Preventing Cardiovascular Disease through Community-Based Risk Reduction: The Bootheel Heart Health Project

ABSTRACT

Objectives. The purpose of this study was to determine whether a community-based risk reduction project affected behavioral risk factors for cardiovascular disease.

Methods. Community-based activities (e.g., exercise groups, healthy cooking demonstrations, blood pressure and cholesterol screenings, and cardiovascular disease education) were conducted in six southeastern Missouri counties. Evaluation involved population-based, cross-sectional samples of adult residents of the state and the intervention region. Weighted prevalence estimates were calculated for self-reported physical inactivity, cigarette smoking, consumption of fruits and vegetables, overweight, and cholesterol screening.

Results. Physical inactivity decreased within the intervention region, that is, in communities where heart health coalitions were developed and among respondents who were aware of these coalitions. In addition, the prevalence rates for reports of cholesterol screening within the past 2 years were higher for respondents in areas with coalitions and among persons who were aware of the coalitions.

Conclusions. Even with modest resources, community-based interventions show promise in reducing self-reported risk for cardiovascular disease within a relatively brief period. (*Am J Public Health.* 1996;86: 206–213)

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Introduction

Despite declines over the past few decades, cardiovascular diseases remain the leading cause of death and disability in the United States.[1] In 1992, more than 861 000 Americans died from heart disease or stroke, the main forms of cardiovascular disease.[1] Cardiovascular disease risk factors can be classified as either modifiable or nonmodifiable.[2] Among modifiable factors, physical inactivity has recently been recognized as one of the four major risk factors for cardiovascular disease[3]; the other factors are cigarette smoking, high blood pressure, and elevated blood cholesterol.[3]

Healthy People 2000,[4] the publication outlining the nation's public health goals, includes chapters on heart disease and stroke and their antecedent risk factors (physical inactivity, poor nutrition, and tobacco use). As a result of large disparities between racial groups, separate objectives have been established for reducing heart disease and stroke among Blacks.[4] Significant progress has been shown for only 5 of the 12 national health objectives for physical activity.[5]

Healthy People 2000 states that community-based intervention is a critically important method for achieving health objectives for the nation.[4] Even with modest budgets, community-based coalitions have effectively changed health policies; for example, they have instituted requirements for smoke-free schools[6] and labeling of heart healthy foods.[7] Community-based programs also are beginning to address multiple risk factors[5] (e.g., heart health coalitions for controlling multiple cardiovascular disease risk factors).

Large community-based prevention projects have used combined interventions that address both individual behavior change and community-wide change.[8,9] Most of these studies have focused on cardiovascular disease prevention. They include the North Karelia Project in Finland,[10,11] the Stanford Five-City Project,[12–15] the Pawtucket Heart Health Program,[16–18] and the Minnesota Heart Health Program.[19–22] In these projects, interventions were delivered via mass media, health professionals, education professionals, community leaders, coworkers, neighbors, friends, family members, and other community members. Among the US projects, favorable results have been reported for health knowledge,[13] smoking,[15,22] blood pressure,[14] and physical activity.[21] Recently in Minnesota, however, significant progress was not observed for most risk factors against the background of strong favorable secular trends.[21] These large cardiovascular dis-

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ease intervention projects had annual budgets of $1 million to $1.5 million for 10 years or more.[7] None of the large cardiovascular disease trials in the United States have involved a significant focus on isolated, rural populations.

Recently, smaller scale cardiovascular disease prevention projects have been implemented by numerous public health agencies.[23,24] However, information on the effectiveness of these projects of relatively short duration and low budget is sparse. Data from South Carolina[7,25,26] suggest that projects with only a few years of intervention exposure can show favorable health changes. Winkleby[27] recently suggested the need for smaller, more focused studies within high-risk subgroups such as minority and low literacy populations.

In 1989, in cooperation with the Centers for Disease Control and Prevention (CDC), the Missouri Department of Health began a cardiovascular disease risk reduction project in the Bootheel area of southeastern Missouri. The long-term goal of the Bootheel Heart Health Project was to reduce morbidity and mortality due to cardiovascular disease, and the shorter term project objectives focused on reducing the major modifiable risk factors for cardiovascular disease. We report on the 5-year evaluation of the prevalence of cardiovascular disease risk factors addressed by the project.

