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# Selected Findings from the Cross-Site Evaluation of the Federal Healthy Start Program

**Vonna Lou Caleb Drayton · Deborah Klein Walker · Sarah W. Ball · Sara M. A. Donahue · Rebecca V. Fink**

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**Abstract** Initiated in 1991, the Federal Healthy Start Program includes 105 community-based projects in 39 states, the District of Columbia and Puerto Rico. Healthy Start projects work collaboratively with stakeholders to ensure participants' continuity of care during pregnancy through 2 years postpartum. This evaluation of Healthy Start projects examined relationships between implementation of nine core service and system program components and improvements in birth and project outcomes. Program components and outcomes were examined using data from a 2010 Healthy Start project director (PD) survey (N = 104 projects) and 2009 performance measure data from the Maternal and Child Health Bureau Discretionary Grant Information System (N = 98 projects). We explored bivariate relationships between the nine core program components and (a) intermediate and long-term project outcomes and (b) birth outcomes. We assessed independent associations of implementation of all core program components with birth outcomes, adjusting for project characteristics and activities. In 2010, 57 projects implemented all nine core program components: 104 implemented all five core service components and 69 implemented all four core systems components. Implementation of all core program components was significantly associated with several PD-reported intermediate and long-term project outcomes, but was not associated with singleton low birth weight or infant mortality among participants' infants. This evaluation revealed a mixed set of relationships between Healthy Start projects' implementation of the core program components and achievement of project outcomes. Although the findings demonstrated a positive impact of Healthy Start projects on birth outcomes, only a few associations were statistically significant.

**Keywords** Maternal and child health · Healthy Start Program · Cross-site evaluation · Program evaluation

V. L. C. Drayton (✉)
Booz Allen Hamilton, One Preserve Parkway, Rockville, MD 20852, USA
e-mail: drayton_vonna@bah.com

D. K. Walker · S. W. Ball · S. M. A. Donahue · R. V. Fink
Abt Associates, 55 Wheeler Street, Cambridge, MA 02138-1168, USA
e-mail: Deborah_walker@abtassoc.com

S. W. Ball
e-mail: Sarah_Ball@abtassoc.com

S. M. A. Donahue
e-mail: Sara_Donahue@abtassoc.com

R. V. Fink
e-mail: Rebecca_Fink@abtassoc.com

## Introduction

The Federal Healthy Start Program began in 1991 as a response to high infant mortality rates (IMR) in the United States as well as the large gap in these rates between white and non-white infants. The first Healthy Start projects were funded as demonstration sites in 15 communities with IMR 1.5–2.5 times the national average. By 2012, the program had expanded in size and mission to include 105 projects in 39 states, the District of Columbia and Puerto Rico, including projects in both urban and rural areas. As specified by Health Resources and Services Administration (HRSA) guidance documents [1–3] the core Program goals include: (1) a reduction of racial and ethnic disparities in access to and utilization of health services, (2) an improved local health care system, and (3) an increased consumer or community voice in health care decisions.

The Federal Healthy Start Program focuses on improving the health and well-being of women, infants, children and their families through the implementation of evidence-based practices and innovative community interventions. In 2010, Healthy Start projects served almost 30,000 pregnant women, many of whom were black or African American, 34 years and younger, with incomes below 100 percent of the federal poverty level [4].

Healthy Start projects work collaboratively with community stakeholders and consumers to leverage existing service and system resources so that women at risk for adverse birth outcomes are assured continuity of care during pregnancy through 2 years postpartum. Since 2001, all Healthy Start projects have been required to implement nine "core" program components: five service components (outreach and recruitment, case management, health education, interconception care (ICC), perinatal depression screening) and four systems-building components (consortia, local health systems action plan (LHSAP), coordination and collaboration with Title V, and a sustainability plan). Healthy Start projects may also implement other support services needed in their local communities, such as breastfeeding support and education, screening for domestic/intimate partner violence and child abuse, initiatives to improve family and/or male involvement, healthy weight interventions, home visiting, and smoking cessation [1–3].

### National Evaluations of the Federal Healthy Start Program

The Federal Healthy Start Program has been evaluated from its inception in the early 1990 s. The first national evaluation, conducted from 1997 through 1999, examined the implementation of the 15 demonstration project activities during fiscal years 1992 and 1996 and assessed whether these projects achieved the Healthy Start Program goals of reducing infant mortality and improving maternal and infant health. The second national evaluation was conducted in two phases from 2002 through 2007 and sought to obtain information about the implementation of program components and to identify program features associated with improved perinatal outcomes. Findings from this evaluation were summarized in a profile report presenting the characteristics of all Healthy Start projects [5] and in case studies that documented the context and implementation of the Healthy Start Program in eight sites [6]. The evaluation also collected information on program implementation and outcomes through a participant survey that was conducted in four sites [7]. The third national evaluation is the cross-site evaluation summarized in this article. It was conducted from 2009 through 2012 to examine relationships between the core program components and long-term program and birth outcomes, in addition to factors that influence these relationships. The primary objective of the evaluation was to assess the effect of implementation of all nine core program components on long-term maternal and child health outcomes.

## Methods

The evaluation was guided by a logic model (Fig. 1) that outlined the hypothesized relationships between Healthy Start project context, implementation of core service and system program components, and four long-term outcomes relevant to the Healthy Start Program goals: (1) improved birth outcomes, (2) improved maternal health, (3) improved child health, and (4) sustained community capacity to reduce disparities in health status in the target community. A cross-sectional design was used to assess the associations of implementation of the nine core program components with (1) project characteristics, (2) achievement of intermediate project outcomes, (3) service and system activities conducted by the Healthy Start project that made a primary or major contribution to reducing disparities in maternal and infant health outcomes, and (4) achievement of long-term birth outcomes.

