JACK, JOSEPH AND MORTON MANDEL SCHOOL OF APPLIED SOCIAL SCIENCES
CASE WESTERN RESERVE UNIVERSITY

Invest in Children Cuyahoga County

APRIL 2014

INVEST IN CHILDREN EVALUATION
PROGRAM BRIEFING REPORT
CUYAHOGA COUNTY, OHIO

NEWBORN HOME VISITING: OUTCOME EVALUATION UPDATE

ELIZABETH ANTHONY, PH.D., ROB FISCHER, PH.D., & NINA LALICH, M.S.P.H.

KEY FINDINGS

Based on data from 2,883 cases served from October 1, 2010 to December 31, 2012:

- Families served via the Newborn Home Visiting (NBHV) program exhibit a high level of need across multiple domains of functioning.
- Nurse home visitors identified at least one physical health issue among 75.8% of newborns.
- Approximately half of all families receiving a NBHV also received at least one referral to another service provider.
- Parents reported statistically significant gains in knowledge regarding how to care for their newborn and nearly all parents found the visit helpful.

INTRODUCTION

An important component of an effective system to promote healthy child development is the provision of a home-based visit at the time a child is born. In fact, the World Health Organization (WHO) promotes newborn home visitation as an effective strategy to deliver newborn care and improve newborn survival. A single in-home visit by a nurse offers parents useful information about existing community services and resources, provides parents with an opportunity to ask questions regarding their infant's health needs, and identifies families or infants in need of greater assistance. In addition, offering services in home has a number of advantages. It allows the nurse to assess the safety of the infant's living environment and to work with parents in an individualized way to improve parent-infant interactions. Furthermore, newborn home visiting can connect high-risk families to on-going home visitation programs, which have been found to

produce significant and substantial impacts on parenting behavior and child health and well-being (Daro, 1993; Gutterman, 1997; Infant Health and Development Program, 1990; Karoly et al., 1998; Ramey & Ramey, 1998; Seitz, Rosenbaum & Apfel, 1985).

The research literature examining outcomes of newborn home visiting programs is limited. However, available evidence suggests such programs do improve infant healthcare outcomes. Specifically, a randomized control trial of the Durham Connects program, a brief (3-7 session), universal, postnatal nurse home visiting intervention implemented in North Carolina reduced total emergency medical care use in the first year of life by 50% among treatment families as compared to controls (Dodge, Goodman, Murphy, O'Donnell, & Sato, 2013).

Home visitation has been cited by policy analysts and advocates as offering a particularly promising service delivery approach for educating parents and reducing child abuse potential (GAO, 1990; U.S. Advisory Board, 1990, 1991, 1993; Zero to Three, 1999).

PROGRAM DESCRIPTION

The NBHV program offers a single in-home visit by a registered nurse to high risk parents under 200% of the federal poverty threshold. The original NBHV program, operated through Help Me Grow, was discontinued in June 2009 due to state funding cuts. However, a new version of the program was launched in early 2010, drawing on funds made available to the Cuyahoga County Board of Health. The program was administered via contractual arrangements with three birthing hospitals – Huron Road, MetroHeath, and University Hospital; however, in 2011, Huron Road hospital closed leaving MetroHealth and University Hospital as recruitment sites in 2012. A hospital nurse in labor and delivery or a NBHV Specialist offers the service in the hospital to eligible mothers after they have delivered their baby. If services are accepted, the mother's consent form and contact information are then forwarded to the NBHV nurse visitor who arranges for the visit to occur within the two weeks following delivery. All clients receive a follow-up phone call 2- to 4-weeks after the visit.

The visit includes a partial assessment of mom's physical and mental health, a physical assessment of the infant, the provision of general information regarding infant health and development and expectations during the postpartum period, a general assessment of the family's overall capacity and needs to care for their infant, and, if appropriate, referral to additional services.

PROGRAM OBJECTIVES

1. Identify and address potential medical, mental or social risk factors.
2. Provide education on newborn and postpartum care.
3. Link families with community resources that support and improve infant health status.

EVALUATION RESEARCH QUESTIONS

The core questions to be examined in this evaluation are:

1. Is the visit beneficial in accurately assessing the families' needs? What are the maternal and newborn medical and social issues and risk factors identified that need to be addressed during the visit?
2. Is the visit beneficial in providing resources and support to the target population by referring the family to appropriate agencies?
3. Does the newborn home visit increase mothers' competence about caring for their newborn?
4. How many families are involved with the County Child Welfare Agency within 12-months of their home visit?
5. How many families who received a referral to Help Me Grow (HMG) participate in HMG home visiting within 12-months of their NBHV?

EVALUATION APPROACH

The evaluation relied on a variety of research elements, making use of secondary data and augmenting it with primary data collected in the field. The plan was organized around two components:

1. Analyzing program-level administrative data to determine the aggregate performance in serving the intended target populations and in altering the need for formal child welfare intervention;
2. Tracking program participants through available administrative data systems.

