# ADDRESSING DISPARITIES IN CARDIOVASCULAR RISK THROUGH COMMUNITY-BASED INTERVENTIONS

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Cardiovascular diseases account for a significant portion of deaths and healthcare costs in the United States. Women from ethnic minorities and rural areas carry a disproportionately higher burden of cardiovascular morbidity and mortality. Many factors contribute to this persistent disparity: a comparatively low level of awareness especially among the at-risk populations, increased prevalence of cardiovascular risks linked to the obesity epidemic, and inconsistent levels of screening and treatment of cardiovascular risks. Cultural and social factors that influence lifestyle and behavior also have significant cardiovascular health consequences and contribute to the disparity. Any intervention to address health disparities should include a community-based component that incorporates education at the lay level, as well as the healthcare provider level. We describe a community education initiative to increase awareness and knowledge about heart disease in women and a community-academic collaborative project to improve diabetes and cardiovascular outcome. These programs have been successfully initiated in the Mississippi Delta, a location with some of the highest cardiovascular mortality (especially among the African American women) as well as limited healthcare infrastructure, low socioeconomic levels, and low literacy rates. (*Ethn Dis*. 2007;17[Suppl 2]:S2-55–S2-59)

**Key Words:** Cardiovascular Risk, Health Disparities, African American, Mississippi

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Cardiovascular disease (CVD) is the number one killer of adults in the United States today. Significant risk factors for CVD include diabetes, obesity, physical inactivity, tobacco use, hyperlipidemia, and hypertension. Estimated population prevalence rates for these cardiovascular risk factors for US men and women are summarized in Table 1. Metabolic syndrome, which involves abdominal obesity, hypertriglyceridemia, low high-density lipoprotien cholesterol, high blood pressure, and hyperglycemia,[2] increases risk of mortality in general and especially in people with pre-existing CVD and diabetes.[3] Although several of these risk factors have biological and genetic bases, the role of lifestyle and personal behavior must be underscored in cardiovascular disease.

Disparities in cardiovascular risk factors are pervasive in this country, as has been shown in national surveys through both self-report and objective measurement.[4] These disparities exist based on sex, ethnicity, education level, socioeconomic status, and geographic location. In general, African Americans, Hispanics/Mexican Americans, persons of low socioeconomic status, those with less than a high school education, and persons living in the southeastern United States and Appalachia are the groups most adversely affected when it comes to cardiovascular health. African American women, especially those living in the Southeast, bear the highest CVD burden with regard to specific risk factors, such as obesity, diabetes, and physical inactivity.[4]

Heart disease is the number one killer of women in the United States; it affects women in every age group. While the mortality trends from heart disease for men have declined over time, they remain unchanged for women. Heart disease accounts for 41.3% of all female deaths, which is more than all types of cancers combined.[5] In 2002, the number of short hospital stays for congestive heart failure and stroke in women exceeded those for men.[4] Although women and men experience similar CVD symptoms, the weighting of factors and prevalence may differ, and women can experience an atypical presentation of cardiac symptoms.[6,7] For example, diabetes is a more powerful risk factor for CVD,[6,7] and increasing age confers greater risk, particularly after menopause, in women compared to men.[6] The relative risk of cardiovascular disease associated with metabolic syndrome is also higher in women.[8] Biological differences between the sexes are still not yet adequately studied or fully understood, which contributes to the observed sex disparities as well.

The influence of ethnicity on cardiovascular morbidity and mortality began to be elucidated with the Atherosclerosis Risk in Communities study, a multicenter, population-based study of heart disease.[9] The findings from this study and others have demonstrated that mortality from CVD at all ages is highest among African Americans.[4] African Americans are also more likely to experience two or more cardiovascular risk factors, develop high blood pressure earlier in life, and have higher average blood pressures (compared to Caucasians). In fact, the prevalence of high blood pressure in African Americans in the United States is among the highest documented worldwide.[1] Among Mexican Americans and African Americans, the risk of diabetes is twice that for non-Hispanic Whites.[10] Car-