### Data Sources

Self-reported data from the 2010 project director survey (PD survey) and performance measure (PM) data for 2009 reported to the Maternal and Child Health Bureau (MCHB) Discretionary Grant Information System (DGIS) were used in all analyses. The 2010 PD survey was administered via web to Healthy Start project staff between July and September 2011 and was completed for all 104 projects (100 % response rate). The survey was designed to collect information on implementation and features of the nine core program components as well as additional support services offered by each Healthy Start project and project achievements. The DGIS is a Web-based system that MCHB grantees use to report their data online to MCHB through HRSA's Electronic Handbook as a part of the grant application and performance reporting processes; it is the repository of PM data for all MCHB programs. During the time period of this evaluation, the MCHB utilized 15 PMs to monitor the progress of all Healthy Start projects towards the achievement of Program objectives. A list of current MCHB Healthy Start Program PMs is available from: https://mchdata.hrsa.gov/DGISReports/PerfMeasure/default.aspx. Performance measure data for 2009 were available for 98 projects. After a thorough examination of the available PM data from the DGIS [8], four PMs (two birth outcome PMs, 1 service outcome PM and 1 system

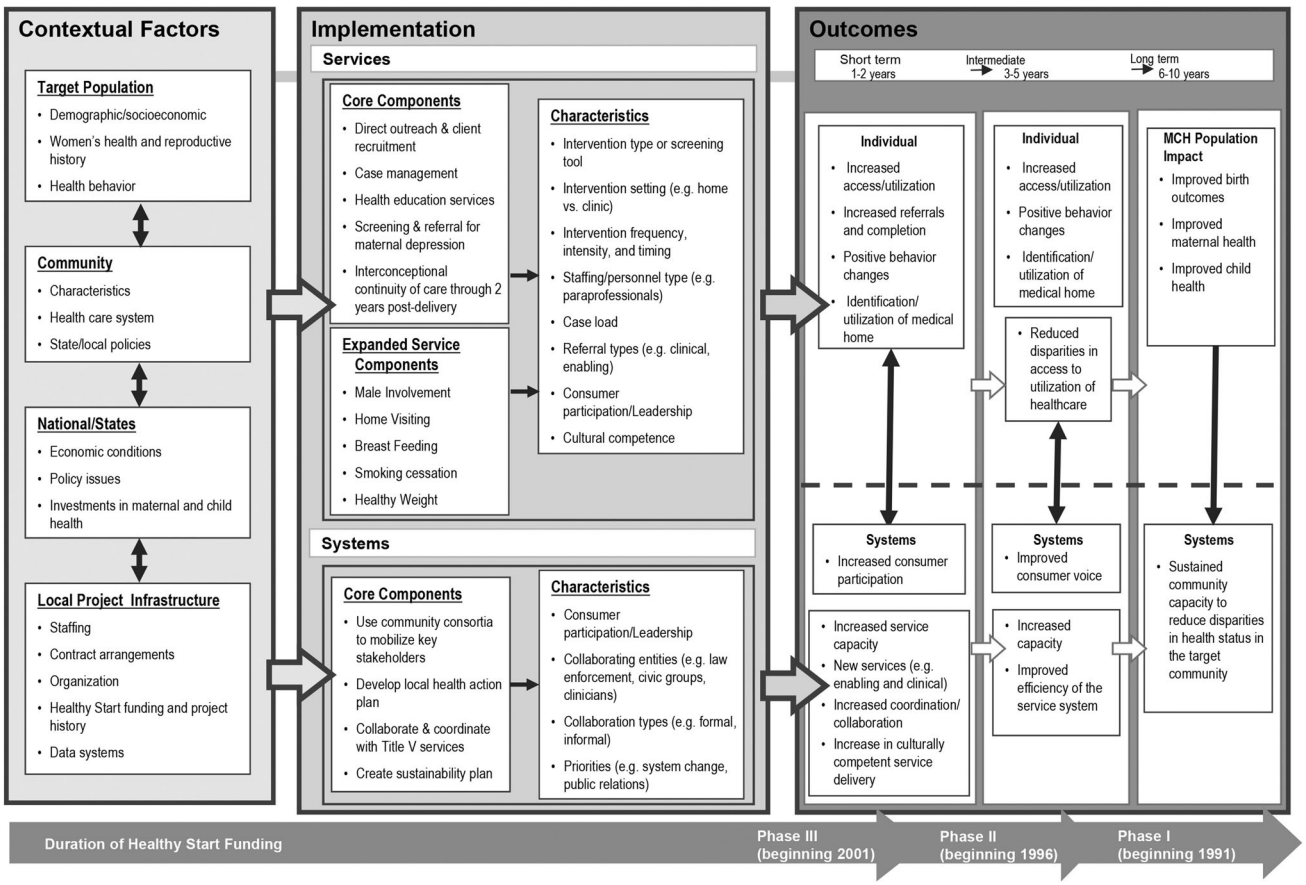


**Fig. 1** Logic model for the cross-site evaluation of Healthy Start

outcome PM; Table 1) were selected for this evaluation based on the quality and consistency of data as well as the relevance of the PM to the evaluation objectives. Project characteristic data that were consistently reported in the DGIS were also used in our analyses. State Title V birth outcome PMs (singleton LBW and IMR) and Healthy People 2010 and 2020 objective targets (LBW and IMR) [9, 10] were used as benchmarks for comparison.

## Measurement of Variables

Variable selection was informed by program components and expected outcomes, the logic model, and previous studies of birth outcomes [11]. The primary exposure of interest was the implementation of all nine core program components: outreach and recruitment, case management, health education, interconception care (ICC), perinatal depression screening, consortia, local health systems action plan (LHSAP), coordination and collaboration with Title V, and a sustainability plan. Implementation was determined using data from the 2010 PD survey (yes/no response for each component). The birth outcomes of interest were measured using two PMs reported in the DGIS in 2009: percent singleton low birth weight (PM 51) and infant mortality rate (PM 52).

We examined characteristics hypothesized to influence the association of implementation of program components with birth outcomes. We obtained information on these characteristics from the 2010 PD survey and the DGIS. Maternal demographic characteristics were not available for this analysis. Project characteristics (Table 2) that were examined were length of funding (initial project funding received in Phase 1 [1991–1996], 2 [1997–2000], 3 [2001–2004], or 4 [2005–2010]), geographic location (urban, not urban), and organization type (government agency, community-based non–governmental agency or other organization type). Project director report of achievement of intermediate outcomes (eleven outcomes; see Table 2) (yes/no), service and systems activities that made a primary or major contribution to reducing disparities in maternal and infant health outcomes (fourteen activities; see Table 2) (yes/no), and achievement of long-term maternal and child health and community capacity outcomes (five outcomes; see Table 2) (yes/no) were examined in descriptive analyses and included as covariates in multivariable analyses. One service outcome PM

