

**BETTY M. KENNEDY, PhD, T. ELAINE PREWITT, DRPH,
BEVERLY MCCABE-SELLERS, PhD, EARLINE STRICKLAND, PhD,
KATHY YADRICK, PhD, PAULA THREADGILL, PhD,
CATHERINE M. CHAMPAGNE, PhD,
BERNESTINE B. MCGEE, PhD, AND MARGARET L. BOGLE, PhD**

Abstract: Collaboratively, the nutritional health problems of the Lower Mississippi Delta (LMD) region were examined and opportunities identified for conducting research interventions. To combat the nutritional health problems in the LMD, community residents yielded to a more comprehensive and participatory approach known as community-based participatory research (CBPR). Community residents partnered with academic researchers and other organizational entities to improve the overall quality of diet and health in their respective communities using CBPR. The collaborative work in the LMD focused on interventions conducted in each of three specific communities across three states: Marvell, Arkansas (Marvell NIRI), and its surrounding public school district; Franklin Parish in Louisiana (Franklin NIRI); and the city of Hollandale, Mississippi (Hollandale NIRI). This paper examined some of the research interventions conducted in Franklin, Hollandale, and Marvell NIRI respectively, how leadership emerged from each of these communities, and lessons learned as a result of the CBPR model.

Key Words: Partnerships, Research Interventions, Rural Populations

ACADEMIC PARTNERSHIPS AND KEY LEADERS EMERGING FROM COMMUNITIES IN THE LOWER MISSISSIPPI DELTA (LMD): A COMMUNITY-BASED PARTICIPATORY RESEARCH MODEL

Betty M. Kennedy, PhD, *The Pennington Biomedical Research Center, Baton Rouge, Louisiana.* **T. Elaine Prewitt, DrPH**, *the University of Arkansas for Medical Sciences, Little Rock, Arkansas.* **Beverly McCabe-Sellers, PhD**, *the USDA, Agricultural Research Service, Little Rock, Arkansas.* **Earline Strickland, PhD**, *the USDA, Agricultural Research Service, Little Rock, Arkansas.* **Kathy Yadrick, PhD**, *the University of Southern Mississippi.* **Paula Threadgill, PhD**, *the Mississippi State University.* **Catherine M. Champagne, PhD**, *The Pennington Biomedical Research Center, Baton Rouge, Louisiana.* **Bernestine B. McGee, PhD**, *the Southern University and A&M College, and Margaret L. Bogle, PhD*, *the USDA, Agricultural Research Service, Little Rock, Arkansas.*
Corresponding author: Betty M. Kennedy, PhD
*Instructor-Research, Dietary Assessment and Food Analysis Core, Pennington Biomedical Research Center.
6400 Perkins Road, Baton Rouge, LA 70808.
E-mail: Betty.Kennedy@pbrc.edu*

Six academic and research partners in Arkansas, Louisiana, and Mississippi, a local community and the cooperative extension service in each state, funded by the Agricultural Research Service of the United States Department of Agriculture (USDA-ARS), together comprised the Lower Mississippi Delta Nutrition Intervention Research Initiative (Delta NIRI) consortium. Collaboratively, the Delta NIRI team examined the nutritional health problems of the Lower Mississippi Delta (LMD) region and identified opportunities for conducting research interventions. A further examination of each state noted above suggested an even greater need for research and interventions. For example, Mississippi has the highest rate of adult obesity in the nation, at 32.5 percent and the highest of overweight youths (ages 10-17) at 44.4 percent; Louisiana has the 8th highest rate of adult obesity in the nation, at 28.9 percent and the 7th highest of overweight youths (ages 10-17) at 35.9 percent; and Arkansas has the 10th highest rate of adult obesity in the nation,

at 28.6 percent and the second highest of overweight youths (ages 10-17) at 37.5 percent according to a new report (July, 2009) by Trust for America's Health (TFAH) and the Robert Wood Johnson Foundation (RWJF). In addition, the LMD region ranks near the top in cancer mortality, diabetes, and cardiovascular disease (Stuff et al., 2004).