The electronic and paper records maintained by the NBHV program were used to describe the medical (e.g., perinatal and postpartum complications) and social issues (e.g., family history of mental illness, maternal depression) and risk factors (e.g., alcohol use, domestic violence, presence of gun in home) identified and addressed during the newborn home visit. In addition, a nurse administered checklist was also used to identify potential safety issues (e.g., access to car seat, presence of smoke detectors, connected utilities). Lastly, to examine if the newborn home visit is beneficial to the target population, nurse visitors asked parents to complete a visit feedback form after the newborn home visit. The form measures knowledge gains in 10 areas of newborn care and development as well as parents' perceptions of the benefits of the home visit. The frequency and severity of these issues are summarized for service cohorts of families (e.g., by calendar year) as a way to assess shifts in the characteristics of the service population.

Sample

The sample was comprised of cases involving families of newborns in Cuyahoga County opened between October 1, 2010 and December 31, 2012. In total, data on 2,883 home visits were available for analysis, a response rate of 84.8%. In regard to the characteristics of the newborns and mothers, **Table 1** provides summary data on a number of demographic attributes.

Table 1. Sample Characteristics (%)

	*2010 (*n*=117)	2011 (*n* =1,453)	2012 (*n* =1,313)	Total (*N* = 2,883)
Recruitment hospital				
University	49.6	46.4	49.4	47.9
MetroHealth	30.8	46.8	47.9	46.7
Huron Road	19.7	6.8	n/a	4.2
Fairview	0.0	0.0	1.7	0.8
Lakewood	0.0	0.0	0.8	0.4
Hillcrest	0.0	0.0	0.1	0.0
# of days b/t birth and home visit, mean (*SD*)	23.8 (*10.9*)	15.6 (*12.1*)	14.4 (*7.6*)	15.4 (*10.4*)
Newborn gender				
Female	51.3	48.2	50.6	49.5
Male	48.7	51.5	49.4	50.4
Undetermined / Missing	0.0	0.2	0.0	0.1
Newborn ethnicity				
Non-Hispanic	87.2	86.3	88.0	87.1
Hispanic	10.3	10.5	8.1	9.4
Other	2.6	3.2	3.8	3.4
Newborn race				
Black / African American	80.3	80.0	74.5	77.5
White	15.4	11.1	13.1	12.2
Asian / Pacific Islander	0.0	0.8	0.5	0.7
American Indian / Alaskan Native	0.0	0.1	0.1	0.1
Other	0.9	1.4	1.1	1.2
Unknown	3.4	6.5	10.7	8.3
Low birth weight births				
Newborns weighing <5 lbs 8 oz at birth	15.4	12.5	11.7	12.2
NICU stay (% yes; does not include transitional care)	0.9	0.8	1.0	0.9
Prenatal care				
Any	99.0	**	**	**
Adequate***	57.1	**	**	**
Mother's marital status				
Single	87.2	88.5	90.2	89.2
Married	12.0	10.7	9.1	10.0
Divorced	0.9	0.7	0.1	0.7
Widowed	0.0	0.1	0.1	0.1
First-time parent (% yes)	62.4	51.6	44.4	48.7
Mother's age in years, mean(*SD*)	22.4(*6.9*)	23.6(*6.0*)	23.7(*5.4*)	23.6(*5.7*)
Teen parent (% yes)	30.8	22.0	19.0	21.0
Mother's level of education				

High school diploma or GED	61.3	**	**	**
Mother's primary language				
English	100.0	97.2	97.7	97.5
Spanish	0.0	1.7	1.6	1.6
Other	0.0	1.0	0.7	0.8
Medicaid eligible				
Within 12 months of home visit	91.5	96.3	**	**
Receiving Supplemental Nutrition Assistance Program				
Within 12 months of home visit	84.6	87.5	**	**
Receiving cash assistance				
Within 12 months of home visit	52.1	43.8	**	**
Received MomsFirst home visit	14.3	16.1	16.3	16.1

*Note. Data collection began in October 2010; therefore, column percentages reflect 3, not 12 months of data.
**Note. Data are not yet available.
***Adequate prenatal care was determined using the Kessner Index, which defines adequate prenatal care as beginning in the 1st trimester and the total number of additional visits must meet or exceed that which would be expected for the child's gestational age.

From 2010 to 2012, nearly all families were recruited from University and MetroHealth hospitals. There was a statistically significant decline in the number of days between birth and receiving a NBHV from 2010 to 2012, with families receiving the NBHV closer to the birth in 2012 than in 2010, $F(2, 2862) = 44.7$, $p < .01$. Each year, approximately equal numbers of male and female infants received a newborn home visit. From 2010 to 2012, the majority of home visits were delivered to non-Hispanic, Black/African American infants and their families. Though very few infants had a NICU stay, between 11.7% and 15.4% were low birth weight births. The percentage of low birth weight infants receiving a home visit declined during the data collection period, from 15.4% of all home visits in 2010 to 11.7% in 2012.