**Table 1** MCHB performance measures (PM) used in multivariate analyses

| Category/ PM | Definition/elements | Components/Scale |
|---|---|---|
| *Birth outcomes* | | |
| PM 51 | Percent of live singleton births weighing less than 2,500 g | Numerator: Number of live singleton births less than 2,500 g in the calendar year to program participants<br>Denominator: Live singleton births in the calendar year among program participants |
| PM 52 | The infant mortality rate per 1,000 live births | Numerator: Number of deaths to infants from birth through 364 days of age to program participants<br>Denominator: Number of live births in the calendar year among program participants |
| *Service outcomes* | | |
| PM 20 | The percent of women participating in MCHB supported programs who have an ongoing source of primary and preventive care services for women | Numerator: The number of women participating in MCHB-funded projects who have an ongoing source of primary and preventive care services during the reporting period<br>Denominator: The number of women participating in MCHB-funded projects during the reporting period |
| *Systems outcomes* | | |
| PM 22 | The degree to which MCHB supported programs facilitate health providers' screening of women participants for risk factors<br>*Risk factors*<br>1. Smoking<br>2. Alcohol<br>3. Illicit drugs<br>4. Eating disorders<br>5. Depression<br>6. Hypertension<br>7. Diabetes<br>8. Domestic violence | Total possible score: 0–64<br>Scoring instructions: Using a scale of 0-2, indicate the degree to which your grant has performed each activity to facilitate screening for each risk factor by health providers in your program<br>Scale definitions:<br>0 = Grantee does not provide this function or assure that this function is completed,<br>1 = Grantee sometimes provides or assures the provision of this function but not on a consistent basis,<br>2 = Grantee regularly provides or assures the provision of this function |

A list of all current MCHB Healthy Start Program PMs is available from: https://mchdata.hrsa.gov/DGISReports/PerfMeasure/default.aspx

(PM 20, the percent of women participants who have an ongoing source of primary and preventive care services for women) and one system outcome PM (PM 22, a score between 0 and 64 representing the degree to which the project facilitated health providers' screening of women participants for eight risk factors) were examined in descriptive analyses and included as covariates in multivariable analyses (see Table 1).

## Analysis

We calculated descriptive statistics for all variables across all Healthy Start projects. We then performed bivariate analyses using Pearson's Chi square test and Fisher's exact test to (1) describe implementation of the nine core Healthy Start Program components by project characteristics; (2) examine the association of implementation of all core components with each of (a) intermediate outcomes, (b) service and systems activities that made a primary or major contribution to reducing disparities in maternal and infant health outcomes, and (c) long-term maternal and child health and community capacity outcomes; and (3) examine the association of intermediate outcomes and service and systems activities that made a primary or major contribution to reducing disparities in maternal and infant health outcomes with (a) long-term maternal and child health and community capacity outcomes and with b) birth outcome PMs. We also compared the birth outcome PM rates among Healthy Start projects with their state's Title V Program rates and with achievement of national Healthy People (HP) 2010 and 2020 objective targets.

We developed multivariable linear and logistic regression models to examine the independent associations of implementation of all core program components with birth outcomes, adjusting for project characteristics, project director-reported intermediate outcomes, and service and system PMs. We developed linear regression models to examine continuous outcomes (singleton LBW, IMR) and logistic regression models to examine achievement (yes/no) of state Title V rates or national HP objectives. We

calculated betas or odds ratios with 95 % confidence intervals. Variables that were included in the models were those found to be associated with the birth outcomes of interest in previous studies or in the bivariate analyses as well as any other characteristics of a priori interest according to the evaluation logic model (Fig. 1). The multivariate models to examine birth outcomes included only those projects with PM data.

The model to examine the association of implementation of all core components with singleton LBW (PM 51) included the following covariates: initial funding (Phase 1 versus all other phases), urban geographic location, not urban geographic location, grantee organization type, Healthy Start project facilitation of provider screening for risk factors (PM 22, score greater than mean of all projects), percent of women participants with ongoing source of primary and preventive care (PM 20), self-reported improved birth spacing in 2010 (yes/no), self-reported increased cultural competence of providers (yes/no), and self-reported increased participant involvement in Healthy Start decision-making (yes/no). The model to examine the IMR outcome (PM 52) included many of the same covariates, in addition to percent singleton LBW (PM 51), an independent risk factor for infant mortality.

This evaluation was determined exempt from IRB review by the Abt Associates Institutional Review Board on September 1, 2010 (Abt IRB # 0499).

## Results

### Descriptive Characteristics

Table 2 presents the distribution of project characteristics as well as project director-reported implementation of the core components, intermediate project outcomes, service and systems activities that made a primary or major contribution to reducing disparities in maternal and infant health outcomes, and long-term maternal and child health and community capacity outcomes. All 104 Healthy Start projects implemented all five core service components. Over two-thirds of projects implemented the four core systems-building components: 99 % implemented one or more consortium, 91 % implemented a LHSAP, 87 % collaborated with Title V, and 66 % had a sustainability plan. Overall, 57 (55 %) projects implemented all nine core program components; this group includes 10 of the 18 projects that were first funded during Phase 1 (1991-1996) of the Healthy Start Program. Most projects were in operation for at least 10 years at the time the PD survey was administered; 17 % were first funded in Phase 1 and 61 % in Phase 2. Approximately 75 % of projects were located in urban areas, including cities and metropolitan areas; and 40 % of grantee organizations were state or local government agencies.

Approximately two-thirds of all projects reported that in 2010 the project had accomplished a number of intermediate outcomes including increased awareness of the importance of interconception care and of disparities in birth outcomes as a community priority, increased positive health behaviors among participants, increased access to available services for participants, and increased number of participants with a medical home.

More than two-thirds of all projects reported that case management, enabling services such as transportation and translation, and interconception care activities conducted by the project made a primary or major contribution to reducing disparities in maternal and infant health outcomes. Less than two-thirds of projects reported that other service and systems activities conducted by the project, such as collaboration with consumers, community-based organizations, and public and private agencies, made a similar contribution to reducing disparities in maternal and infant health outcomes.

Sixty-eight percent of project directors reported that the project had achieved improvements in birth outcomes in 2010 and 39 % reported achieving improvements in maternal health. Less than one-third of project directors reported that the Healthy Start project had achieved sustained capacity to reduce disparities in health status in the community (32 % of projects); improvements in child health (31 %); and increased birth spacing (19 %). A small proportion (12 %) of project directors reported that the Healthy Start project had not achieved any long-term outcomes in 2010.

### Bivariate Analyses: Core Program Components

Table 3 presents the results of bivariate analyses examining the relationship between implementation of the nine core program components and project characteristics, as well as relationships between implementation of program components and three categories of project director-reported outcomes: (1) intermediate outcomes, (2) activities that contributed to reducing disparities in maternal and infant health outcomes, and (3) long-term maternal and child health and community capacity outcomes. The 57 projects that implemented all core components were used as the reference group. Only results that were statistically significant ($p \leq 0.05$) are reported in the table.

Healthy Start projects whose grantee organizations were state or local government agencies were significantly ($p \leq 0.05$) less likely to implement all core components compared with projects whose grantee organizations were a community-based non-governmental organization or other type of organization.

