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Methodology and Demographics

Ann M. Stromquist PhD , James A. Merchant MD, DrPH , Leon F. Burmeister PhD , Craig Zwerling MD, PhD, MPH & Stephen J. Reynolds PhD

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The Keokuk County Rural Health Study: Methodology and Demographics

Ann M. Stromquist, PhD
James A. Merchant, MD, DrPH
Leon F. Burmeister, PhD
Craig Zwerling, MD, PhD, MPH
Stephen J. Reynolds, PhD

SUMMARY. The Keokuk County Rural Health Study is a population-based, prospective study of environmental exposures and health

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Ann M. Stromquist is Study Coordinator, Keokuk County Rural Health Study, and James A. Merchant is Professor, Department of Preventive Medicine and Environmental Health and Internal Medicine, and Director, Institute for Rural and Environmental Health, The University of Iowa, 100 Oakdale Campus 124 AMRF, Iowa City, IA 52242-5000.

Leon F. Burmeister is Interim Head, Department of Preventive Medicine and Environmental Health, The University of Iowa, 2825 Steindler Building, Iowa City, IA 52242.

Craig Zwerling is Associate Professor, Department of Preventive Medicine and Environmental Health, and Director, Injury Prevention Research Center, and Stephen J. Reynolds is Associate Professor, Department of Preventive Medicine and Environmental Health, The University of Iowa, 100 Oakdale Campus, 124 AMRF, Iowa City, IA 52242-5000.

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status of a large randomly-selected sample of residents from each of three strata in one rural Iowa county. The study focuses on injury rates and respiratory disease; in addition, it monitors health care delivery; geriatric, reproductive, and mental health; and other health outcomes. Injury and disease prevalence are investigated in relation to occupational, agricultural, and other environmental exposures. This paper describes the sampling method, the protocol, and the demographic profile of adult subjects of the first 400 households enrolled in the study. Farmers were slightly younger than rural nonfarmers and townspeople and more farmers had lived in the county all of their lives. Females were more highly educated than were males, and less than half as many female farmers had lived in the county all their lives than had male farmers. Net household income figures were complex and are shown in a graph in Table 1. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworth.com]*

KEYWORDS. Rural, farm, prospective, population-based, rural epidemiology, rural environmental exposures, agricultural exposures, rural health

INTRODUCTION

Rural America is losing farmers and farm families to work-related disease and injury at an alarming rate. Recent studies have shown increased incidence in occupational injuries[1,2,3] and respiratory disease.[4,5,6] In addition, noise-related hearing loss,[7,8] cancer,[9,10] and dermatitis[11] are of increasing concern to farmers. Despite this rural morbidity, access to rural health services continues to decline.

While there are limited data on the prevalence and incidence of agricultural injury and disease, these problems have rarely been studied prospectively. Moreover, existing work has focused almost exclusively on the farmer, ignoring other members of the household. The Keokuk County Rural Health Study is a large, population-based, prospective study which systematically assesses respiratory disease, injury, and other health outcomes in relation to agricultural, occupational, and other environmental exposures in a stratified random sample of residents living in one rural Iowa county. The sample, which includes men and women, children, adolescents and elderly, farmers, rural nonfarmers, and townspeople, will be studied for twenty years.

Keokuk County, in southeastern Iowa, with a population of 11,624, was chosen as the location of our study for several reasons. Sigourney, the

county seat and largest town in the county, has a population of 2,111, making the entire county "rural" according to the U.S. Census Bureau definition (towns with a population < 2,400). The county is typical of rural Iowa counties. Its agriculture is diverse and representative of the state, with the bulk of agricultural production in corn, soybeans, and hogs raised on family farms. There are an estimated 1,000 farms in the county, averaging 355 acres per farm. Those residents who do not live on farms live in rural areas, in Sigourney, or in one of the other 17 small towns ranging in population from 62 to 762. There is no urban center nearby, no large university, no interstate dividing the county, all factors which contributed to its selection as "a typical Iowa county." At the time the county was selected, no other University studies had been conducted there. Thus residents had not been previously burdened by the demands of researchers. Those residents with whom we explored the idea of a twenty-year study in a series of meetings, including farmers, business and community leaders, educators, homemakers, storeowners, mental health providers, and physicians, voiced concern about their own health and the health of their children and grandchildren. They expressed eagerness for a connection with the University of Iowa and indicated they would be supportive of, and enthusiastic about, our study. We have since formed a Community Advisory Committee, composed of two residents from each township, which serves as a sounding board for our ideas and helps facilitate communication with the community.

Here we describe the methodology used in selecting the sample, the study protocol, and some demographic characteristics of the adults living in the first 400 households enrolled in the study.

METHODS

Sampling. The sampling unit is the household. A complete listing of county households was compiled from lists obtained from the State Department of Transportation (county residents who had a motor vehicle registered), area telephone directories, plat directories listing landowners and rural residents, and a purchased mailing list compiled from 19 sources. In addition, we consulted local schools, postmasters, city clerks, other town and county officials, business people, volunteer firefighters and other county residents in order to make the census as accurate and current as possible. We then chose a stratified random sample of 400 households from farms, and 300 from rural nonfarm and town households. This total of 1,000 households represents approximately 2,500 people. As needed, additional households are randomly selected. For example, some people selected have moved out of the county, died, or refused to participate.