Each year, mothers were primarily English-speaking, single, and in their early-20's. Nearly half of all mothers were first-time parents and approximately 1 in 5 was a teen parent; however, the number of teen parents receiving a home visit declined from 30.8% in 2010 to 19.0% in 2012. At the same time, national, state, and county-level data suggest the teen birth has been declining among the larger population, not just the sample served by the NBHV program (see http://www.cdc.gov/nchs/data/databriefs/db89.pdf). For example, in Cuyahoga County, the teen birth rate fell from 10.7% in 2010 to 8.9% in 2012 (see http://publicapps.odh.ohio.gov/EDW/DataBrowser/Browse/OhioLiveBirths).

Using data from the ChildHood Integrated Longitudinal Data (CHILD) System, we were able to extract records on service receipt from other county service providers and match them to the NBHV dataset. However, at the time this report was written, administrative data from other county agencies had not been obtained or matched for children who received a home visit in 2012, and in some cases 2011. Therefore, we are only able to look at interactions across multiple systems for the 117 families who received a NBHV in 2010 and the families who received a NBHV in 2011 in some cases. Roughly two-thirds of the mothers sampled in 2010 had a high school diploma or GED. Over 90% of families were Medicaid eligible within 12-months of the home visit in 2010 and 2011. The majority of families (between 84.6% and 87.5%) were receiving Supplemental Nutrition Assistance Program (SNAP) benefits within 12 months of the home visit in 2010 and 2011 and approximately half of all families served in both years were receiving cash assistance.

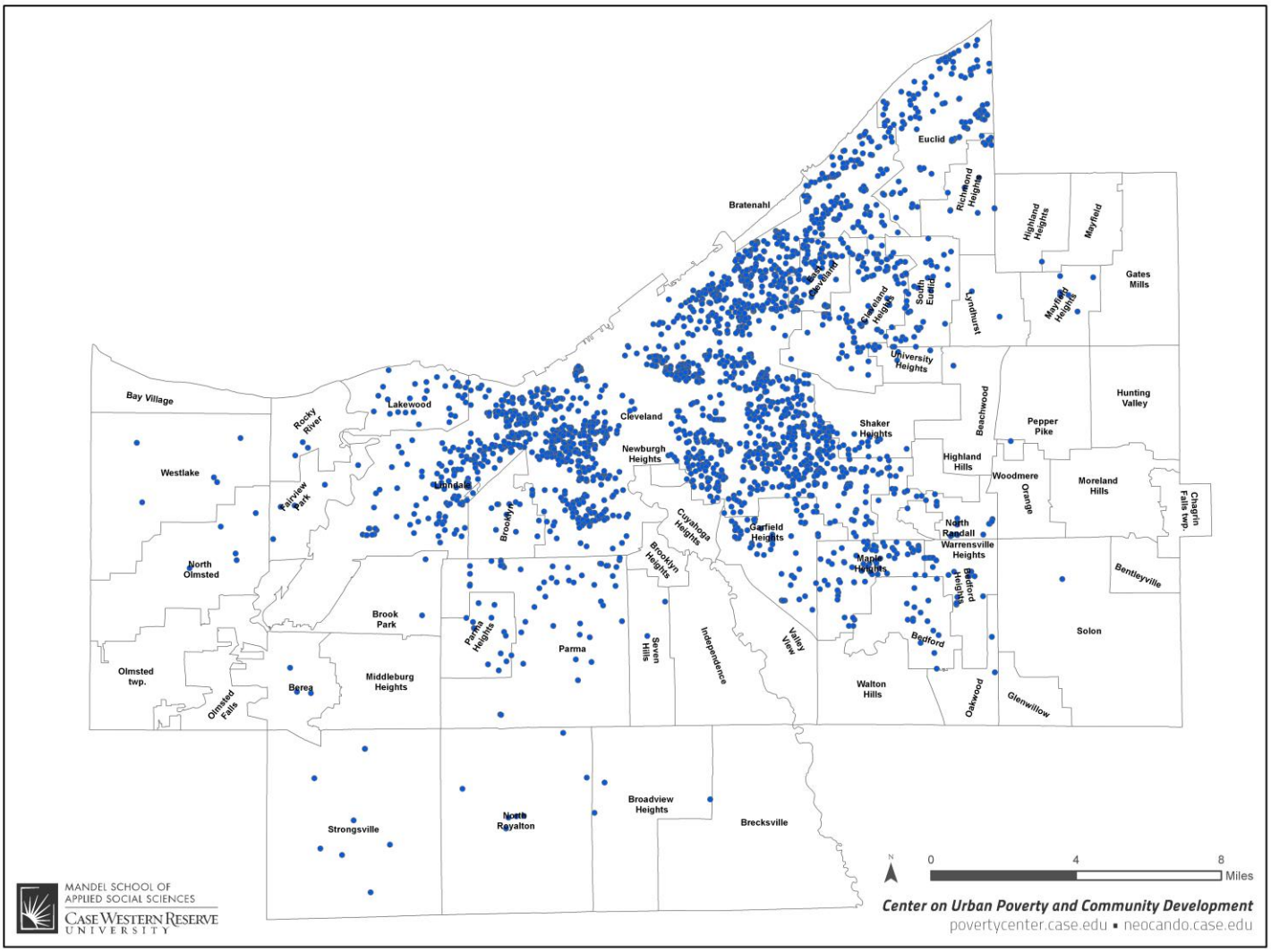

Figure 1. Location of Children Served by the NBHV Program.