**Table 2** Distribution of Healthy Start project characteristics and project director-reported implementation of program components, intermediate outcomes, service and systems activities that contributed to reducing disparities in maternal and infant health outcomes, and long-term maternal and child health and community capacity outcomes, among all Healthy Start projects (N = 104 projects)

| | All projects (N = 104) | |
|---|---|---|
| | n | (%) |
| *Project characteristics*[a] | | |
| Length of funding | | |
| Initial Funding Phase 1 (1991–1996) | 18 | 17 |
| Initial Funding Phase 2 (1997–2000) | 63 | 61 |
| Initial Funding Phase 3 (2001–2004) | 10 | 10 |
| Initial Funding Phase 4 (2005–2010) | 13 | 12 |
| Geographic location: Urban [urban/central city, metropolitan area (city and suburbs)] | | |
| Yes | 78 | 75 |
| No | 26 | 25 |
| Geographic location: Not urban (suburban, border US-Mexico, rural) | | |
| Yes | 28 | 27 |
| No | 76 | 73 |
| HS grantee organization type | | |
| Government agency (state agency, community government agency such as a local health department) | 42 | 40 |
| Community-based non-governmental organization (health care or non-health care) or Other organization (including academic medical center, non-profit organization, tribal organization, Federally Qualified Health Center) | 62 | 60 |
| *Implementation of all nine core program components*[b] | | |
| Yes | 57 | 55 |
| No | 47 | 45 |
| *Intermediate outcomes*[c] | | |
| Increased awareness of the importance of interconception care | | |
| Yes | 80 | 77 |
| No | 24 | 23 |
| Increased awareness of disparities in birth outcomes as community priority | | |
| Yes | 76 | 73 |
| No | 28 | 27 |
| Increased positive health behaviors among our participants | | |
| Yes | 74 | 71 |
| No | 30 | 29 |
| Increased access to the services available for our participants | | |
| Yes | 71 | 68 |
| No | 33 | 32 |
| Increased number of participants with a medical home | | |
| Yes | 70 | 67 |
| No | 34 | 33 |
| Increased screening for perinatal depression among providers in the community | | |
| Yes | 51 | 49 |
| No | 53 | 51 |
| Increased participant involvement in Healthy Start decision-making | | |
| Yes | 50 | 48 |
| No | 54 | 52 |
| Increased integration of prenatal, primary care, and mental health services | | |
| Yes | 47 | 45 |
| No | 57 | 55 |
| Increased cultural competence of providers in our community | | |
| Yes | 43 | 41 |
| No | 61 | 59 |
| Increased participant involvement in other community activities addressing systems change | | |
| Yes | 39 | 37 |
| No | 65 | 63 |
| Increased participant involvement in decision-making among partner agencies | | |
| Yes | 22 | 21 |
| No | 82 | 79 |
| *Service and systems activities that contributed to reducing disparities in maternal and infant health outcomes*[d] | | |
| Case management | | |
| Yes | 90 | 87 |
| No | 14 | 13 |
| Enabling services | | |
| Yes | 73 | 73 |
| No | 31 | 30 |
| Interconception care | | |
| Yes | 70 | 67 |
| No | 34 | 33 |
| Perinatal depression screening | | |
| Yes | 66 | 63 |
| No | 38 | 37 |
| Outreach and client recruitment | | |
| Yes | 64 | 62 |
| No | 40 | 39 |
| Collaboration with consumers | | |
| Yes | 60 | 58 |
| No | 44 | 42 |

**Table 2** continued

| | All projects (N = 104) | |
|---|---|---|
| | n | (%) |
| Collaboration with community-based organizations | | |
| Yes | 53 | 51 |
| No | 51 | 49 |
| Collaboration with public agencies | | |
| Yes | 49 | 47 |
| No | 55 | 53 |
| Collaboration with private agencies | | |
| Yes | 46 | 44 |
| No | 58 | 56 |
| Consortium | | |
| Yes | 45 | 43 |
| No | 59 | 57 |
| Local Health System Action Plan | | |
| Yes | 43 | 41 |
| No | 61 | 59 |
| Collaboration with local Title V | | |
| Yes | 34 | 33 |
| No | 70 | 67 |
| Collaboration with State Title V | | |
| Yes | 31 | 30 |
| No | 73 | 70 |
| Provider education | | |
| Yes | 39 | 38 |
| No | 65 | 62 |
| *Long-term maternal and child health and community capacity outcomes*[e] | | |
| Improved birth outcomes | | |
| Yes | 71 | 68 |
| No | 33 | 32 |
| Improved maternal health | | |
| Yes | 41 | 39 |
| No | 63 | 61 |
| Sustained community capacity to reduce disparities in health status in the community | | |
| Yes | 33 | 32 |
| No | 71 | 68 |
| Improved child health | | |
| Yes | 32 | 31 |
| No | 72 | 69 |
| Increased birth spacing | | |
| Yes | 20 | 19 |
| No | 84 | 81 |
| No long term outcomes were achieved in 2010 | | |
| Yes | 13 | 12 |
| No | 91 | 88 |

[a] Data source: Maternal and Child Health Bureau Discretionary Grant Information System

[b] Data source: 2010 Project Director survey. To determine implementation of core service components, project directors were asked, "Which of the following services does your Healthy Start project offer?" (response options: "Outreach and participant recruitment," "Case management," "Health education," "Perinatal depression screening," and "Interconceptional services"). To determine implementation of the core systems-building component of having a consortium, project directors were asked "Does your Healthy Start project have at least one active consortium that addresses maternal and child health issues" (response options: Yes/No). To determine implementation of the core systems-building component of having a Local Health System Action Plan, project directors were asked "Does your Healthy Start project have a Local Health System Action Plan (LHSAP)?" (response options: Yes/No; a follow up question was asked to determine if the LHSAP was specific to the Healthy Start project). To determine implementation of the core systems-building component of coordination and collaboration with Title V, project directors were asked to specify the types of collaborative activities that their Healthy Start project established with the State Title V agency. Projects were classified with a "yes" response if the project director indicated that the State Title V agency "is a member of the Healthy Start consortium," "has a written memorandum of understanding or agreement with Healthy Start," "provides contracted services to Healthy Start," "hosts out-stationed Healthy Start staff," "participates in joint training with Healthy Start," "has a shared staffing arrangement with Healthy Start," "coordinates case management or is planning with Healthy Start for shared participants," "shares protocols with Healthy Start," "is involved in Healthy Start sustainability planning," "has a data-sharing arrangement with Healthy Start," "contributes to pooled funding streams to support joint services," "has a Healthy Start employee on their board," "works with Healthy Start to develop consistent health messages for participants," and/or "receives cultural competence training from Healthy Start." To determine implementation of the core systems-building component of having a sustainability plan, project directors were asked "Does your Healthy Start project have a sustainability plan, that is, a plan to maintain services to the target population after federal Healthy Start funding ends?" (response options: Yes/No)

[c] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following intermediate outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed

[d] Data source: 2010 Project Director survey. Project directors were asked, "To what extent did the following activities conducted by your Healthy Start project contribute to reducing disparities in maternal and infant health outcomes?". Response options included Primary contribution, Major contribution, Moderate contribution, Minor contribution, and No contribution or N/A. Primary contribution and Major contribution were classified as "Yes."

