omaha. (2002). 2002 Census of agriculture: preliminary statistics for Nebraska. Retrieved on August 25, 2007, from <http://www.unomaha.edu/cpar/2002ag/AgCensus.pdf>
- Coyne, C.A. (2004). Rural cancer patients' perspective on clinical trials: a qualitative study. *Journal of Cancer Education*, 19(3), 165-9. [[MEDLINE](#)]
- Coyne, C.A., Demian-Pospescu, C., & Friend, D. (2006). Social and cultural factors influencing health in southern West Virginia: A qualitative study. *Preventing Chronic Disease*, 3(4), A124. [[MEDLINE](#)]
- Debartolo, M.C., & McCrone, S. (2003). Recruitment of rural community-dwelling older adults: Barriers, challenges, and strategies. *Aging & Mental Health*, 7(2), 75-82.
- Eberhardt, M.S., Ingram, D.D., Makuc, D.M., Pamuk, E.R., Freid, V.M., Harper S.B., et al. Urban and Rural Health Chartbook. Health, United States 2001. Hyattsville, Maryland: National Center for Health Statistics.
- Eberhardt, M.S., & Pamuk, E.R. (2004). The importance of place of residence: examining health in rural and nonrural areas. *American Journal of Public Health*, 94(10), 1682-86. [[MEDLINE](#)]
- Hansen, E., & Donohoe, M. (2003). Health issues of migrant and seasonal farmworkers. *Journal of Healthcare for the Poor and Underserved*, 14(2), 153-64.
- Harris, D. (2006). Rural revisited: A decade and a half of practice. *Zero to Three*, 26(4), 22-9.
- Hartley, D. (2004). Rural health and healthcare disparities: Rural health disparities, population health, and rural culture. *American Journal of Public Health*, 94(10), 1675-1678. [[MEDLINE](#)]
- Hons, B.A. (1998). Farmers' occupational health: Cause for concern, cause for action. *Journal of Advanced Nursing*, 27(4), 683-91.
- Johnston, M.E., & Herzig, R.G. (2006). The interpretation of "culture": Diverging perspective on medical provision in rural Montana. *Social Science & Medicine*, 63(9), 2500-11. [[MEDLINE](#)]
- Larson, A. (2002). Migrant health issues. *Environmental/Occupational Safety and Health Monograph Series*, 2, 8-14.

- Loftin, W.A., Barnett, S.K., Bunn, P.S., & Sullivan, P. (2005). Recruitment and retention of rural African Americans in diabetes research: Lessons learned. *Diabetes Educator*, 31(2), 251-91. [MEDLINE]
- McCauley, L.A., Anger, W.K., Keifer, M., Langley, R., Robson, M.G., & Rohlman, D. (2006). Studying health outcomes in farmworker populations exposed to pesticides. *Environmental Health Perspectives*, 114(6), 953-960. [MEDLINE]
- Morgan, S.E., Cole H.P., Struttman, T., & Percy, L. (2002) Stories or statistics? Farmers' attitudes toward messages in an agricultural safety campaign. *Journal of Agricultural Safety & Health*, 8(2), 2225-39. [MEDLINE]
- National Institutes of Health (NIH). (2002). Outreach notebook for the inclusion, recruitment, and retention of women and minority subjects in clinical research principal investigators' notebook. Retrieved on July 12, 2007, from <http://purl.access.gpo.gov/GPO/LPS29256>.
- O'Fallon, L.R., & Dearry, A. (2001). Commitment of the National Institute of Environmental Health Sciences to community-based participatory research for rural health. *Environmental Health Perspectives Supplements*, 109(S3), 469-473. [MEDLINE]
- Ott, C.D., Twiss, J.J., Waltman, N.L., Gross, G.J., & Lindsey, A. (2006). Challenges of recruitment of breast cancer survivors to a randomized clinical trial for osteoporosis prevention. *Cancer Nursing*, 29(1), 21-31. [MEDLINE]
- Palmas, W. (2006). Recruitment and enrollment of rural and urban medically underserved elderly into a randomized trial of telemedicine case management for diabetes care. *Telemedicine Journal and E-Health*, 12(5), 601-7. [MEDLINE]
- Parra-Medina, D., D'Antonio, A., Smith, S.M., Levin S., Kirkner, G., & Mayer-Davis, E. (2004). Successful recruitment and retention strategies for a randomized weight management trial for people with diabetes living in rural, medically underserved counties of South Carolina: The POWER study. *Journal of the American Dietetic Association*, 104(1), 70-5. [MEDLINE]
- Paskett, E.D., Cooper, M.R., Stark, N., Ricketts, T.C., Tropman, S., Hatzell, T., Aldrich, T., & Atkins, J. (2002). Clinical trial enrollment of rural patients with cancer. *Cancer Practice*, 10(1), 28-35. [MEDLINE]
- Phillips, C.D., & McLeroy, K.R. (2004). Health in rural America: Remembering the importance of place. *American Journal of Public Health*, 94, 1661-1663. [MEDLINE]
- Polit, D.F., & Beck, C.T. (2004). *Nursing research: Principles and method*. (7th ed.). Philadelphia: Lippincott, Williams & Wilkins.
- Rodriguez, M.D., Rodriguez, J., & Davis, M. (2006). Recruitment of first-generation Latinos in a rural community: The essential nature of personal contact. *Family Process*, 45(1), 87-100. [MEDLINE]
- U.S. Census Bureau. (2006). State & county quick facts. Retrieved on August 25, 2007, from <http://quickfacts.census.gov/qfd/states/31000.html>
- U.S. Department of Agricultural Statistics Service, U.S. Department of Agriculture (USDA). (2002). Census, US – State Data, Table 55. Summary by size of farm: 2002. Retrieved on October 9, 2007, from http://www.nass.usda.gov/Census/Pull_Data_Census
- U.S. Department of Agriculture (USDA). (2007). State Fact Sheets: Nebraska. Retrieved on October 9, 2007, from <http://www.ers.usda.gov/StateFacts/NE.htm>
- U.S. Department of Health and Human Services (USDHHS). (2000). *Healthy people 2010: Understanding and improving health*. (2nd ed). Washington, DC: USDHHS.

- U.S. Department of Labor (USDL). (2005). The national agricultural workers survey. Retrieved on July 12, 2007, from <http://www.doleta.gov/agworker/naws.cmf>
- U.S. Department of Labor (USDL). (2006). Occupational employment and wages, May 2006. Retrieved on August 26, 2007, from <http://www.bls.gov/oes/current/oes452093.htm>
- Villarejo, D. (2003). The health of U.S. hired farm workers. *Annual Review of Public Health*, 24, 175-193. [[MEDLINE](#)]
- Von Essen, S.G., & Auvermann, B.W. (2005). Health effects from breathing air near CAFOs for feeder cattle or hogs. *Journal of Agromedicine*, 10(4), 55-64. [[MEDLINE](#)]
- Von Essen S., & McCurdy, S.A. (1998). Health and safety risks associated with work in production agriculture. *Western Journal of Medicine*, 169, 214-220. [[MEDLINE](#)]
- Weinert, C., & Long, K.A. (1991). The theory and research base for rural nursing practice. *Rural Nursing*, 1, 21-38.
- Yawn, B.P. (2004). Participatory research in rural primary care. *Minnesota Medicine*, 87(9), 52-54. [[MEDLINE](#)]