Methods

Data-Driven Planning and Coalition Development

The intervention region was identified following analysis of mortality data. High mortality rates for coronary heart disease deaths were found for five counties (i.e., Dunklin, New Madrid, Stoddard, Mississippi, and Scott) clustered in the six-county area in southeastern Missouri known as the Bootheel. The Bootheel is bordered on the south by Arkansas and across the Mississippi River on the east by Tennessee, Kentucky, and Illinois. Except for Kansas City and St. Louis, the Bootheel has the largest Black population in Missouri. This medically underserved rural area is characterized by high rates of poverty and low educational levels.[28] Additional details on the data-driven planning conducted in this project have been presented elsewhere.[29]

Several models and theories were used in developing the Bootheel Heart Health Project, which was initially based on the planned approach to community health model.[30] Additional theoretical models underlying the project were composites of social learning theory[31,32] and the stage theory of innovation.[33] Coalition development was ensured by involving local leaders and community groups in the planning process. Local leaders were identified through established agencies (e.g., local government or voluntary agencies) and through word of mouth as the project coordinator interviewed area leaders. A detailed inventory on all key contacts was maintained. After nearly 5 months of extensive effort to identify and meet with community leaders in each of the six counties, the first coalition planning meeting was held in New Madrid County in September 1990.

By late 1990, community members in the area had organized 5 "subcoalitions" within the six-county region. By the end of the study period, 17 subcoalitions were active. The local coalitions allowed for tailored interventions and helped minimize members' travel. Once a year, each coalition submitted a proposal to the Missouri Department of Health for local projects. Each of the six county coalitions received about $5000 per year to implement community-based interventions. Coalitions were allowed to select their own priorities from a list of possible cardiovascular disease–related interventions provided by project staff. Local health agencies were a key component in the coalition development process, providing assistance in many areas, including provision of blood pressure and cholesterol screenings, training, and distribution of local funds for coalition activities.

Intervention Activities

The coalitions in all six counties developed walking clubs, aerobic exercise classes, heart healthy cooking demonstrations, community blood pressure and cholesterol screenings, and cardiovascular disease education programs.[34] Examples of coalition projects included (1) annual heart healthy fitness festivals that involved exercise demonstrations, registration for exercise classes and walking clubs, and screenings for hypertension, diabetes, and cholesterol; (2) a "High Blood Pressure Sunday," where ministers included heart disease education in the sermon, the congregations were screened for hypertension, and heart healthy dinners were served in the church; (3) poster contests sponsored by local schools, the winning entries being featured in local newspapers; (4) the "Heart Healthy Corner," a weekly newspaper column on heart disease prevention written by a coalition member; and (5) environmental changes such as the construction of a walking and fitness path.

By using coalition records and the average frequency of events, we estimated the number of intervention activities over the project period. The most frequently held events were walking club functions (n = 4000) and exercise classes (1275 class hours), followed by blood pressure screenings (n = 2050), community events (n = 415), cholesterol screenings (n = 70), cooking demonstrations (n = 60), and diabetes screenings (n = 30).

Risk Factor Survey Data

Two special surveys were conducted to evaluate the project's progress. These surveys were based on the methods of the Behavioral Risk Factor Surveillance System, which was developed in 1981 by the CDC.[35,36] This flexible, state health agency–based surveillance system assists in planning, implementing, and evaluating health promotion and disease prevention programs.[35,36] Missouri began conducting statewide Behavioral Risk Factor Surveillance System surveys in 1986.

Survey methods have been discussed in detail elsewhere[35–37]; we review them briefly here. Questions were standardized on the basis of those used in the Behavioral Risk Factor Surveillance System and were identical in the 1990 and 1994 surveys.[37] The core areas related to cardiovascular risk and sociodemographics involved a total of 87 questions. In the 1994 survey, approximately 30 questions were added to the end of the survey instrument to examine related issues such as coalition exposure, arthritis, functional status, and quality of life. Risk factors were as follows: no leisure-time physical activity (report of no exercise, recreational, or physical activities [other than regular job duties] during the past month); current smoker (respondents who had ever smoked 100 cigarettes and currently smoked cigarettes); consumes five fruits and vegetables daily (report of average daily consumption of five or more servings of fruits and vegetables); overweight (body mass index [weight in kilograms divided by height in meters squared] ≥ 27.8 for men and ≥ 27.3 for women); and cholesterol checked (response of yes to question on whether blood cholesterol had been checked within the past 2 years). Since no clinical measures were taken, no data were available on blood pressure levels.