**Table 1. Unadjusted prevalence of cardiovascular risk factors for African Americans compared to Caucasians, 2003–2004**

| | African Americans (%) | Caucasians (%) |
|---|---|---|
| Diabetes | | |
| Men | 10.3 | 6.2 |
| Women | 12.6 | 4.7 |
| High Blood Pressure | | |
| Men | 41.8 | 30.6 |
| Women | 45.4 | 31.0 |
| Cholesterol ≥200 mg/dL | | |
| Men | 41.6 | 48.9 |
| Women | 46.8 | 52.1 |
| Stroke | | |
| Men | 4.0 | 2.3 |
| Women | 3.9 | 2.6 |
| Tobacco Use | | |
| Men | 23.9 | 24.1 |
| Women | 20.2 | 20.4 |
| Overweight and obese (BMI ≥25.0 kg/m$^2$) | | |
| Men | 62.9 | 69.4 |
| Women | 77.2 | 57.2 |
| Regular leisure-time physical activity | | |
| Men | 29.5 | 33.4 |
| Women | 19.6 | 31.8 |

Source: American Heart Association Heart Disease and Stroke Statistics – 2006 Update.[1]
BMI=body mass index.

diovascular risk factors alone cannot fully explain disparities across the ethnic minority groups. Ethic differences also exist at biological levels such as visceral adiposity, insulin resistance, and inflammatory markers, which may influence health outcomes.[11]

Among minority women, ethnic disparities exist for CVD such that African American and Mexican American women have higher rates of risk factors than do Caucasian women of similar socioeconomic status.[12] For African American women, cardiovascular disease accounted for 39.9% of total deaths in 2003.[1] Diabetes exacerbates heart disease risk and has the highest prevalence rate among less educated, lower income African American women. African American women also experience the highest prevalence rates of obesity and abdominal obesity, regardless of educational status,[4] which increases their risk of CVD.

Geographically, some evidence shows that the prevalence of certain cardiovascular conditions (hypertension, myocardial infarction, stroke) is greater in the southeastern United States.[4] Cardiovascular disease (CVD) morbidity and mortality rates are higher in Mississippi irrespective of ethnicity and are 12% and 22% higher in African American Mississippians than the rest of the nation for men and women respectively.[9] For the year 2003, Mississippi registered the highest unadjusted heart disease death rate in the United States, with 310.3 persons (per 100,000 US standard population) succumbing annually compared to the US average of 232.3.[13] The prevalence of diabetes is equally troublesome: 10.2% (age-adjusted) of Mississippians were living with diabetes in 2004.[14] Mississippi overall, and especially the Mississippi Delta region, experiences the highest prevalence of diabetes and obesity in the United States, is 52nd in quality of care for diabetes patients, and has high rates of diabetic complications.[15]

The Mississippi Delta, often defined as an 18-county region in northwest Mississippi, is predominantly rural and ≈60% African American.[16] In terms of healthcare, the Delta contains a large at-risk population. Along with extreme poverty, poor access to healthcare exists; only 12% of the state's physicians are located in the region.[17] In 2003, heart diseases were the cause of 31.8% of all deaths recorded in the Delta.[18] Of these deaths due to heart diseases, 53.1% were in women.[19] The crude death rate for heart diseases was 348.2 (per 100,000 US standard population) for Delta females, compared to 307.7 for Mississippi females and 236.2 for US females.[13,19]

The reasons for these disparities are complex, and several barriers exist to resolving cardiovascular health disparities. One such barrier is the fact that women in general perceive they are at lower risk for heart disease and related mortality than men.[7] Although awareness is improving, most women still believe that cancer is their greatest health risk, and CVD knowledge among African American and Hispanic women remains inadequate.[5] Some women do not seek immediate treatment because they have atypical cardiac symptoms, which may lead to less favorable outcomes after coronary events or intervention compared to men.[7] Women also tend to receive less counseling regarding their CVD risk as compared to men.[5] With regard to ethnicity, African Americans may have a general mistrust of the medical system due to experiences of discrimination and abuses that occurred in past medical research.[9] In addition, access to quality healthcare remains a contributing factor to cardiovascular disparities for rural and lower socioeconomic status populations.[4]