Figure 1 shows the residence of the children served during this period, based on matched data in the Child System. Of the 2,883 children, 2,640 or 91.5% were geocoded for this map. The distribution shows that though children are heavily clustered within the urban center of the county, they are distributed throughout the inner-ring and out-ring suburbs as well. This distribution confirms that newborn home visit needs are widespread across the region.

FINDINGS

EVALUATION QUESTION 1: IS THE VISIT BENEFICIAL IN ACCURATELY ASSESSING THE FAMILIES' NEEDS? WHAT ARE THE MATERNAL AND NEWBORN MEDICAL AND SOCIAL ISSUES AND RISK FACTORS THAT NEED TO BE ADDRESSED DURING THE VISIT?

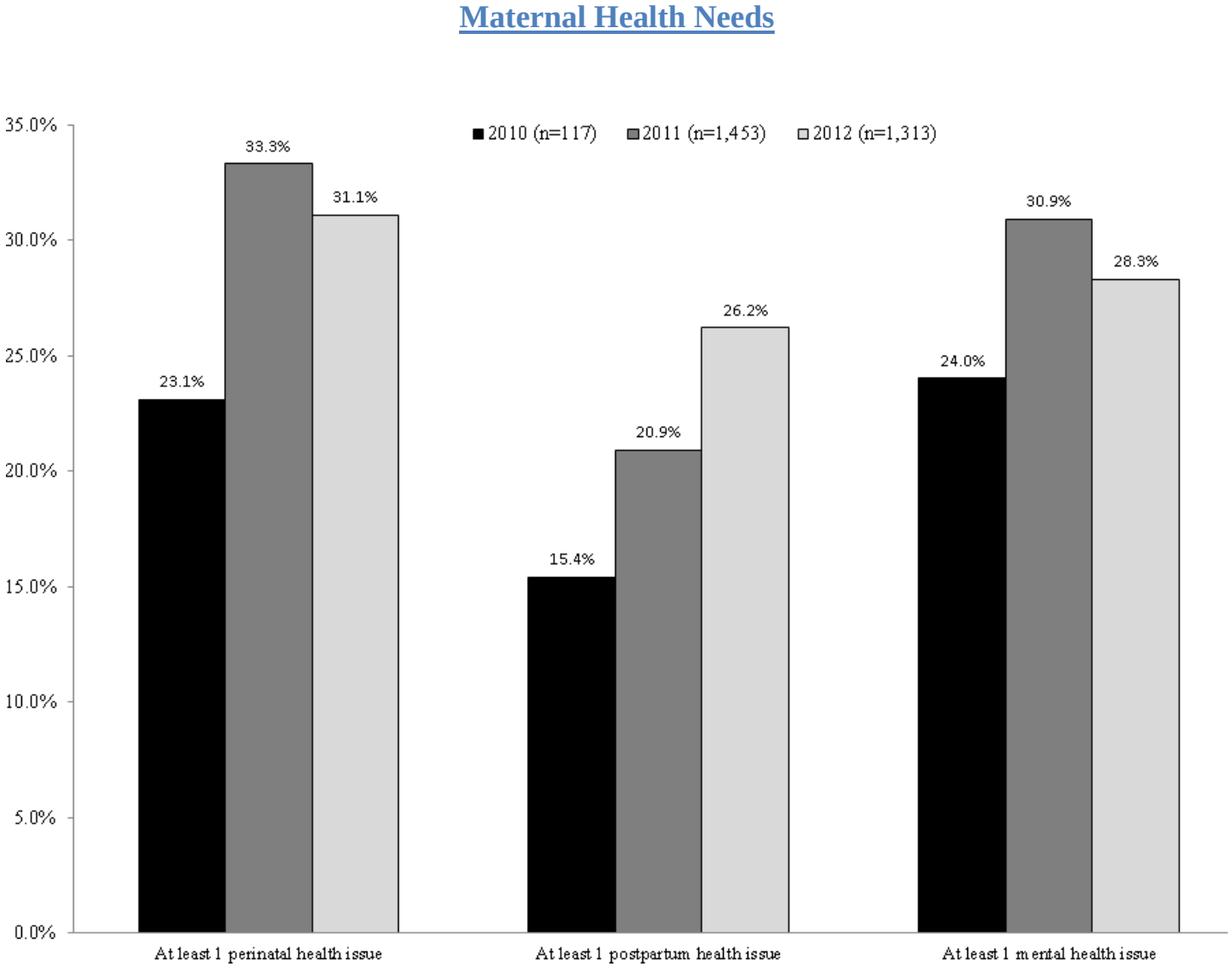

Figure 2. Percent of Mothers with at Least 1 Health Issue.

Figure 2 presents the percentages of mothers with at least one physical or mental health issue identified during the home visit. The specific perinatal and postpartum physical health issues identified can be found in Figures 3 and 4, respectively.