Using random-digit dialing (as in the standard Behavioral Risk Factor Surveil-

TABLE 1—Characteristics of Participants in the Bootheel Surveys and US Census Estimates

	Survey Data, %		Census Data, %	
	1990 (n = 1006)	1994 (n = 1510)	Bootheel Region[a]	Missouri[a]
Age, y				
18–34	23.5	24.2	31.8	35.9
35–54	34.4	35.2	32.9	33.1
55+	41.9	40.4	35.3	30.9
Unknown/refused	0.2	0.2	...	...
Gender				
Female	61.5	64.6	53.0	51.8
Male	38.5	35.4	47.0	48.2
Race				
White	91.9	87.8	88.2	87.7
Black	6.6	10.7	11.4	10.7
Other	1.1	1.2	0.4	1.6
Unknown/refused	0.4	0.3	...	...
Education level				
Less than high school graduate	37.9	33.4	45.3	26.1
High school graduate	38.9	41.2	34.4	33.1
Some college/technical school graduate	13.0	15.6	10.3	18.4
College graduate or more	9.9	9.5	10.0	22.4
Unknown/refused	0.3	0.3	...	...

[a]Based on the 1990 US census of adults.[28]

TABLE 2—Adjusted Prevalence of Risk Factors for Cardiovascular Disease: Bootheel Region and Missouri, 1990 and 1994

	Bootheel Region			Missouri[a]		
Risk Factor	1990	1994	*P*	1990	1994	*P*
No leisure-time physical activity	43.1	42.1	>.10	29.0	32.7	>.10
Current smoker	20.8	18.1	>.10	22.7	19.3	>.10
Consumes 5+ servings of fruits and vegetables per day	21.9	21.6	>.10	17.3	23.3	.03
Overweight	39.9	46.3	<.01	43.7	52.0	<.01
Cholesterol checked in past 2 years	59.4	63.2	.05	63.0	67.6	.08

Note. Prevalences were adjusted by analysis of covariance for age, race, gender, education level, Time × Education Level, and Time × County.
[a]Based on 1990 (n = 437) and 1994 (n = 381) data from the Missouri Behavioral Risk Factor Surveillance System (BRFSS) for rural counties (except the six Bootheel counties). Data on cholesterol screening are from the 1990 and 1993 (n = 476) Missouri BRFSS (unpublished).

lance System),[38] we selected cross-sectional samples of noninstitutionalized adults in the six-county region who had telephones. Based on the 1990 census,[28] an estimated 87.2% of households in the six-county region (range = 81.4% to 90.1%) had telephones. The survey was administered by trained interviewers during January through March 1990 and again in January through May 1994. Among eligible respondents (i.e., those with working phones and nonbusiness phone extensions), the response rates were 89% in 1990 and 76% in 1994. Because intervention activities were conducted largely among Blacks, we oversampled Blacks in the 1994 survey. In the 1994 survey, the first 1000 respondents were selected from the entire six-county area; 500 additional interviews were conducted in communities in which 20% or more of the population was Black (as reported in the 1990 census[28]). The samples were generally representative of the overall Bootheel population,[28] although they slightly underrepresented younger persons, males, and those with less education (Table 1). The 1994 survey was more racially representative than the 1990 survey. Among sociodemographic categories, the only significant difference in sample percentages between 1990 and 1994 involved race ($P < .05$).

Statistical Analyses

After data collection, risk factor data were cleaned and edited by means of standard Behavioral Risk Factor Surveillance System quality control procedures.[36] After editing, data were weighted with SUDAAN,[39] a specialized statistical program for analyzing complex sample survey data. Through weighting, summary estimates and standard errors account for the probability of selection and for the age, gender, and race distributions of the population.[36,37]

We constructed two measures of intervention "exposure" to determine whether risk factor prevalence estimates varied according to the degree of contact with intervention activities. In the first analysis, individual communities were dichotomized according to whether they had active coalitions (i.e., members regularly participating in organized events) by the end of the study period. This was accomplished by matching phone prefixes from areas with active coalitions with those of survey respondents. If a match occurred, the respondent was part of the "coalition present" category; those not matched were placed in the "coalition absent" group. In the second analysis, risk factor data were cross tabulated with responses to a question about whether respondents were aware of the heart health coalition in their county.