Given the complex nature of health disparities, proposed solutions are likely to be multifaceted. Several approaches to resolving discrepancies in cardiovascular risk have been suggested, including further study toward a better understanding of the disparities, improvements in quality of and access to healthcare though policy changes, increasing the number of minority health-

care providers, and enhanced community-based outreach efforts.[9] Efforts to reduce cardiovascular disparities without the collaboration of communities may result in only short-lived improvements, which highlights the possible contributions for community-based participatory research (CBPR) in this arena.[20]

Community-based participatory research (CBPR) is an approach that originated from the problematic delay in translating research findings into interventions and policies that benefit the health of various populations. CBPR has been defined as a collaborative research approach designed to benefit communities and researchers alike that emphasizes shared decision-making power and reciprocal transfer of expertise.[21] To bring about changes that will lead to elimination of disparities requires education and intervention. Solutions that only address clinical outcomes are not likely sustainable, since the intervention is resource-dependent and provider- or clinic-specific. Education of both laypersons and healthcare providers will help increase general awareness and the knowledge base that will serve to empower patients to take personal action, and to seek and expect evidence-based screening and therapy. Grassroots efforts to change the environment must be employed to effect any change in adoption of healthier lifestyles, a critical step towards reducing cardiovascular risk. Two examples of ongoing programs are discussed to illustrate community-based efforts towards improving the health status of persons living in the Mississippi Delta.

## HEART & SOUL INITIATIVE

Women living in the Mississippi Delta experience significant cardiovascular health risks by nature of the healthcare access problems and poverty of the region. The Heart & Soul Initiative is a community education project designed to bring the Heart Truth materials to women in the Mississippi Delta. The Heart Truth is a program developed by the National Institutes of Health, National Heart, Lung, and Blood Institute, to educate women about sex differences in risk factors for heart disease. The current effort was undertaken by a women's health organization housed within an academic medical center, in which faculty and staff provided educational sessions in various Delta communities. Participants were recruited through local medical clinics, hospitals, churches, and newspaper ads. Although recruitment proved difficult, this program did reach >125 women in the region. The participants were 64% African American, 76% did not have diagnosed coronary heart disease, and more than half reported not meeting recommended guidelines for physical activity. We discovered several deficits in heart disease knowledge in this geographic area. Most women were not aware that gastrointestinal problems could be a sign of a heart attack in women (70%), or that heart disease kills one in three women (62%). Only half the women recognized increasing activity and eating a low-fat diet as behaviors that can improve risk for heart disease. Alternatively, 94% knew that heart disease was the number one killer of American women. Improvement in knowledge scores from pretest to posttest was evident in some areas (annual deaths from heart disease in women; age as a risk factor for heart disease; arm, neck, or jaw pain as a symptom of a heart attack), which suggests that these programs may have impacted heart disease knowledge in participants.

## DELTA DIABETES PROJECT

Diabetes is such a potent risk factor for cardiovascular disease, especially in African Americans, that interventions to improve diabetic outcomes should naturally lead to improved cardiovascular risk. The Delta Diabetes Project (DDP) is a community-based participatory program that has implemented a regional diabetes management network for the Mississippi Delta. The DDP is based on a multidisciplinary chronic disease model that uses some unique features for changing traditional provider roles to spare resources. The DDP contains an education arm and a management arm and focuses on patient self-management as the key to improving regimen adherence. On average, patient utilization has consisted of four management and two education visits per patient per year. Thus far, the DDP has treated >4500 patients and incorporates >800 visits per month in clinics throughout the Mississippi Delta. The DDP has demonstrated excellent outcomes, including diabetic measures as well as quality of care and patient satisfaction results, which have been successfully reproduced in community settings.[22]