Figure 5 illustrates the specific mental health needs identified during the home visit. On average, from 2010 to 2012, 32.1% of mothers had at least one perinatal physical health issue. These health issues, which occurred during pregnancy, speak to the risk level of the population as do the sample characteristics presented in Table 1. On average, from 2010 to 2012, 23.2% of mothers had at least one postpartum physical health issue and 27.3% had at least one mental health issue.

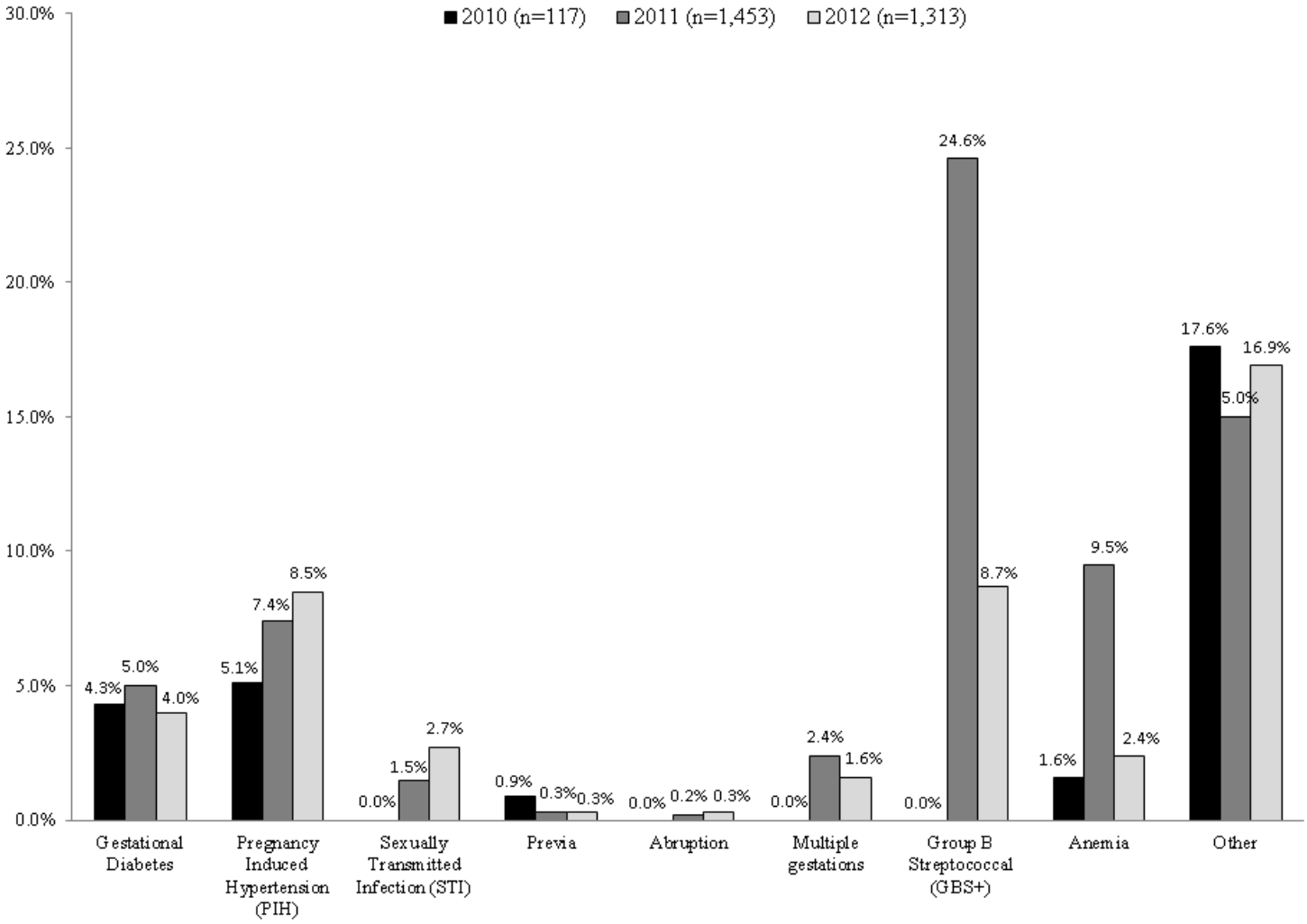

Figure 3. Percent of Mothers with Specific Perinatal Physical Health Issues.

In 2010 and 2012, the most common physical health issues identified during the home visit were categorized as "Other" (Figure 3). "Other" most often included late prenatal care and preeclampsia. In 2011, GBS+ was the most common perinatal health issue. While the percent of mothers with gestational diabetes, previa, and abruption remained relatively stable across the three year time period, the percent of mothers with PIH and STIs increased steadily from 2010 to 2012.