Analysis of covariance models were used to calculate prevalence estimates for each of the five risk factors and effect size differences while adjusting for covariates (e.g., sociodemographic factors) that may have confounded results.[2,40,41] The net change in risk factors within areas with and without active coalitions was measured by means of a Time × Coalition Present term. Additional two-way terms for time and age, gender, race, and education level were included to account for possible variations in cardiovascular risk factors over time within these sociodemographic subgroups. Only the two-way Time × Education term was statistically significant and therefore included in all subsequent models. The models also accounted for intraclass correlations of persons within counties[41,42] through a three-way interaction term (County ×

Coalition Present × Survey year), along with appropriate lower order terms. The three-way term was not significant and only marginally influenced effect estimates; this term was left out of final models to conserve statistical power.

Results

From 1990 to 1994, no significant changes were observed in the no leisure-time physical activity (also referred to hereafter as "physical inactivity") and cigarette smoking risk factors in the entire Bootheel or statewide samples (Table 2). Fruit and vegetable consumption improved in the statewide sample ($P = .03$). For the Bootheel sample, improvement was noted in the proportion of respondents reporting that they had had their cholesterol checked in the previous 2 years ($P = .05$). The prevalence of overweight based on self-reported weight and height increased in the Bootheel and statewide ($P < .01$).

The prevalence of the five primary cardiovascular disease risk factors was compared within various sociodemographic subgroups (Table 3). Risk factor prevalence estimates varied considerably by subgroup. For example, physical inactivity was higher among older respondents, Blacks, and people with less education. Although estimates were not always statistically significant, Blacks in the Bootheel showed improvement for each of the five risk factors. Such was not the case for Whites, for whom very slight improvements were observed for physical inactivity and cholesterol screening; slight worsening in risk was noted for smoking, fruit and vegetable consumption, and overweight among Whites.

For the physical inactivity variable, significant improvement was observed for communities having coalitions in comparison with communities not having coalitions ($P = .03$) (Table 4). The prevalence of overweight based on self-reported weight and height increased less in communities having coalitions than in communities not having coalitions ($P = .07$). In addition, a net positive effect was noted for the prevalence of having cholesterol checked within the previous 2 years ($P = .04$). Conversely, fruit and vegetable consumption appeared to show a slight decrease in areas with active coalitions relative to those without coalitions.

Respondents in the 1994 Bootheel survey also were stratified by whether they were aware of the heart health coalition in their county (Figure 1). In the 1994 data,

TABLE 3—Prevalence of Risk Factors for Cardiovascular Disease, by Sociodemographic Category: Bootheel Region, 1990 and 1994

