A Birth Records Analysis of the Maternal Infant Health Advocate Service Program: A Paraprofessional Intervention Aimed at Addressing Infant Mortality in African Americans

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Recognizing that no single intervention was likely to eliminate racial disparities, the Genesee County REACH 2010 partnership, utilizing both ''bench'' science and ''trench'' knowledge, developed 13 broad-based, multifaceted interventions to eliminate infant mortality. This article provides highlights from a recent birth records comparison analysis of the Maternal Infant Health Advocate Service (MIHAS) intervention, and is solely based on the records of 111 MIHAS clients, and a random sample of 350 African-American women residing in Flint, Michigan. The MIHAS clients were more likely than the comparison sample not to have graduated from high school (56% vs 35%, respectively, $P<.0001$). The MIHAS clients were more likely to report at least some smoking during pregnancy (20% vs 15%, respectively, $P<.05$). However, after controlling for age and education, these results were no longer statistically significant. In terms of birth outcomes, the comparative odds of MIHAS clients delivering a low birth-weight infant are 1.124 (95% CI: 0.620–2.038); the odds of their delivering an infant at 37 weeks or earlier are 1.032 (0.609–1.749). Although the MIHAS clients did not have statistically better birth outcomes than those of the general African-American population in Flint, the MIHAS clients did not demonstrate the outcomes one would expect, given their higher level of risk. Based on this analysis, the MIHAS intervention may have brought its clients ''up to par'' with the general community on several birth outcomes. (*Ethn Dis.* 2004;14[suppl 1]:S1-104–S1-109)

Key Words: Birth Outcome, Community Based Program, Infant Health, Infant Health Risk Factors, Maternal Health

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Introduction

The Genesee County REACH 2010 Team is a broad-based collaborative. In 1999, the partnership successfully submitted a grant application to the Centers for Disease Control and Prevention Racial and Ethnic Approaches to Community Health initiative (REACH 2010). The REACH 2010 initiative is aimed at eliminating disparities in health status experienced by ethnic minority populations in key health areas.[1] The Genesee County Team comprises 3 community based organizations: Flint Access to Community Economic Development, Flint/Genesee Neighborhood Roundtable, and Flint Odyssey House Health Awareness Center, along with the Genesee County Community Action Resource Department, Genesee County Health Department, Greater Flint Health Coalition, Hurley Medical Center, Genesys Regional Medical Center, Mott Children's Health Center, Programs to Reduce Infant Deaths Effectively (PRIDE), and the University of Michigan-Flint, and the University of Michigan School of Public Health-Ann Arbor. The REACH Team have a history of working together to address health issues within Flint/Genesee County. The Genesee County Health Department serves as the central coordinating agency, convening all partners.

Genesee County, located in southeastern Michigan, has a population of approximately 436,141, composed of approximately 75.3% Whites and 20.4% African Americans. The city of Flint, the geographic center of Genesee County, has a population of 124,943, of which nearly 53% are African Americans. Approximately 83% of the African Americans in Genesee County reside in the city of Flint.[2]

The disparity between the infant mortality rate of African Americans and Whites in Genesee County, Michigan, and the city of Flint, rank among Michigan's highest.[3,4] During 1998–2000, Genesee County's overall infant mortality rate of 12.1 deaths per 1000 live birth was among the highest of Michigan's most populous counties.[3] Likewise, the city of Flint had the highest rate among Michigan's cities (14.7 deaths per 1000 live births).[4] When examining the Black-White disparity rates, African-American infants in Genesee county died at 2.5 times the rate of Whites in the county (20.9 vs 8.5 deaths, respectively, per 1000 live births)[5,6]; compared to figures for the entire state of Michigan, African-American infants in the county were more than 3 times as likely to die, compared to White infants in the state.[6] More sobering however, is that despite the applied contributions from the clinical, scientific laboratory, and legislative "benches" to reduce the Black-White gap in infant mortality over the past 2 decades, the AA infant mortality rate in Genesee County has actually risen.[7]