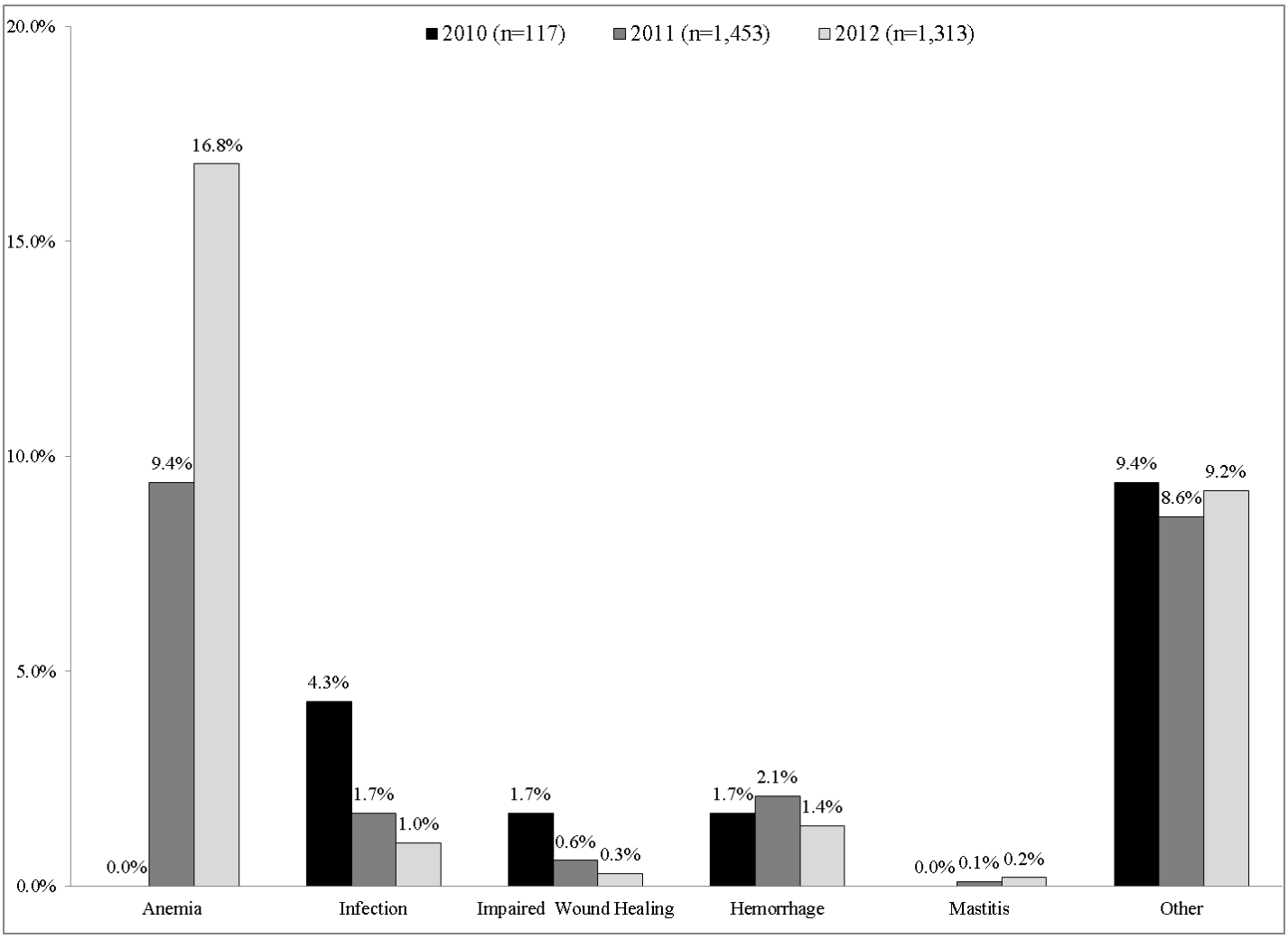

Figure 4. Percent of Mothers with Specific Postpartum Physical Health Issues.

As with perinatal complications, the most commonly identified postpartum physical health issue in 2010 was categorized as "Other" (Figure 4). "Other" most often consisted of a fever or high blood pressure. In 2011 and 2012, anemia affected more mothers than those health issues categorized as "other." Becoming less common with time were the percentages of mothers evidencing infections or impaired wound healing.