[e] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following long term outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed

**Table 3** Association of implementation of Healthy Start Program components with project characteristics and project director-reported intermediate outcomes, service and systems activities that contributed to reducing disparities in maternal and infant health outcomes, and long-term maternal and child health and community capacity outcomes (N = 104 projects)

| | Implementation of all required core program components | | | | |
|---|---|---|---|---|---|
| | Yes (n = 57) | | No (n = 47) | | *p* value* |
| | n | (%) | n | (%) | |
| *Project characteristics*[a] | | | | | |
| HS grantee organization type | | | | | |
| Government agency (state agency, community government agency such as a local health department) | 18 | 32 | 24 | 51 | 0.04 |
| Community-based non-governmental organization (health care or non-health care) or Other organization (including academic medical center, non-profit organization, tribal organization, Federally Qualified Health Center) | 39 | 68 | 23 | 49 | |
| *Intermediate outcomes*[b] | | | | | |
| Increased access to the services available for our participants | | | | | |
| Yes | 46 | 80 | 25 | 53 | 0.00 |
| No | 11 | 20 | 22 | 47 | |
| Increased screening for perinatal depression among providers in the community | | | | | |
| Yes | 33 | 58 | 18 | 38 | 0.04 |
| No | 24 | 42 | 29 | 62 | |
| Increased integration of prenatal, primary care, and mental health services | | | | | |
| Yes | 31 | 54 | 16 | 34 | 0.03 |
| No | 26 | 46 | 31 | 66 | |
| *Service and systems activities that contributed to reducing disparities in maternal and child health outcomes*[c] | | | | | |
| Enabling services | | | | | |
| Yes | 46 | 81 | 27 | 58 | 0.01 |
| No | 11 | 19 | 20 | 42 | |
| Interconception care | | | | | |
| Yes | 44 | 77 | 26 | 55 | 0.01 |
| No | 13 | 23 | 21 | 45 | |
| *Long-term maternal and child health and community capacity outcomes*[d] | | | | | |
| Improved child health | | | | | |
| Yes | 22 | 39 | 10 | 21 | 0.05 |
| No | 35 | 61 | 37 | 79 | |
| Increased birth spacing | | | | | |
| Yes | 16 | 28 | 4 | 9 | 0.01 |
| No | 41 | 72 | 43 | 91 | |

* Pearson's Chi square or Fisher's exact test

[a] Data source: Maternal and Child Health Bureau Discretionary Grant Information System

[b] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following intermediate outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed. Only outcomes with statistically significant ($p \leq 0.05$) relationships with implementation of all core program components are reported

[c] Data source: 2010 Project Director survey. Project directors were asked, "To what extent did the following activities conducted by your Healthy Start project contribute to reducing disparities in maternal and infant health outcomes?". Response options included Primary contribution, Major contribution, Moderate contribution, Minor contribution, and No contribution or N/A. Primary contribution and Major contribution were classified as "Contributed." Only activities with statistically significant ($p \leq 0.05$) relationships with implementation of all core program components are reported

[d] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following long term outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed. Only outcomes with statistically significant ($p \leq 0.05$) relationships with implementation of all core program components are reported

Although projects implementing all core components more frequently reported achievement of the majority of intermediate outcomes than projects that did not implement all core components, the intermediate outcomes for which the relationship between implementation of all core components and the outcome were statistically significant were (1) increased access to services available for participants, (2) increased integration of prenatal, primary care and mental health services and (3) increased screening for perinatal depression.

Projects implementing all core components were significantly more likely to report that enabling and interconception care services conducted by the project made a primary or major contribution to reducing disparities in maternal and infant health, when compared with projects that did not implement all required core components. Additionally, projects implementing all core components were significantly more likely to report that their project had achieved increased birth spacing and improved child health in 2010, compared with projects that did not implement all core components.

### Bivariate Analyses: Intermediate Outcomes, Service and Systems Activities that Contributed to Reducing Disparities in Maternal and Infant Health Outcomes, and Long-Term Maternal and Child Health and Community Capacity Outcomes

Results of the bivariate analyses examining the relationship between project director-reported intermediate outcomes, service and systems activities that made a primary or major contribution to reducing disparities in maternal and infant health outcomes and long-term outcomes revealed many significant associations (data not shown). Intermediate outcomes that were significantly associated ($p \leq 0.05$) with project director-reported improvements in birth outcomes and/or maternal health included: increased cultural competence of providers in the community; increased number of participants with a medical home; increased awareness of the importance of interconception care; increased screening for perinatal depression; and increased participant involvement in community activities addressing systems change. Healthy Start project activities, such as interconception care, perinatal depression screening, enabling services, collaboration with consumers, and LHSAP, that made a primary or major contribution to reducing disparities in maternal and infant health outcomes were each significantly ($p \leq 0.05$) associated with project director-reported improvement in birth, maternal, and/or child health outcomes (data not shown).

### Descriptive and Comparative Analyses: Birth Outcome Performance Measures

In 2009, 20 % of Healthy Start projects had singleton LBW rates and 59 % had IMR that were less than or equal to the Healthy People 2010 (HP2010) LBW targets of 5 % and 4.5 per 1,000 live births [9], respectively. The Healthy People 2020 (HP2020) targets were revised to 7.8 % (LBW rate) and 6 per 1,000 live births (IMR) [10], and a higher proportion of Healthy Start projects achieved these targets than achieved the HP2010 targets (33 % achieved the LBW target and 60 % achieved the IMR target) (data not shown). Compared with Healthy Start projects that did not meet the HP2020 LBW target, projects that achieved the HP2020 target were significantly ($p \leq 0.05$) more likely to report achieving increased access to services available for participants and increased integration of prenatal, primary care, and mental health services. Similarly, these projects were significantly more likely to report that their outreach and client recruitment, collaboration with community-based organizations, collaboration with private and public agencies, and/or collaboration with local Title V activities made a primary or major contribution to reducing disparities in maternal and infant health outcomes. Achieving the HP2020 target for IMR was not significantly associated with project director-report of achieving intermediate outcomes or of (conducting) service or system activities that made a primary or major contribution to reducing disparities in maternal and infant health outcomes (Table 4).