In the joining of knowledge from both academia and the community, the Team agreed to focus on infant mortality with what we believe to be a unique approach among most of the REACH 2010 Initiatives, in that, to address racial and ethnic disparities in health, the structural barriers that affect health must be identified and examined. With this understanding, *Justice in Health: A Community Under Construction* became the vision of the Genesee County

REACH 2010 initiative. It is grounded in public health as a social justice ideology, which promotes the correction of systemic and fundamental distributional inequalities in society.[8] The mission is to reduce racial disparities in health outcomes, with a particular focus on infant mortality, through population-focused and systematic structural interventions that embody cultural understanding, sensitivity, and relevance. It is the team's belief that the activities and change created through this work to reduce the disparities in infant mortality will produce structural and enduring system change in the community's health, academic, and social systems, and contribute, subsequently, to the reduction of racial disparities in other important health outcomes. Based on the mission, 3 broad themes emerged that collectively summarize the overall goals of the 13 interventions: 1) enhancing the baby care system; 2) fostering community mobilization; and 3) reducing racism. As a result, each intervention was developed around one or more of these core themes as a part of the program design. Based on these 3 overarching themes, 4 strategies were developed to best characterize the 13 interventions. In the planning stage, the REACH Team identified 4 communities within Genesee County that are most seriously affected. As a result, the overall REACH initiative focuses on ZIP code areas 48503, 48504, 48505, and 48458. For a more in-depth discussion of the process utilized to identify infant mortality, and the conceptual and logical models of the Genesee County REACH 2010 Infant Mortality Initiative, please refer to Pestronk and Franks.[9]

The Genesee County plan also recognizes that socioeconomic disadvantage is a strong risk factor for low birth weight and infant mortality in United States, for women of color who are no longer adequately protected by the affirming symbols of their native cultures, and are simultaneously marginalized, both psychologically and economically, by mainstream US culture. Therefore the Maternal and Infant Health Advocacy Services' (MIHAS) primary goal is to identify high-risk African-American mothers as early in the pregnancy as possible, and to support each woman through the infant's first birthday. The 48505 zip code area within Flint is the area in which the disparity is greatest, demonstrated by an infant death rate among Black babies 3 times that of their White counterparts.[7] This is a large geographic area; therefore, it was determined that the MIHAS would concentrate efforts here. The remainder of this article describes the MIHAS intervention, and provides some highlights from a recent birth records comparison analysis.

MIHAS: The Intervention

The MIHAS intervention, a program of Faith Access to Community Economic Development (FACED), hypothesizes that advocacy, support, and mentoring are critical in reducing the racial disparities in infant mortality. The 4 objectives of the MIHAS intervention are: 1) to identify pregnant African-American women early in their pregnancies; 2) to assist identified participants in navigating the prenatal care system; 3) to identify resources that assure services are adequate to reduce the stress associated with health barriers; and 4) to engage participants in other activities that assist in addressing issues of race and ethnicity as they relate to infant mortality.

The MIHAS program consists of 2 African-American female advocates, and one part-time coordinator. At the inception of the MIHAS program, the advocates and the coordinator participated in a 4-week (approximately 40 hours per week/5 days per week) orientation, and a hands-on training curriculum. Some of the major components of the training included teaching the advocates how to open and close cases, write appropriate case notes to document all activities with clients, screen and follow up on outside referrals, and find appropriate community resources. To ensure advocates were proficient in documenting their activities with the clients, the advocates were trained by a registered nurse in using the Subjective Objective Assessment Plan (SOAP) process. For this usage, subjective means "what the clients are telling you"; objective means the advocates "observe"; assessment means "determination of the issues, any judgment and/or conclusion"; and the plan means the "action steps necessary to help alleviate the defined issues/problems." Throughout the past 3 years, advocates were required to have additional training on various maternal and child health topics provided by the state health department, such as "Smoke-Free Baby and Me," and Sudden Infant Death Syndrome.

The MIHAS intervention has an annual goal of enrolling 50 new clients each year. Clients are identified through referrals from clinics, Women, Infants and Children (WIC) programs, the local health department, self-referrals, other community programs, and advocate case finding. Once clients have been identified, the advocates utilize 3 methods to contact them: letter, drop-in, and phone calls. Clients who receive information about the service are advised about the research and asked to sign a consent form before enrolling. The advocate and client then set goals and establish a plan to promote a healthy pregnancy and birth outcome.