In order to address some of the nutritional health problems in the LMD, community residents yielded to a more comprehensive and participatory approach to research and interventions (Green, George, Daniel, et al., 1995; Israel, Schulz, Parker, & Becker, 1998; Israel, Schulz, Parker, et al., 2003; Israel, Eng, Schulz, & Parker, 2005; Minkler & Wallerstein, 2003; Schulz, Krieger, & Galea, 2002). This type of comprehensive and participatory approach to research and interventions is known as community-based participatory research (CBPR). Community residents partnered with academic researchers and other organizational entities to improve the overall quality of diet and health in their respective communities employing the (CBPR) model. The collaborative work in the LMD focused on interventions conducted in each of three specific communities across three states: Marvell, Arkansas (Marvell NIRI), and its surrounding public school district; Franklin Parish in Louisiana (Franklin NIRI); and the city of Hollandale, Mississippi (Hollandale NIRI). These communities were chosen because community leaders demonstrated high levels of enthusiasm towards the Delta NIRI program and community residents had previously demonstrated their ability to work together at improving their overall fitness and health (Core, 2006). This paper examined some of the research interventions conducted in Franklin, Hollandale, and Marvell NIRI respectively, how leadership emerged from each of these communities, and lessons learned as a result of the CBPR model.

Research and Intervention Foundation

The Delta NIRI team conducted several research studies in the LMD region that provided a basis for conducting research interventions. Initial community outreach contacts were made throughout the LMD in the 36 Delta NIRI counties and parishes through in person interviews with nearly 500 key informants (Yadrick et al., 2001). Key informants in the LMD region document perceptions of the most important nutritionally-related health problems including obesity, diabetes, hypertension, and poor diet. Additionally, key informants identified lack of knowledge about appropriate food choices and lack of exercise as being important areas for interventions.

Subsequently, a validation survey—the Foods of Our Delta Study (FOODS) [Bogle et al., 2001], and the FOODS (2000) survey (Champagne et al., 2004) was conducted. The FOODS (2000) sample was comprised of 1457 households. In the full sample, 22% were food insecure (15% food insecure without hunger and 7% food insecure with hunger) [Stuff et al., 2006]. Food insecure without hunger is evident in the household with concerns for adjustments to household food management, including reduced quality of diets; while food insecure with hunger prevails when food intake for adults and children in the household has been reduced to the extent that they have repeatedly experienced the physical sensations of hunger (Stuff et al., 2006). FOODS (2000)

data also demonstrated an eating pattern characterized by low intake of fruits and vegetables and an intake of high fat calorically dense foods (Champagne et al., 2004). A comparison of Healthy Eating Index scores for LMD adults with their national counter-parts demonstrated the lower quality of diets among LMD adults (McCabe-Sellers et al., 2007).

Research Process, Training and Community Meetings

Academic partners and researchers provided training for emerging community leaders to increase their understanding of the research process. The research process included conceptualizing and development of research interventions, hiring and training of personnel to conduct the interventions, recruiting participants, data collection, analyzing data, presenting the research to various audiences, and community residents assisting with grant writing. In addition, resources were provided for capacity building to empower community leaders to perform influential roles in ensuring access to quality healthcare in their states and communities. These tasks were accomplished through the community-based participatory research (CBPR) model. CBPR is defined as "a collaborative process that equitably involves all partners in the research process and recognizes the unique strengths that each brings (Minkler et al., 2003). CBPR begins with a research topic of importance to the community with the aim of combining knowledge and action for social change to improve community health and eliminate health disparities" (Minkler et al., 2003).

Academic partners, public officials (mayors, councilmen, councilwomen, school administrators, etc.), and community residents from all three communities met monthly for approximately one year. During this time, community residents elected two chairpersons to chair or co-chair community and research meetings. The purpose of these meetings was to identify and implement a specific intervention that would be most beneficial to improving community health and reducing health disparities. Community residents made the decision to develop and conduct an intervention applicable to their respective community needs. As a result, community leadership emerged from those residents elected by their peers as chairpersons, co-chairpersons, and community liaisons who "stepped forward" in and for their communities as described in each individual community below.

Franklin NIRI Community

Research interventions previously conducted in other communities were presented to residents of Franklin Parish, Louisiana. For example, a six-month church-based weight loss study was conducted with 40 randomized participants using church members trained as peer educators to improve health in African American adults (Kennedy, Paeratakul, Champagne, et al., 2005). The purpose of the study was to evaluate the effectiveness of a peer-educator delivered weight loss program and to compare the effectiveness of two program delivery methods: group versus individual setting. The findings from the study revealed that a church setting may provide an effective delivery mechanism for a health and nutrition program. Likewise, church members may be trained to conduct a weight loss program, and both

interventions (group and individual) were effective in inducing weight loss. The study retention rate was 90 percent, and after six months, a modest but significant mean weight loss of 3.3kg was seen in all participants.

In a second study, 40 participants were randomized into a six-month study conducted at a community center using trained community residents as peer educators to teach nutrition education and physical activity classes, plus a "Rolling Store" (an innovative delivery medium), to provide fruits and vegetables to prevent weight gain in African American women (Kennedy, Champagne, Ryan, et al., 2009). The program retention rate was 93%. Although the primary purpose of the study was to prevent weight gain; participants in the treatment group lost an average weight of 1.9 kg, while the control group gained 1.1 kg of weight. The "Rolling Store" model along with nutrition education and physical activity classes was feasible, accessible, and economical in producing satisfactory health and behavioral outcomes.