	No Leisure-Time Physical Activity		Current Smoker		Consumes 5+ Servings of Fruits and Vegetables per Day		Overweight		Cholesterol Checked in Past 2 Years	
	1990 Prevalence (95% CI)	1994 Prevalence (95% CI)	1990 Prevalence (95% CI)	1994 Prevalence (95% CI)	1990 Prevalence (95% CI)	1994 Prevalence (95% CI)	1990 Prevalence (95% CI)	1994 Prevalence (95% CI)	1990 Prevalence (95% CI)	1994 Prevalence (95% CI)
Age, y										
18–34	37.8 (±6.6)	35.3 (±5.3)	35.0 (±6.4)	31.5 (±5.2)	17.7 (±5.2)	17.2 (±4.0)	18.0 (±5.0)	28.1 (±4.9)	34.6 (±6.5)	37.9 (±5.4)
35–54	39.9 (±5.5)	43.9 (±4.7)	31.7 (±5.4)	36.8 (±4.7)	20.5 (±4.5)	18.4 (±3.5)	36.3 (±5.5)	34.1 (±4.5)	48.1 (±5.7)	53.5 (±4.7)
55+	56.4 (±5.4)	47.1 (±4.6)	19.6 (±4.7)	16.1 (±3.4)	24.1 (±4.8)	26.3 (±4.0)	26.5 (±5.0)	32.6 (±4.4)	69.8 (±4.9)	69.1 (±4.4)
Gender										
Female	44.4 (±4.4)	45.1 (±3.6)	26.7 (±4.1)	27.5 (±3.3)	22.6 (±3.7)	25.5 (±3.1)	24.0 (±3.8)	30.6 (±3.3)	51.5 (±4.5)	52.8 (±3.1)
Male	44.3 (±5.4)	38.4 (±4.4)	31.8 (±5.2)	29.5 (±4.2)	17.9 (±4.3)	15.3 (±3.2)	30.0 (±4.9)	32.4 (±4.3)	48.5 (±5.5)	53.8 (±8.4)
Race										
White	43.6 (±3.6)	41.1 (±3.0)	28.7 (±3.4)	29.3 (±2.9)	20.9 (±2.9)	20.7 (±2.4)	25.9 (±3.2)	30.3 (±2.8)	51.2 (±3.6)	51.8 (±3.4)
Black	53.2 (±14.1)	45.7 (±8.9)	27.8 (±12.7)	21.5 (±7.3)	14.9 (±10.1)	19.1 (±6.1)	42.6 (±14.0)	42.3 (±8.9)	36.9 (±11.8)	52.7 (±7.3)
Education level										
Less than high school graduate	54.6 (±5.8)	53.0 (±5.2)	30.6 (±5.5)	34.5 (±5.1)	14.4 (±4.2)	19.0 (±3.8)	31.7 (±5.4)	34.7 (±5.0)	46.1 (±5.7)	53.2 (±5.2)
High school graduate	42.0 (±5.4)	40.2 (±4.4)	29.5 (±5.1)	29.8 (±4.2)	22.2 (±4.4)	19.2 (±3.4)	24.4 (±4.6)	30.7 (±4.1)	51.0 (±5.5)	50.8 (±4.5)
Some college/technical school graduate	39.2 (±9.2)	36.2 (±6.9)	30.4 (±9.3)	24.1 (±6.1)	22.0 (±8.1)	20.5 (±5.5)	27.4 (±8.7)	29.4 (±6.5)	50.8 (±9.6)	52.7 (±7.3)
College graduate or more	28.0 (±9.6)	24.9 (±7.6)	19.3 (±8.7)	10.7 (±5.3)	30.4 (±10.2)	30.7 (±8.0)	20.1 (±8.8)	29.0 (±8.1)	58.1 (±10.6)	61.6 (±8.8)

Note. CI = confidence interval.

TABLE 4—Adjusted Prevalence of Risk Factors for Cardiovascular Disease in 1990 and Percentage Change in the Estimates by 1994, by Presence of an Active Coalition: Bootheel Region

Risk Factor	Active Coalition Present		Active Coalition Absent		Net Effect, %	P
	1990 Prevalence, %	Absolute Change, % (95% CI)	1990 Prevalence, %	Absolute Change, % (95% CI)		
No leisure-time physical activity	47.6	−3.0 (−8.5, +2.5)	48.2	+3.8 (−2.9, +10.5)	6.8	.03
Current smoker	19.7	−1.3 (−6.3, +3.6)	22.4	−5.0 (−11.1, +1.1)	3.7	>.10
Consumes 5+ servings of fruits and vegetables per day	23.0	−1.3 (−5.7, +3.1)	20.0	+0.9 (−4.5, +6.4)	2.2	>.10
Overweight	41.3	+4.3 (−0.9, +9.4)	37.8	+10.2 (+3.9, +16.6)	5.9	.07
Cholesterol checked in past 2 years	58.9	+4.3 (−1.0, +9.6)	62.6	−0.2 (−6.7, +6.5)	4.5	.04

Note. Prevalences were adjusted by analysis of covariance for age, race, gender, education level, Time × Education Level, and Time × County. CI = confidence interval.