The role of advocates is ever changing, depending on the client and the situation. Believing that sometimes expectant mothers just need a little help, advocates feel their greatest strength is helping moms identify the necessary resources. Upon entering the MIHAS program, clients meet face-to-face with their advocates to set specific goals to be addressed during their enrollment. While enrolled in the intervention, all clients must be actively working toward their goals. The number of visits and time spent with each client by the ad-

Table 1. FLINT REACH 2010 interventions by strategies

Strategy	Intervention
1. Community dialogue and awareness	Community Dialogue groups
	Undoing Racism Workshop Initiative
	Community Media Campaign
2. Education and training	Cultural Competence in Healthcare curriculum
	African Culture Education and Development Center
	Coordinated Perinatal System of Care
	Male Mobilization to Reclaim and Celebrate African Culture
	Healthy Eating and Harambee Dinners Initiative
	One-Stop Village
3. Outreach and advocacy	Maternal and Infant Health Advocates Service
	Faith-based Health Team
4. Mentoring and support	Birth Sisters Initiative
	''Just Between Girls'' and ''Young Men Destine for Success''

vocates varies, mostly depending on the clients' needs.

Early on, the advocates learned that encouraging their clients to seek prenatal care was not enough. During interactions, clients frequently expressed feeling discomfort during medical appointments to their advocates. Two major reasons for this discomfort cited by the MIHAS clients were an inability to clearly understand their physicians, due to both language barriers, and feelings that their physician did not spend much time with them. A second major lesson learned by the advocates about the client-physician interaction is that their clients felt that most of the physicians they encountered were "talking down" to them—causing the MIHAS clients to have feelings of disrespect. Consequently, advocates began to accompany their clients to prenatal visits, follow-up visits, and well-baby check-ups, whenever possible. The advocates have learned that their presence enables clients to ask questions and get information, without feeling intimidated by the medical staff.

Advocates provide valuable assistance to expectant mothers in the program, beyond the baby healthcare system, with supportive services ranging from providing assistance when seeking employment, and help with school enrollment, to continuing their educational goals. Poor reading skills among many of the clients is a known barrier, therefore advocates often accompany their clients to provide assistance and support with filling out necessary paperwork. The tasks of the advocates are not limited to linking the clients to needed resources; clients can also rely on their advocates to offer occasional words of wisdom, encouraging them to press on and stay focused.

METHODS

This report is solely based on birth record analysis performed on the MIHAS clients who had given birth at the time of the birth records extraction in August 2003. With the collaboration of the Genesee County Health Department, 74% (111/150) of the birth records that were available were successfully retrieved. A comparison group was assembled, using natality data for African-American women who gave birth in Genesee County. The comparison group was a uniform probability sample drawn from a database of all known births in Genesee County during the first 6 months of 2003, at which time the mothers resided in the ZIP code areas 48503, 48504, and 48505 of Flint, Michigan. These data were assembled by the Genesee County Health Department and were used as the sample frame for a related investigation, the Flint Healthy Infant Survey. Non-clients in these 3 ZIP codes were chosen as the initial comparison group, and plans are underway to further explore other comparison groups. The analysis was restricted to African-American mothers, since the target group for the MIHAS intervention is African-American women. The African-American comparison group currently comprises 350 mothers. Though additional data might be included in the comparison group, it is believed that this would not change the overall conclusions.

The descriptive analysis was developed using *t* tests, and the multivariate analysis was developed using multiple logistics regression analyses. All descriptive statistics were derived, and regression analyses conducted, using the SAS statistical software package (SAS version 8; Sas Institute Inc, Cary, NC).