As a result of both of the aforementioned research interventions, Franklin NIRI community leaders decided to combine aspects of the two interventions to implement "People United to Sustain Health" (PUSH). PUSH was a two-year intervention conducted in Franklin Parish specifically, Winnsboro, Louisiana with 40.3% of the (5,344) population living below the poverty line, and included the cities and towns of Baskin, Gilbert, and Wisner, Louisiana (US Census, 2005). The church, Franklin NIRI office, and LSU AgCenter Research and Extension served as intervention sites for PUSH. The goal of PUSH was to improve the overall quality of diet and health in 100 adult men and women of Franklin Parish.

PUSH was implemented by trained community residents as peer educators from the Franklin Parish community. Peer educators had Master's and/or bachelor's degrees however, none had any previous training in implementing a research intervention. Academic partners trained community residents as peer educators to conduct weekly nutrition education and physical activity classes, to perform study measurements (height, weight, blood pressure, waist circumference), and to submit data measurements in a timely manner to the academic partners for data entry. In addition, phlebotomist and licensed practical nurses from Franklin Parish were hired and trained according to the PUSH protocol to collect blood samples, perform analysis, and to submit data measurements for data entry to the academic partners.

Finally, a "Rolling Store" operator was hired from Franklin Parish and trained to transport preselected fruits and vegetables from a partnered local grocery store each week. The operator was a licensed driver owning a 16 feet truck with camper shell. The "Rolling Store" parked at the intervention-site for 3-4 hours on a predetermined day of the week to allow PUSH participants ample time to visit the "Rolling Store" for fresh fruits and vegetables. Recipes and cooking demonstrations were provided for selected items. The intervention and protocol was approved by each academic partner institutional review boards for this intervention as well as those conducted in Hollandale and Marvell communities. Each participant was asked to sign an approved written informed consent form that detailed the purpose, requirements for participation, and the potential

benefits and risks of the intervention. The informed consent also indicated that participation was voluntary and could be terminated by the participant at any time. PUSH was recently completed and data analysis is in progress. Although PUSH has ended, community residents have received valuable knowledge and training along with the tools necessary to sustain the intervention for years to come.

Hollandale NIRI Community

Hollandale NIRI developed and implemented the Fit for Life Steps intervention. Fit for Life was a six-month walking intervention that focused on affecting health through forming walking teams led by supportive coaches and educating participants through monthly nutrition and physical activity classes (Zoellner et al., 2007; Powers, 2007). Significant improvements in waist circumference (-1.4 inches), systolic blood pressure (-4.3 mmHg), and HDL cholesterol (+7.9 mg/dL; $P < .001$) resulted from baseline to end of study (Zoellner et al., 2007; Powers, 2007). Additionally, local community coordinators worked with the Delta NIRI team to install a walking trail and a basketball court in the Hollandale City Park (Core, 2006).

Hollandale is a city in Washington County, Mississippi with approximately 39% of the (3,437) population living below the poverty line (US Census, 2005). Despite poverty, leadership emerged from Hollandale NIRI and was evident among the administrative staff at T. R. Sanders Elementary School and the Hollandale School District. For example, Mr. Amos, Superintendent of Hollandale schools was extremely supportive of all research requests and Mr. George Sanders, Principal of T.R. Sanders—participated regularly in Hollandale NIRI activities. Unlike Franklin NIRI, leadership emerged in the Hollandale NIRI from an organizational perspective. The school district supported and provided assistance to all community outreach activities and research opportunities sponsored by the Hollandale NIRI. In addition, the elementary school administrative staff strongly encouraged research interventions within the school. Consequently, they established a school nutrition advisory committee consisting of lead teachers, school nurse, and food service director who worked with researchers to finalize research procedures.

Finally, a health promotion program "School Kids Access to Treat to Eat" (SKATE) was implemented in Hollandale for grades 4 through 6 (Kennedy, Prewitt, Strickland, Yadrick, et al., 2009). This six month health promotion program encouraged kids to try an assortment of snacks (fruits and vegetables) to increase their consumption and appreciation for healthier choices. The program was implemented by seven community residents who were hired and trained as research assistants to prepare and weigh snacks before and after consumption. Teachers enthusiastically participated by collecting snack containers for weighing, distributing snacks, and acting as role models of snack consumption. Approximately 191 kids, 160 parents, and 11 teachers participated in this health promotion program (Kennedy, et al., 2009).