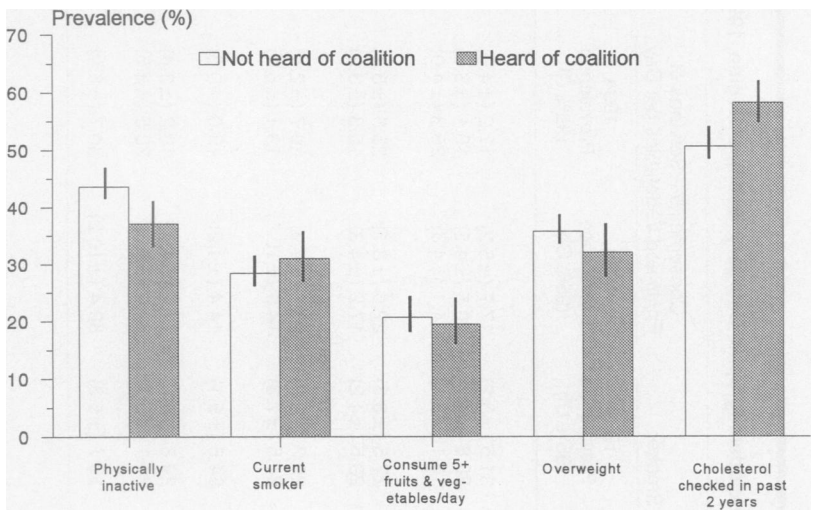

FIGURE 1—Prevalence (and 95% confidence intervals) of risk factors for cardiovascular disease, by awareness of the county heart health coalition: Bootheel region, 1994.

24.2% of respondents reported being aware of their county coalition. Each risk factor except cigarette smoking showed slightly more favorable prevalence rates among respondents who were aware of the heart health coalition. Physical inactivity prevalence rates were significantly different between the two groups ($P = .03$). In addition, the prevalence of having cholesterol screening was higher among respondents who were aware of the coalitions ($P = .04$). These differences in physical inactivity and cholesterol screening were slightly larger when the analyses in Figure 1 were restricted to respondents in areas with active coalitions.

Discussion

Our project builds on the extensive work of the "first generation"[43] cardiovascular disease prevention programs funded by the National Heart, Lung and Blood Institute.[12–22] "Second generation" programs, such as the Bootheel Heart Health Project, can be implemented by public health agencies that rely on considerably smaller intervention and evaluation budgets. Even with modest resources, community-based interventions show promise in improving behaviors related to cardiovascular disease risk within a brief period (i.e., about 3 years of intervention exposure). Such projects are ongoing throughout the United States; however, few have included long-term evaluation components that allow systematic measurement of change over time.

The recently completed Heart to Heart Project in South Carolina is similar to ours in that it demonstrated measurable improvements in dietary fat consumption[25] and cholesterol awareness and screening.[26] Community-based interventions previously have been shown to increase physical activity among adolescents[44] and adults.[21] Our results also are consistent with earlier reports[45,46] of increases in physical activity in relation to environmental changes within a community (e.g., bike paths, exercise clubs, and access to recreational facilities).

The increase in physical activity within the target population in the Bootheel may have positive health effects, as suggested by recent epidemiologic and clinical studies[3,47] in which regular, moderate physical activity, such as walking, reduced the risk for cardiovascular disease and all-cause mortality. The CDC/American College of Sports Medicine recommendation stresses the favorable health benefits of moderate, daily physical activity.[47] The Bootheel project is unusual among physical activity interventions in that it focused on a rural Black population at very high risk of cardiovascular disease as a result of physical inactivity and other factors.

The changes resulting from the Bootheel Heart Health Project were obtained at a fairly low cost. Over the project period, the annual cost of the Bootheel project was approximately $105 000.

Our findings for two other cardiovascular disease risk factors are generally

consistent with state and national data showing increasing trends in the rate of overweight[48,49] and the proportion of individuals having their cholesterol checked.[50,51] In the Bootheel risk factor survey, trends toward increases in rates of cholesterol screening and overweight were observed. Our findings of decreased physical inactivity, along with a stable rate of overweight, in active coalition areas appear to support recent studies[52] showing a relation between longitudinal weight gain and low physical activity. Larger samples and better measures of intervention exposure will be needed to further clarify this potentially important relationship.