Protocol. Study participants come into the research facility located on the courthouse square in Sigourney, the county seat, for medical evaluations and personal interviews. Researchers go to participants' farms and homes for the environmental assessments. Results of the medical and environmental assessments are mailed to participants.

Medical Screening. Each participant eight years of age and older receives a health screening, including measurements of height, weight, and blood pressure; vision and hearing tests; spirometry and methacholine challenge; skin tests for allergies; and drawing of venous blood for blood cell counts, hematocrit, and future serological studies. All medical tests are performed according to published standardized protocol.

Personal Interview. Each adult participant is interviewed about their general health status and health care delivery, respiratory health, injuries, dental health, skin disease, mental health, reproductive health, and behavioral risk factors for injury, including alcohol/drug use, job demands, firearms, violence, domestic violence, sleep disorders, motor vehicle safety, and sports and recreational activities. Each adolescent participant is interviewed about their general health status, mental health, and several behavioral risk factors for injury. In addition, parents of children are asked questions about their children's health status. The interview was developed insofar as possible from questions used in national surveys such as the National Health Interview Survey, the National Health and Nutrition Examination Survey, and CDC's Injury Risk Factor Survey.

Environmental Assessment. Each household receives an environmental assessment of the home, farm, and property. This evaluation includes personal interviews, walk-through audits, and measurements of environmental parameters including carbon dioxide, carbon monoxide, nitrogen oxides, combustible gases and dust inside homes, ammonia, hydrogen sulfide, carbon dioxide, and dust inside livestock facilities. Information is obtained concerning the residence, farm operations and work practices, facilities and equipment, and health and safety practices.

Job History and Occupational Survey. Each adult participant completes a job history, listing all full- and part-time jobs held since the age of 12, and a comprehensive occupational survey, with information about tasks, hobbies, and agricultural and occupational exposures.

RESULTS

These results are from preliminary analyses of data from the 672 adults living in the first 400 households enrolled in the study and report some of the demographic characteristics of these first participants.

Age. The mean age of the adult subjects was 53.2 years (range 18-95 years). The mean ages of men and women did not differ significantly, but rural nonfarm residents (58.7 years) and townspeople (53.3 years) were older than farm residents (49.9 years).

Gender. Women represented 53.7% of the sample, men 46.3%.

Income. As can be seen from Table 1, a higher percentage of farm households reported a net income that fell in the middle range ($20,000-$49,999) than did rural nonfarm and town households. The percentage of farm households with a net income in the high range ($50,000-$149,999), fell between that of town and rural nonfarm households. Although 19% of the farm households reported a gross income of $150,000 or more, none reported a net income that large.

Education. Of our sample, 89.3% had graduated from high school-94.8% of the farmers, 88.2% of the rural nonfarmers, and 86.9% of the townspeople. Almost seventeen percent of the sample had graduated from college. Of the females, 21.4% were college graduates compared to 11.1% of the males. Of the farmers, 14.1% were college graduates-21.8% of the female farmers and 7% of the male farmers. Of the rural nonfarmers, 18.2% were college graduates, as were 17.5% of the townspeople.

Residence. Of the sample, 31.4% had lived in Keokuk County all of their lives. Of the male farmers, 52.1% had lived in the county all their lives, while only 23.6% of the female farmers had. Of all farmers (male and female), 38.3% had lived in the county all their lives, compared to 29.9% of the rural nonfarmers, and 28.3% of the townspeople.

DISCUSSION

In this preliminary examination of some of the demographic characteristics of the adults in the first 400 households, some differences among the

TABLE 1. Net household income by type of residence.

	None	$1,000-$19,999	$20,000-$49,999	$50,000-$149,999	$150,000+
Farm (%)*	9.5	25.7	47.9	8.5	0
Rural Nonfarm (%)*	7.8	32.9	29.7	9.4	0
Town (%)*	16.3	27.1	40.4	6.7	0
TOTAL (%)*	12.5	27.7	40.6	7.6	0

*Row percentages do not add up to 100% because some respondents did not know their net income.

subsamples are evident. Residents of farm households tend to be younger and have a higher net household income than residents of rural nonfarm and town households. Farm women are more highly educated than farm men, and women in general are more highly educated than men. Nearly one-third of the sample have lived in Keokuk County all of their lives, and twice as many farm men as farm women have lived in the county all of their lives.

As data on the environmental exposures and health outcomes of this sample are collected and analyzed in the future, it will be of continued interest to compare the subgroups discussed here: men and women; young and elderly; and farm, rural nonfarm, and town households. In addition, future analyses of these data from children and adolescents will enrich the emerging picture of the effect of agricultural and occupational exposures on the health of an entire community in rural Iowa.

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