Similar results were observed when comparing Healthy Start project PM rates with state birth outcome rates. In 2009, over one quarter (27 %) of all Healthy Start projects had a singleton LBW rate less than the rate in their state, and 62 % had an IMR that was less than the rate in their state. Healthy Start projects that had a lower singleton LBW rate in 2009 than the rate reported for their state were significantly ($p \leq 0.05$) more likely to report achieving increased positive health behaviors among participants and increased number of participants with a medical home in 2010 (data not shown).

### Multivariate Analyses

The results of the multivariate analyses are presented in Tables 5 and 6. After controlling for project characteristics, project director-reported intermediate outcomes and other covariates consistent with the logic model, there were no significant associations of implementation of all core program components with singleton LBW and/or infant mortality rates. Urban project setting and state/local government agency grantee organization were significantly associated with higher rates of LBW, and non-urban project setting was significantly associated with higher IMR. As expected, LBW rates were significantly associated with higher IMR. Intermediate and long-term program outcomes reported in the 2010 PD survey were not significantly associated with either singleton LBW or infant mortality.

**Table 4** Association of percent singleton low birth weight (LBW) and infant mortality rates (IMR) among project participants' infants meeting HP2010 and HP2020 objective targets with Healthy Start project director-reported achievement of intermediate outcomes and conduct of service and systems activities that contributed to reducing disparities in maternal and infant health outcomes (N = 104)

| | PM 51 (% singleton LBW) | | | | PM 52 (IMR) | | | |
|---|---|---|---|---|---|---|---|---|
| | Less than HP2010 LBW target of 5 % (n = 20 projects) | | Less than HP2020 LBW target of 7.8 % (n = 32 projects) | | Less than HP2010 IMR target of 4.5 deaths per 1,000 live births (n = 58 projects) | | Less than HP2020 IMR target of 6 deaths per 1,000 live births (n = 59 projects) | |
| | % Yes | % No | % Yes | % No | % Yes | % No | % Yes | % No |
| *Intermediate outcomes*[a] | | | | | | | | |
| Increased awareness of the importance of interconception care | 85 | 15 | 84 | 16 | 79 | 21 | 80 | 20 |
| Increased awareness of disparities in birth outcomes as community priority | 75 | 25 | 75 | 25 | 71 | 29 | 71 | 29 |
| Increased positive health behaviors among our participants | 85 | 15 | 84 | 16 | 71 | 29 | 71 | 29 |
| Increased access to the services available for our participants | 85* | 15 | 81* | 19 | 69 | 31 | 69 | 31 |
| Increased number of participants with a medical home | 85 | 15 | 75 | 25 | 76 | 24 | 76 | 24 |
| Increased screening for perinatal depression among providers in the community | 60 | 40 | 59 | 41 | 48 | 52 | 49 | 51 |
| Increased participant involvement in Healthy Start decision-making | 45 | 55 | 50 | 50 | 47 | 53 | 47 | 53 |
| Increased integration of prenatal, primary care, and mental health services | 60 | 40 | 66* | 34 | 40 | 60 | 41 | 59 |
| Increased cultural competence of providers in our community | 55 | 45 | 53 | 47 | 36 | 64 | 37 | 63 |
| Increased participant involvement in other community activities addressing systems change | 20 | 80 | 31 | 69 | 34 | 66 | 36 | 64 |
| Increased participant involvement in decision-making among partner agencies | 10 | 90 | 16 | 84 | 24 | 76 | 25 | 75 |
| *Service and systems activities that contributed to reducing disparities in maternal and child health outcomes*[b] | | | | | | | | |
| Case management | 90 | 10 | 88 | 12 | 93 | 7 | 93 | 7 |
| Enabling services | 75 | 25 | 69 | 31 | 78 | 22 | 78 | 22 |
| Interconception care | 65 | 35 | 63 | 37 | 66 | 34 | 66 | 34 |
| Perinatal depression screening | 60 | 40 | 56 | 44 | 69 | 31 | 69 | 31 |
| Outreach and client recruitment | 50 | 50 | 47** | 53 | 62 | 38 | 63 | 37 |
| Collaboration with consumers | 60 | 40 | 50 | 50 | 57 | 43 | 58 | 42 |
| Collaboration with community-based organizations | 30* | 70 | 28** | 72 | 55 | 45 | 56 | 44 |
| Collaboration with public agencies | 35 | 65 | 31* | 69 | 50 | 50 | 51 | 49 |
| Collaboration with private agencies | 30 | 70 | 25** | 75 | 48 | 52 | 49 | 51 |
| Consortium | 35 | 65 | 37 | 63 | 41 | 59 | 42 | 58 |
| Local Health System Action Plan | 30 | 70 | 31 | 69 | 40 | 60 | 41 | 59 |
| Collaboration with local Title V | 15 | 85 | 19* | 81 | 40 | 60 | 39 | 61 |
| Collaboration with state Title V | 30 | 70 | 25 | 75 | 36 | 64 | 36 | 64 |
| Provider education | 35 | 65 | 31 | 69 | 41 | 59 | 42 | 58 |

Note that Healthy People (HP) LBW targets are for LBW among all live births, whereas Healthy Start PM 51 and State Title V HSI 01B measures the singleton LBW rate

* Pearson's Chi square or Fisher's exact test $p$ value $\leq 0.05$

** Pearson's Chi square or Fisher's exact test $p$ value $\leq 0.01$

[a] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following intermediate outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed. A "yes" response indicates that the project director reported that the project achieved the intermediate outcome. A "no" response indicates that the project director did not report that the project achieved the intermediate outcome

[b] Data source: 2010 Project Director survey. Project directors were asked, "To what extent did the following activities conducted by your Healthy Start project contribute to reducing disparities in maternal and infant health outcomes?". Response options included Primary contribution, Major contribution, Moderate contribution, Minor contribution, and No contribution or N/A. A "yes" response indicates that the project director reported that the service or system activity made a primary or major contribution to reducing disparities in maternal and infant health outcomes. A "no" response indicates that the project director reported that the service or system activity did not make a primary or major contribution to reducing disparities in maternal and infant health outcomes