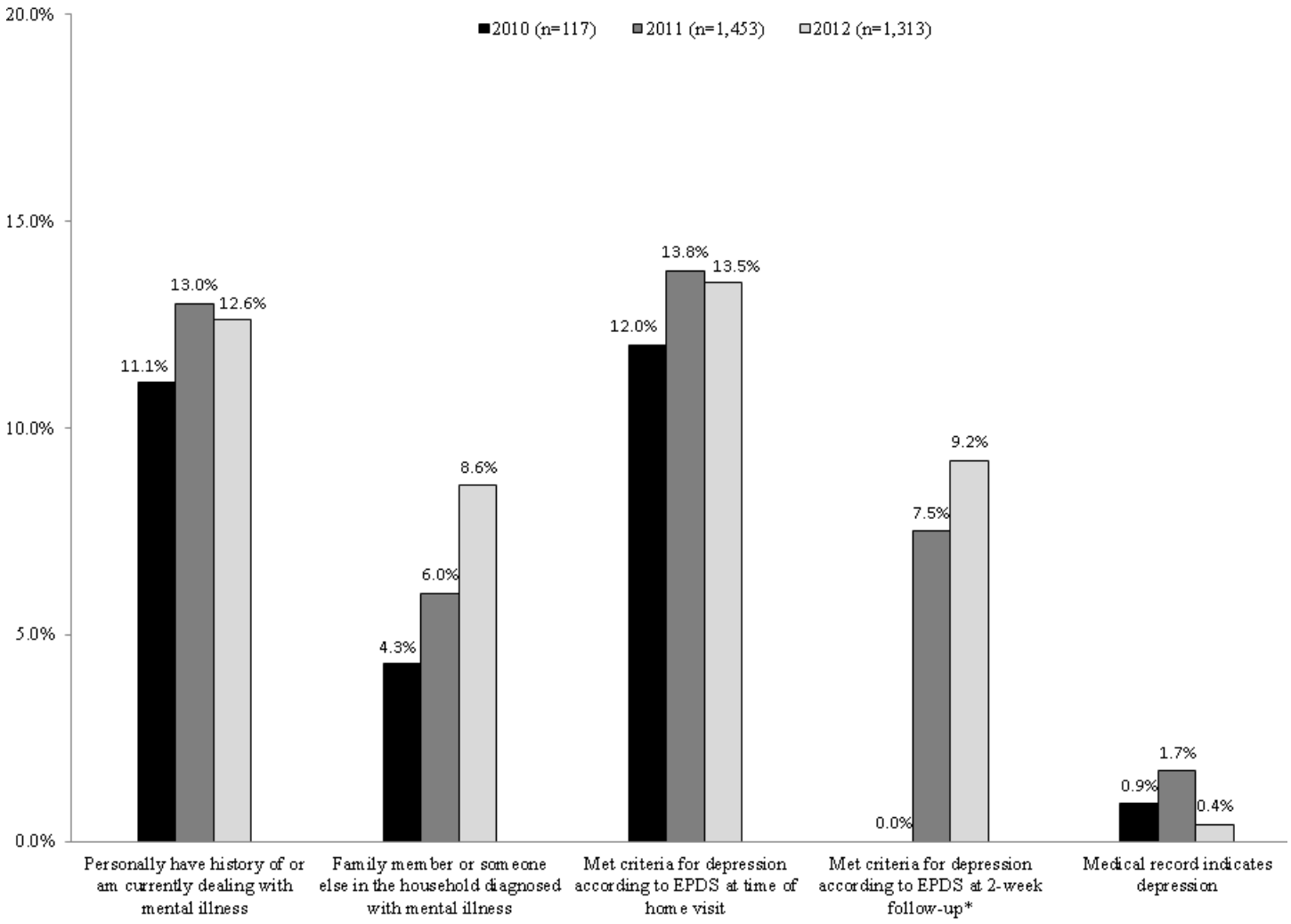

Figure 5. Percent of Mothers with Mental Health Issues.
*****N= 805 total (2010 n=62; 2011 n=481; 2012 n=262).

The percent of mothers personally dealing with a mental health issue ranged from a low of 11.1% in 2010 to a high of 13.0% in 2011 (Figure 5). Less common were mothers reporting that a family member or someone else in the household had been diagnosed with a mental illness.

In addition to self-reported mental illness, home visiting nurses screened mothers specifically for depression. Maternal depression was assessed at the home visit and via follow-up phone calls 2-weeks after the initial home visit using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS consists of 10-items to which mothers respond using a 0 to 3 scale. Scores can range from 0 to 30 with scores of 10 or greater indicating possible depression. According to EPDS instructions, mothers are to reflect on how they felt in the past 7 days when answering each item.

On average, from 2010 to 2012, 13.6% or 392 mothers scored in the "possible depression" range at the first EPDS administration. At the second administration, data were only available from 805 women. Of those, 60 (7.5%) mothers' scores fell in the "possible depression" range. Of the mothers with data from both assessment time points (n=800), 112 (14.0%) were in the "possible depression" range at Time 1 but not Time 2, 629 (78.6%) remained out of the "possible depression" range at both time points, 39 (4.9%) fell in the range at both time points, and 20 (2.5%) mothers were not in

the range at Time 1, but were at Time 2. Mothers who screened at risk for depression at any point during the initial home visit or follow-up phone call were offered a referral to their primary care physical or a community behavioral health agency. In addition, nurses made the same referrals to any mother who expressed a desire to speak with someone or whose circumstances necessitated a referral according to the nurses' professional judgment. Mothers have the right to decline nurse referrals; however, if a nurse feels that a mother is in danger of harming herself or her infant, the nurse contacts the proper authorities and/or suicide hotline.