RESULTS

Maternal Infant Health Advocate Services (MIHAS) clients experience significant medical and psychosocial concerns that bring them to the attention of the MIHAS program. According to many of the standard methods of measuring socioeconomic status, MIHAS clients are clearly a disadvantaged segment of the Flint community. In terms of education, as shown in Table 2, approximately 45% of the MIHAS

Table 2. MIHAS birth records analysis compared to random sample for selected variables*

	MIHAS	Sample†
Educational status		
Less than HSD	54.95	34.43‡
HSD	29.73	39.14
More than HSD	15.32	25.43§
Age group		
15–19	35.14	25.43
20–24	59.72	45.98§
25–29	15.32	21.71
30+	10.81	18.57
Prenatal smoking history		
Smoked during pregnancy	20.04	15.71§
Prenatal care visit		
1st trimester	66.67	67.71
2nd trimester	29.73	27.71
3rd trimester	3.6	4.57
Kessner adequacy scale		
Adequate/intermediate	95.5	93.14
NICU usage		
Infant received NICU	13.51	12.29
Very low birth weight	3.45	4.73
Low birth weight	22.22	16.07
Gestational age (<37 weeks)	26.13	24.57

* The proportions are based on a sample size of 111 for the MIHAS group and 350 for the comparison sample.
† The significance level was determined using a *t* test within the specific subgroup of the samples.
‡ Significant at the .001 level.
§ Significant at the .05 level.

clients had graduated high school. The MIHAS clients are less likely to have received a post-secondary education than are other recent mothers within REACH target areas (15% vs 25%, respectively, $P<.05$). In terms of age, MIHAS clients are also much younger than the representative sample of African-American mothers in the REACH target areas in Flint. In fact, MIHAS clients are more likely to be in the 20–24-year-old age group, as compared to the comparison sample. By these measures, it is clear that the MIHAS program achieves one program objective: to identify and serve disadvantaged mothers in the REACH target areas.

Recognizing the significance of alcohol and other drug use during pregnancy, our analysis was, however, limited to tobacco use only, due to poor and incomplete data collection regarding the former. Again, MIHAS clients appear to be at significant risk. Compared with other African-American mothers in Flint, MIHAS clients were more likely to report at least some smoking during pregnancy (approximately 20% vs 15%, respectively, $P<.05$). However, as shown in Table 3, after controlling for potentially confounding factors, such as maternal age and education, these results were not statistically significant.

Approximately 67% of the MIHAS clients began to receive prenatal care in the first trimester. The receipt of prenatal care in the first trimester was especially stark when contrasting the MIHAS clients to the general population in the 48505 ZIP code area, of which only a little more than 50% received care in the first trimester. This comparison is especially surprising when considering that the largest single area of MIHAS recruitment was from the 48505 ZIP code area. Overall, non-MIHAS African-American mothers in 48504 and 48505 were very unlikely to receive care in the first trimester (results from ZIP code subgroup analysis, not presented). Although MIHAS clients faced greater pregnancy risk, when comparing them to the larger, random sample, the MIHAS clients were equally likely to receive prenatal care in the first trimester.

In addition to the timing of the first prenatal care visit, we also examined the Kessner index[10] of prenatal care adequacy. The Kessner index examines the timing of the first and accumulative number of prenatal visits for women of a given gestation at delivery. Using the Kessner index to compare the MIHAS clients to random sample, it appears the MIHAS intervention brings women "up to par," given what one would expect in

Table 3. Multiple logistic regression of selected variables of MIHAS clients*

Selected Variables	Odds Ratios (95% CI)
Smoking†	1.591 (0.897–2.821)
Kessner Index (adequate/intermediate)†	1.854 (0.678–5.066)
NICU‡	1.418 (0.724–2.776)
Very low birth weight§	0.896 (0.245–3.277)
Low birth weight§	1.124 (0.620–2.038)
Gestational age (37 weeks or less)§	1.032 (0.609–1.749)

NICU=Neonatal Intensive Care Unit.
* The comparison sample is the reference group.
† Adjusted for maternal age and education.
‡ Adjusted for maternal age, education, tobacco use, and gestational age.
§ Adjusted for maternal education, age, and prenatal smoking history.

the broader community. However, it should be noted that the program does not lead to markedly better measures of prenatal care adequacy than those seen among other African-American mothers in Flint, as shown in Table 2. Based on the Kessner index, approximately 96% of MIHAS clients, and about 93% of other African-American mothers in Flint, received "intermediate" or better care. The analysis did not show any clinically or statistically significant differences between MIHAS clients and other mothers. The MIHAS clients fared somewhat better than other African-American mothers in 48505, but worse than those in other ZIP codes. Table 3 demonstrates that after controlling for potential confounding factors, such as maternal age and education, the analysis showed no difference in the adequacy of prenatal care using the Kessner index.