The patient population for the DDP is 70% African American, 36% uninsured, and the average patient has had diabetes for ≥10 years. Glycosylated hemoglobin (A1C) was used as an estimate of glycemic control over the previous 2–3 months. The mean A1C on presentation for the DDP was ≈10%, with a mean decrease in A1C of 1.92% following participation in the program (normal values range from 4%–8%). These results have been durable over five years (Figure 1). A subsample (n=289) was examined for differences in outcome related to demographic variables and found similar decreases in A1C, blood pressure, and lipids that were independent of either sex or race. Quality of care results also indicate a high degree of conformity to recommended guidelines for care of diabetic patients (Figure 2).[23] These preliminary findings for the DDP suggest that diabetic outcomes can be improved in large groups of ethnically diverse patients living in rural areas

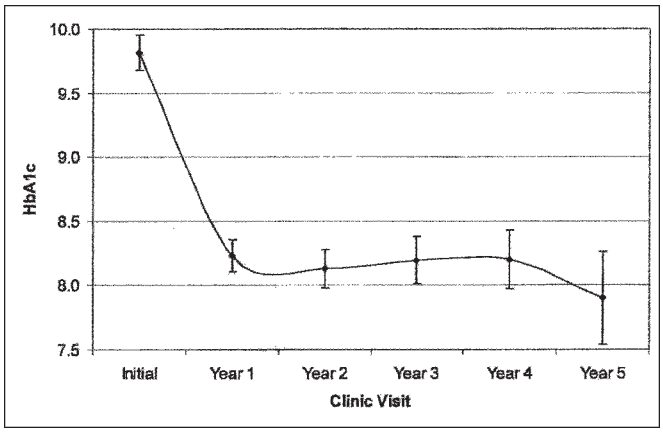


**Fig 1. Changes in mean HbA1C over 5 years in the Delta Diabetes Project***

through academic-community partnerships that facilitate reorganization of healthcare delivery.

## CONCLUSIONS

Cardiovascular disease and its risk factors pose a public health problem. Disparities in CVD risk based on sex, ethnicity, and socioeconomic status persist despite recent healthcare advances. Community-based interventions may be a route through which cutting-edge scientific knowledge can be disseminated and applied to persons affected by these disparities, reducing the gap between the "bench" and the "bedside" and effecting more sustainable change in health outcomes. Challenges inherent in CBPR approaches include balancing rigorous research methods with the needs of the community, the long-term nature of CBPR, and the accurate and comprehensive measurement of health outcomes.[22] The importance of establishing egalitarian relationships between academic institutions and community partners cannot be emphasized enough and although not formally examined in the above-mentioned programs, were likely significant contributors to the programs' initial successes. Limitations to the programs presented here include the lack of a comparison group or randomization to intervention, lack of ethnic diversity outside of Caucasian and African American participants, and the small sample size recruited for the Heart & Soul Initiative. The preliminary outcomes for these programs suggest that community-based approaches to cardiovascular risk management and related efforts toward parity in health outcomes for African American and rural populations warrant further investigation.

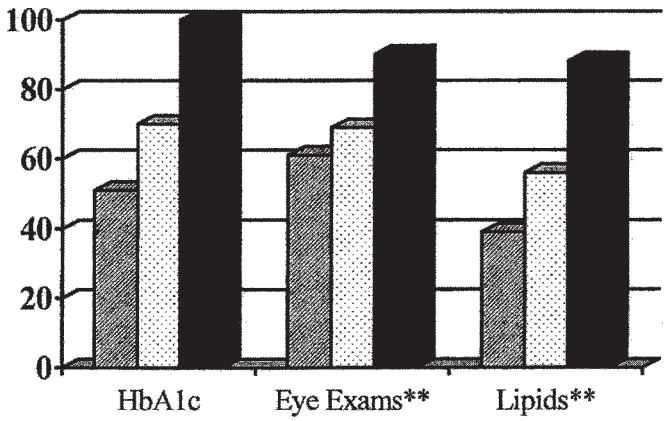


**Fig 2. Delta Diabetes Project Sample: Quality of care indicator results Stripes/grey = Mississippi; Dotted = USA; Solid black = DDP model *Mississippi and US data derived from Jencks et al, 2000. [15] **DDP period = 12 months, US and Mississippi data period = 24 months**

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