Marvell NIRI Community

Marvell is a city in Phillips County, Arkansas with approximately 30% of the (1,395) population living be-

low the poverty line (US Census, 2005). Marvell NIRI focused their efforts on diverse roles and responsibilities assumed by emerging community leaders to benefit their community. These roles included leadership of research working groups, support in implementing research protocols, assistance in preparing grants for research funding, serving as co-investigators on grants and advisory committee memberships (Kennedy, et al., 2009).

Community leadership emerged through Marvell NIRI in several ways. Community members served as chairpersons and members of research working groups for Healthy Eating, Walking Trail, Worksite, Garden and Walking Clubs, and Summer Day Camp interventions (Kennedy, et al., 2009). The Walking Club intervention for example, included walking groups that met weekly and used pedometers to support efforts for self-monitoring and to remain physically active. Monthly group meetings included presentations on nutrition and exercise from health professionals and a healthy breakfast following a community walk.

Additional ways community leadership emerged included advisory committee memberships—which involved planning and organizing a community research skills workshop, and participation in collection, review and interpretation of research data. Community members served as co-presenters at research meetings, and co-authors for scientific presentations at local, national, and international meetings. Community members also served as co-investigators for grants. For example, Marvell had an aging walking trail and members of the Marvel walking trail, local government, and ARS worked collaboratively to obtain a state grant to refurbish it. Marvell also received a grant to create a farmer's market. As a result, community gardens were formed and managed by community residents that produced a harvest of vegetables and herbs in its first year (Core, 2006). Community leaders and the Delta NIRI team submitted a grant for national funding that proposed using the CBPR model to address health disparities in the community. This represented the first grant submitted from Delta NIRI to the National Institutes of Health (NIH) with a community leader as Co-Principal Investigator.

In addition to chairpersons and community members participating in CBPR skill building workshops, they also received training in participant recruitment, data collection procedures, and intervention delivery for various other research and health promotion programs. Finally, Marvell NIRI joined forces with a local non-profit organization, Boys, Girls, and Adults Community Development Center (BGACDA), whose leader was recognized for her outstanding community leadership by the Ford Foundation. The BGACDC hosts an annual summer day camp program for children ages 6-14 years. Marvell NIRI and ARS co-sponsored research aimed at improving willingness to try fruits and vegetables through a healthy fruit and vegetable snack program. Honor graduates of local high schools were hired and trained to implement the program within the summer day camp, and community members assisted.

Discussion and Lessons Learned

This paper examined some of the research interventions conducted in Franklin, Hollandale, and Marvell NIRI respectively, how leadership emerged from each of these communities, and lessons learned as a result of the CBPR model. CBPR increasingly is being recognized by health scholars and funders as an effective approach to collaboratively studying and acting to address health disparities (Minkler et al., 2003). Research interventions conducted collaboratively by emerging community leaders and academic researchers across three states, emulates the CBPR effective approach in addressing health disparities in the LMD region.

Furthermore, research interventions conducted in Franklin, Hollandale, and Marvell NIRI—all involved leadership and collaboration in identifying research topics, setting priorities, selecting research design, developing research protocols, conducting the research, interpreting data, and presenting research results at local, state, and national meetings. It must be understood that leadership and collaboration was a process involving time, effort, understanding, patience, and most importantly, tolerance. Academic researchers, USDA-ARS, and community residents in each of these three communities endured and were successful because they each learned to be tolerant, understanding, and patient. As a result, academic researchers and community leaders worked together to create an atmosphere of collaboration and harmony in Franklin, Hollandale, and Marvell NIRI. Time, coupled with basic leadership training and workshops further helped to develop and enrich community residents taking on leadership roles in each of their respective communities.

Limitations and Implications for Future Research

This paper is limited to three communities in the LMD (Franklin Parish, Louisiana; Hollandale, Mississippi; and Marvell, Arkansas), funded by USDA-ARS for nutrition research interventions, and may not characterize experiences across the LMD region. Instead, a mechanism for future interventions is provided for those pursuing research using the CBPR model. Through CBPR, an opportunity is provided for emerging community leaders, academic partners and researchers, and other organizational entities to develop collaborations that are sustainable and successfully address the compelling health risks confronting rural and impoverished communities.

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Acknowledgement

Thanks to the residents and representatives from all organizational entities of Franklin Parish, Louisiana; Hollandale, Mississippi; and Marvell, Arkansas for their cooperation, diligence, and participation in all aspects of the research interventions conducted in each respective community.

Supported in part by the United States Department of Agriculture, Agricultural Research Service (USDA/ARS) Project No. 6251-53000-003-00D).