**Table 5** Adjusted associations of implementation of Healthy Start Program components with singleton low birth weight (LBW) among Healthy Start project participants' infants (N = 98 projects)

| Project characteristic | % Singleton LBW[a] | % Singleton LBW less than State Title V rate[b] | % Singleton LBW less than HP2010 LBW target of 5 %[b] | % Singleton LBW less than HP2020 LBW target of 7.8 %[b] |
|---|---|---|---|---|
| Implemented all 5 core service components and all 4 core systems components versus did not implement all core components[c] | 0.4 | 0.5 | 0.4 | 0.4 |
| Initial funding received in Phase 1 (1991–1996) versus initial funding received in Phase 2, 3, or 4[d] | 1.2 | 1.3 | 0.6 | 0.4 |
| Urban geographic location [urban/central city, metropolitan area (city and suburbs)] versus not urban[d] | **2.9** | 0.4 | 0.8 | 0.4 |
| Not urban geographic location (suburban, border US-Mexico, rural) versus not not urban[d] | 1.6 | 0.6 | 1.7 | 0.4 |
| State or local government agency grantee organization versus community-based non-governmental organization (health care or non-health care) or other organization (including academic medical center, non-profit organization, tribal organization, Federally Qualified Health Center)[d] | 1.5 | **0.1** | **0.1** | 0.4 |
| PM 20 (% women participants with an ongoing source of primary and preventive care for women) (%, 2009)[d] | 0.0 | 1.0 | 1.0 | 1.0 |
| PM 22 (degree to which Healthy Start project facilitates health providers' screening of women participants for risk factors) (score greater than mean of all projects, 2009)[d] | 0.8 | 1.3 | 0.5 | 1.1 |
| Achieved increased birth spacing[e] | 0.5 | 0.4 | 0.8 | 2.1 |
| Achieved increased cultural competence of providers in the community[f] | −1.3 | 2.1 | 2.4 | 1.9 |
| Achieved increased participant involvement in Healthy Start decision-making[f] | 0.9 | 0.9 | 0.8 | 0.6 |

Results based on multivariable linear or logistic regression models (separate models for each outcome), with each model adjusted for the other variables in the table. Bold font indicates effect estimate was significant at $p < 0.10$ or 95 % confidence interval <>1

[a] Linear model: values are β coefficients. The effect estimate represents the effect per percent increase of LBW

[b] Logistic model: values are odds ratios. The effect estimate represents the effect of having a rate less than the state Title V rate or less than the Healthy People (HP) target. Note that HP2010 and HP2020 LBW targets are for LBW among all live births, whereas Healthy Start PM 51 and State Title V HSI 01B measures the singleton LBW rate

[c] Data source: 2010 Project Director survey. To determine implementation of core service components, project directors were asked, "Which of the following services does your Healthy Start project offer?" (response options: "Outreach & participant recruitment," "Case management," "Health education," "Perinatal depression screening," and "Interconceptional services"). To determine implementation of the core systems-building component of having a consortium, project directors were asked "Does your Healthy Start project have at least one active consortium that addresses maternal and child health issues" (response options: Yes/No). To determine implementation of the core systems-building component of having a Local Health System Action Plan, project directors were asked "Does your Healthy Start project have a Local Health System Action Plan (LHSAP)?" (response options: Yes/No; a follow up question was asked to determine if the LHSAP was specific to the Healthy Start project). To determine implementation of the core systems-building component of coordination and collaboration with Title V, project directors were asked to specify the types of collaborative activities that their Healthy Start project established with the State Title V agency. Projects were classified with a "yes" response if the project director indicated that the State Title V agency "is a member of the Healthy Start consortium," "has a written memorandum of understanding or agreement with Healthy Start," "provides contracted services to Healthy Start," "hosts out-stationed Healthy Start staff," "participates in joint training with Healthy Start," "has a shared staffing arrangement with Healthy Start," "coordinates case management or is planning with Healthy Start for shared participants," "shares protocols with Healthy Start," "is involved in Healthy Start sustainability planning," "has a data-sharing arrangement with Healthy Start," "contributes to pooled funding streams to support joint services," "has a Healthy Start employee on their board," "works with Healthy Start to develop consistent health messages for participants," and/or "receives cultural competence training from Healthy Start." To determine implementation of the core systems-building component of having a sustainability plan, project directors were asked "Does your Healthy Start project have a sustainability plan, that is, a plan to maintain services to the target population after federal Healthy Start funding ends?" (response options: Yes/No)

[d] Data source: Maternal and Child Health Bureau Discretionary Grant Information System

[e] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following long term outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed

[f] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following intermediate outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed

**Table 6** Adjusted associations of implementation of Healthy Start Program components with infant mortality rate (IMR) among Healthy Start project participants' infants (N = 98 projects)

| Project characteristic[a] | Infant mortality rate[a] | Infant mortality rate less than State Title V IMR[b] | Infant mortality rate less than HP2010 IMR target of 4.5 deaths per 1,000 live births[c] | Infant mortality rate less than HP2020 IMR target of 6 deaths per 1,000 live births[c] |
|---|---|---|---|---|
| Implemented all 5 core service components and all 4 core systems components versus did not implement all core components[d] | −0.7 | 1.2 | 1.1 | 1.1 |
| Initial funding received in Phase 1 (1991–1996) | | | | |
| vs. initial funding received in Phase 2, 3, or 4[e] | 4.9 | 0.4 | 0.5 | 0.4 |
| Urban geographic location (urban/central city, metropolitan area [city and suburbs]) versus not urban[e] | −4.1 | 1.6 | 1.5 | 1.3 |
| Not urban geographic location (suburban, border US-Mexico, rural) versus not urban[e] | **7.4** | 0.5 | 0.6 | 0.5 |
| State or local government agency grantee organization versus community-based non-governmental organization (health care or non-health care) or other organization (including academic medical center, non-profit organization, tribal organization, Federally Qualified Health Center)[e] | 0.7 | 1.0 | 0.9 | 1.1 |
| PM 51 (% low birth weight) (%, 2009) | **0.5** | 0.9 | 0.9 | 0.9 |
| PM 20 (% women participants with an ongoing source of primary and preventive care for women) (%, 2009) | 0.0 | 1.0 | 1.0 | 1.0 |
| PM 22 (degree to which Healthy Start project facilitates health providers' screening of women participants for risk factors) (score greater than mean of all projects, 2009)[e] | −3.0 | 0.7 | 0.8 | 0.6 |
| Achieved increased birth spacing[f] | 3.8 | 0.6 | 0.3 | 0.5 |

[a] Results based on multivariable linear or logistic regression models (separate models for each outcome), with each model adjusted for the other variables in the table. Bold font indicates effect estimate was significant at $p < 0.10$ or 95 % confidence interval <>1

[b] Linear model: values are β coefficients. The effect estimate represents the effect per increase in the infant mortality rate (deaths per 1,000 live births)

[c] Logistic model: values are odds ratios. The effect estimate represents the effect of having a rate less than the state Title V rate or less than the Healthy People (HP) target