Although this paper has summarized the major quantitative evaluation of the Bootheel project, comprehensive qualitative evaluation is also being conducted. Elements of this evaluation include focus group analyses (i.e., case studies), analyses of the coalitions' level of effort, and media content analyses. Evaluation of so-called "environmental factors"[53] is important in showing community-level changes (e.g., the addition of a walking path in a low-income neighborhood) that may occur prior to changes in behavioral risk factors or mortality rates. Case studies provide information on how and why various strategies succeed or fail.[54–56] Furthermore, community-based interventions may have beneficial effects that have little direct relation to cardiovascular disease risk reduction. For example, as a result of the Bootheel project, coalition members became more active in local government, gaining election to city councils and school boards.

The limitations of our study should be noted. The study lacked a true experimental design and comparison groups; thus, in our quasi-experimental design, we relied mainly on internal comparisons with statewide rural Behavioral Risk Factor Surveillance System data. A strength of our analysis, however, involves the two a priori measures of nonmutually exclusive intervention exposure that demonstrated measurable differences in physical inactivity between "exposed" and "nonexposed" groups. As supporting evidence, physical inactivity was the risk factor most frequently and consistently addressed in coalition activities.

We cannot precisely account for the effects of national programs (e.g., the National High Blood Pressure Education Program[57] or the National Cholesterol Education Program[58]) on changes in cardiovascular disease risk factors in local populations. Although national campaigns can influence physical activity,[59] little national attention has been directed toward physical activity until recently.[47] In addition, our analyses showed increases in physical inactivity in Bootheel areas without active coalitions and in other rural counties in Missouri.

We relied on self-reported, cross-sectional telephone survey data and had no comprehensive information on the accuracy of the Behavioral Risk Factor Surveillance System data during the study period. However, previous studies[60–62] have shown fairly high accuracy of Behavioral Risk Factor Surveillance System data on reported risk factors for cardiovascular disease and demographic characteristics. In particular, smoking status and physical activity appear to be reported with high accuracy.[60,63,64] A 1993 test–retest study of the Missouri Behavioral Risk Factor Surveillance System found high reliability for several cardiovascular disease risk factor questions.[62] Since the surveillance system relies on telephone interviews, the potential exists for response bias due to lack of phone coverage of certain sociodemographic groups.[65] A previous study from South Carolina[66] indicates that in-person interviews may be unnecessary unless a very high proportion of nontelephone households is present; we estimate that approximately 13% of households in the study area lacked telephones. Our study did not collect in-person clinical data such as blood pressure and cholesterol measurements and biochemical validation of smoking status.

In summary, the decline in physical inactivity and increase in cholesterol screening shown in the Bootheel project suggest that a community-level reduction in cardiovascular disease risk may be achievable through relatively low-cost interventions that combine educational efforts with environmental changes. However, because of limitations in our study design, further data are needed, including longer term measurements of cardiovascular disease risk factors, morbidity, and mortality, as well as replication of similar projects in other underserved areas. □

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National Rural Health Association Conference to Be Held in May

The National Rural Health Association will hold its 19th annual national conference on rural health, "Keeping Rural Healthy—A Community Challenge," May 15 through 18, 1996, at the Hyatt Regency Minneapolis Hotel in Minneapolis, Minn. The conference will focus on the tremendous impact that the changing health care environment is having on the provision of health care services in rural areas, and it will examine ways in which rural communities can meet the challenge of keeping their communities healthy. It will explore how those involved in rural health care can work together to facilitate community involvement in health care at every level.

The conference is designed to develop practical skills and techniques in health services administration, organization, and research; present practical clinical sessions of interest to rural health providers; showcase current policy issues affecting rural health services; and report the results of research applicable to rural health service administrators and providers. The education program of the conference is tailored to the needs of hospital and clinic administrators, physicians, nurses, researchers, policy-makers, educators, and state and federal officials. It features more than 70 general and concurrent sessions, topical symposia, and contributed research paper sessions conducted by leaders in the rural health field. Each year the conference draws more than 1000 participants.

The conference program also includes exhibits, as well as a national awards presentation recognizing outstanding achievement of rural health care providers, practices, programs, education, and research. To receive registration information, contact the NRHA, One West Armour Blvd, Suite 301, Kansas City, MO 64111; tel (816) 756-3140.