Whether an infant received Neonatal Intensive Care Unit (NICU) care was also examined. The NICU is an important measure that captures many high-risk deliveries and many very sick infants. Keeping infants out of the NICU is an important goal of prevention programs. Even if one cannot promise an optimal delivery at term, one might be able to manage pregnancies, labor, and delivery, to keep infants out of the NICU. As presented in Table 2, given the higher level of risk among MIHAS clients, the *t* test analysis shows statistical evidence indicating that the MIHAS clients were no more likely than other mothers to not require NICU care. When accounting for smoking, prematurity, and other risk factors, it is shown that infants of MIHAS clients were equally as likely as those of other mothers in Flint to receive NICU treatment (see Table 3).

In terms of birth outcomes, after controlling for known risk factors such as smoking status, maternal age, and education, MIHAS clients were equally as likely as other African-American mothers in Flint to deliver very low (<1500 grams) and low (1500–2500 grams) birth-weight infants, and to have a premature delivery (Table 3). As shown in Table 2, 22% of MIHAS clients, as compared to 16% of the random sample, delivered low birth-weight infants (5.5 pounds or smaller). Approximately 74% of the MIHAS clients delivered at 38 weeks or more, as compared to 76% of the comparison group.

DISCUSSION

In this comparison analysis, we examined how MIHAS clients differ in their risk factors and their birth outcomes from other women in the REACH target areas. These comparisons must be interpreted carefully. This analysis of risk factors and birth outcomes provides several insights into the MIHAS program. The MIHAS intervention has enrolled and served a disadvantaged, high-risk population. Although MIHAS clients are a significantly disadvantaged group, they were as likely as other African-American mothers in Flint to receive first-trimester prenatal care, and to receive adequate care based on the Kessner index. In terms of birth outcomes, it was also shown that MIHAS clients are equally as likely not to require NICU care, after controlling for known risk factors. In addition, the NICU analysis highlighted the importance of not smoking, particularly for women who faced other medical risks. Women who delivered premature infants, and who smoked, were the group at highest risk.

However, not all of the findings were positive. It was revealed that MIHAS clients exhibit higher smoking prevalence than other African-American mothers in Flint. This is a challenge and an opportunity, given the significant but preventable health problems associated with smoking. This finding may represent an opportunity for the MIHAS intervention, given the potential availability of smoking cessation interventions for pregnant women.

Despite the higher level of risks faced by MIHAS clients in terms of maternal age, tobacco use, and educational status, MIHAS clients were equally as likely to deliver low birth-weight and premature infants as the general African-American population in Flint. These birth outcome findings are not surprising for 2 primary reasons. First, best-practice home visiting interventions and other high-quality interventions have not been shown to be effective in preventing premature deliveries.[11] Second, birth certificate data have real limitations in exploring high-risk populations. A medical chart review is likely to be more accurate when one tries to specifically account for the impact of hypertension and other factors. Though additional datasets with high-risk samples of African-American women are available, it is not clear that this is a key area in which one would expect strong program effects. It should be noted, however, that although the MIHAS intervention did not statistically favorably increase birth outcomes for its clients above that of the general African-American population in Flint, the MIHAS clients did not have the poor outcomes that one would expect, given their high level of risk. Based on this analysis, it appears that the MIHAS intervention may have brought its clients "up to par" for birth outcomes, given what one would expect in the broader community.

This analysis provided some important bottom-line facts concerning infant health. The birth records data used to develop this report do not allow in-depth analysis of how the MIHAS intervention actually does its work. Future evaluation work will be conducted that will allow further exploration of how the MIHAS intervention does or does not improve access or use of services, and how the program addresses clients' psychosocial concerns that affect maternal health, thus creating risks for infants and children.

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