[d] Data source: 2010 Project Director survey. To determine implementation of core service components, project directors were asked, "Which of the following services does your Healthy Start project offer?" (response options: "Outreach and participant recruitment," "Case management," "Health education," "Perinatal depression screening," and "Interconceptional services"). To determine implementation of the core systems-building component of having a consortium, project directors were asked "Does your Healthy Start project have at least one active consortium that addresses maternal and child health issues" (response options: Yes/No). To determine implementation of the core systems-building component of having a Local Health System Action Plan, project directors were asked "Does your Healthy Start project have a Local Health System Action Plan (LHSAP)?" (response options: Yes/No; a follow up question was asked to determine if the LHSAP was specific to the Healthy Start project). To determine implementation of the core systems-building component of coordination and collaboration with Title V, project directors were asked to specify the types of collaborative activities that their Healthy Start project established with the State Title V agency. Projects were classified with a "yes" response if the project director indicated that the State Title V agency "is a member of the Healthy Start consortium," "has a written memorandum of understanding or agreement with Healthy Start," "provides contracted services to Healthy Start," "hosts out-stationed Healthy Start staff," "participates in joint training with Healthy Start," "has a shared staffing arrangement with Healthy Start," "coordinates case management or is planning with Healthy Start for shared participants," "shares protocols with Healthy Start," "is involved in Healthy Start sustainability planning," "has a data-sharing arrangement with Healthy Start," "contributes to pooled funding streams to support joint services," "has a Healthy Start employee on their board," "works with Healthy Start to develop consistent health messages for participants," and/or "receives cultural competence training from Healthy Start." To determine implementation of the core systems-building component of having a sustainability plan, project directors were asked "Does your Healthy Start project have a sustainability plan, that is, a plan to maintain services to the target population after federal Healthy Start funding ends?" (response options: Yes/No)

[e] Data source: Maternal and Child Health Bureau Discretionary Grant Information System

[f] Data source: 2010 Project Director survey. Project directors were asked, "Which of the following long term outcomes did your Healthy Start project achieve in 2010?". Multiple responses were allowed

## Discussion

This evaluation of the Federal Healthy Start Program using both data from a survey of project directors and Healthy Start project birth, service, and system outcome performance measures data revealed a mixed set of relationships between implementation of core program components and long-term maternal and child health outcomes. Analyses of the 2010 PD survey data indicate that implementation of all core components was associated with better project director-reported intermediate and long-term project outcomes. This is the first analysis to use MCHB performance measure data in a national evaluation to assess Healthy Start projects' progress toward achieving outcomes that are expected to occur if program elements are successfully and completely implemented. Results from this evaluation are consistent with our hypothesis (illustrated in the logic model, Fig. 1) of a progression of achievement of intermediate outcomes leading to long-term outcomes. For example, increased screening for perinatal depression, case management and interconception care services may have led to PD-reported improvement in maternal health. In addition, we found that Healthy Start projects that reported an increase in the number of participants with a medical home in 2010 and an increase in positive behaviors among participants had a significantly better (lower) singleton LBW rate among project participants' infants than the rate in their state.

Our analyses used state and national benchmarks, and our findings are reinforced by the results of previously published evaluations that were conducted by Healthy Start projects using vital records, clinical services and program data. Site-specific evaluations conducted by individual Healthy Start projects have identified components of the program that show a positive effect on birth outcomes of participants' infants when compared with demographically similar women who did not participate in the program. For example, evaluations of individual Healthy Start projects found that services provided to high risk participants resulted in improved birth outcomes such as reduced rates of LBW, preterm birth, and infant mortality [12–14] in addition to lower rates of sexually transmitted diseases [15].

Although previous national evaluations of the Federal Healthy Start Program helped to establish the importance of the Healthy Start program components for achieving Program goals, these evaluations relied solely on grantees' perspectives because objective performance measure data were not adequate for use in national evaluations. A thorough examination of the PM data reported by Healthy Start projects revealed that the quality of reported data is sufficient for evaluation activities but also identified several key challenges to using these data for program evaluation [8]. Our review of the notes and detailed explanations that accompanied the PM data that grantees submitted to the DGIS revealed data quality issues, including: 1) inconsistency in the definition of the measure used by the project with the definition specified by MCHB; 2) lack of verification of some measures, e.g. PM 52, due to the timing of the completion of birth–death linked files prepared by the state vital records department; and 3) missing and incomplete data. These data limitations may introduce bias if the projects that had missing data or provided incomplete data are different from those who provided accurate and complete data, or if the under-reporting or erroneous reporting is related to the performance measures used as the outcomes for this analysis (PM 51 and PM 52).

A potential limitation of these analyses was the possible variation in the information source(s) used to complete the PD survey. Healthy Start project staff, including the project director and other project staff, were asked to complete the survey, and the staff member(s) who provided responses could have varied by project. The survey was pilot-tested with representatives of different Healthy Start project staff roles, but allowing survey completion by more than one type of respondent can increase the potential for variation in the interpretation of the survey questions and lead to variation in responses. Responses may also have varied based on the length of time the respondent had been with the project, in addition to the length of time that the project had been in operation and the program components that were implemented. We did not have access to complete, reliable information about other project characteristics and program components needed to perform a comprehensive evaluation of project implementation in a variety of community settings and to conduct analyses that adequately addressed all of the relationships outlined in the logic model. For example, participant demographic data captured by the MCHB DGIS were not available for use in these analyses. The eligibility criteria for participation in Healthy Start lead to some demographic similarities across project sites; however, other important differences in the populations served by sites may exist. More detailed information about program implementation and outcomes achieved by individual Healthy Start projects is needed to improve the specificity of future evaluations.

Healthy Start projects provide services to high risk women in the most vulnerable communities in our country. Improving birth outcomes for project participants requires intensive and focused services and policies that will assure quality services within communities. Ongoing monitoring and assessment of the implementation of these programs and routine, standardized collection of essential birth outcome and project implementation data will provide critical information for evaluating what is and is not working in individual Healthy Start projects and the Program as a

whole. MCHB could provide Healthy Start Program staff with online tools and training to improve the reliability of data collection and reporting. Future Healthy Start Program evaluations should build on more robust local evaluations at the project level as well as employ a set of focused questions for the national evaluation that specifically address the major issues of interest to state and national policy-makers. Improved capacity for data collection and documentation by individual projects would help assure that comprehensive cross-site evaluations could be conducted in the future. Resources should be provided to assure that the systems required to conduct this type of evaluation are in place.

Based on our experience conducting national evaluations of the Federal Healthy Start Program, we recommend that future evaluations explicitly connect to local, state, and national frameworks and agendas for improving birth outcomes and reducing health inequities. The evaluation plan should incorporate analyses at multiple levels to provide a robust and comprehensive examination of Healthy Start Program activities and achievements. Most importantly, monitoring and evaluation activities conducted by individual Healthy Start projects must be strengthened to help ensure systematic and standardized annual reporting to MCHB of performance measure data, program activities and accomplishments, and other data needed for evaluation.

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