Newborn Health Needs

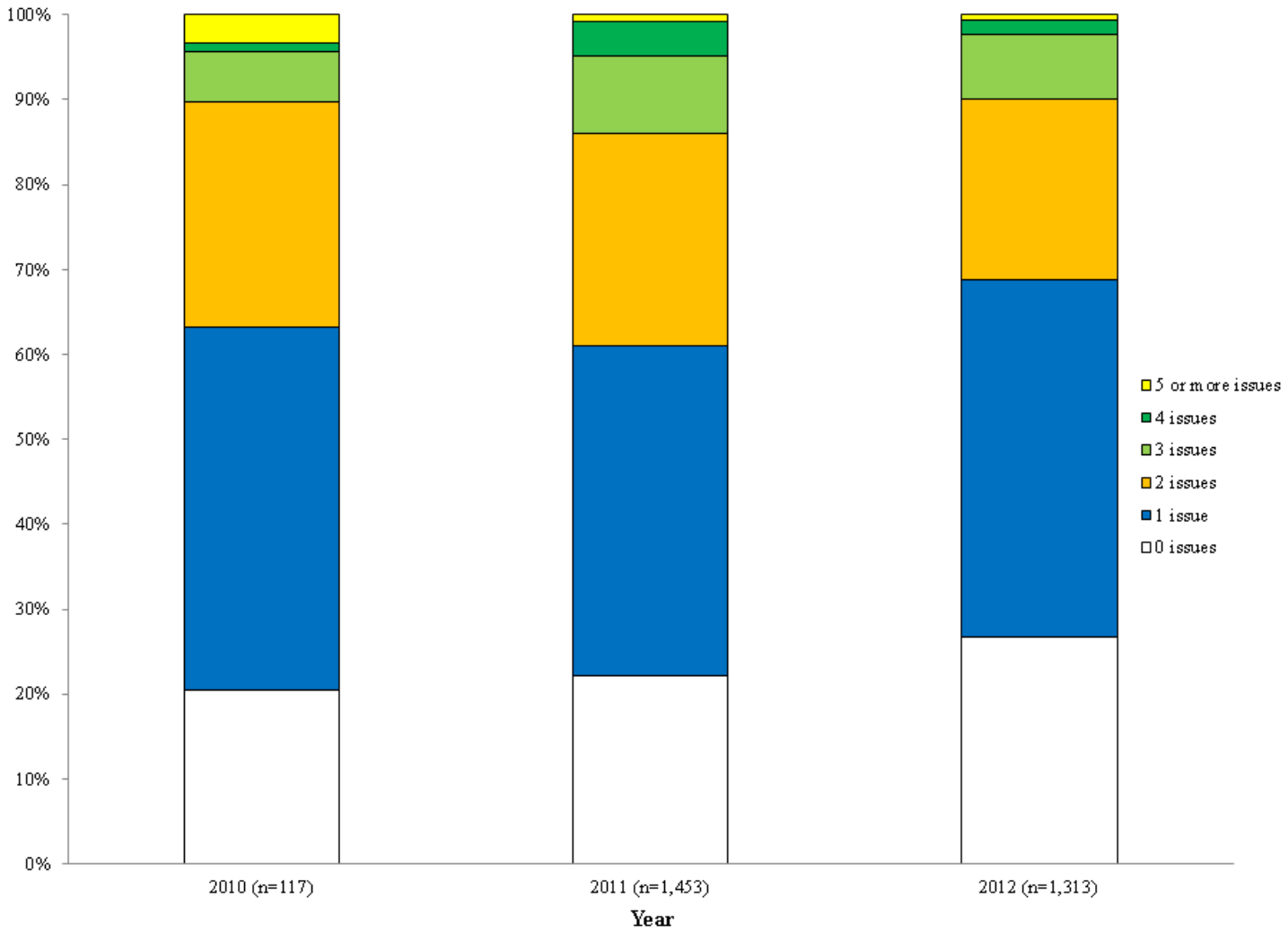

Figure 6. Percent of Newborns with 0 – 5+ Health Needs.

Newborns were screened for multiple health issues. We created a variable to assess how many health issues and risk factors were identified by nurse home visitors for each newborn. A specific list of all the health related items included in this variable can be found in Table 2 below. In addition, we included four items measuring unsafe sleeping practices and

two items on car seat safety (percentages for each specific item can be found in Table 3). On average, from 2010 to 2012, 75.8% of newborns had at least one physical health need identified during the home visit (Figure 6). The average number of physical health needs identified each year was less than two: 1.34(*SD* = 1.11) in 2010, 1.37(*SD* = 1.11) in 2011, and 1.18(*SD* = 1.02) in 2012; however, as many as 7 physical health issues were identified in 0.1% of newborns (Figure 6).

Table 2. Percent of Newborns' with Specific Medical Needs

	*2010 (*n*=117)	2011 (*n* =1,453)	2012 (*n* =1,313)	Total (*N* = 2,883)
Hearing Screening Results**				
Failed	0.9	1.3	1.0	1.1
Unknown	13.7	1.2	0.8	1.5
Birth Complications				
Preterm	0.9	2.5	3.0	2.7
Fetal distress	5.1	5.4	5.7	5.5
Presentation	2.6	1.8	1.5	1.7
Other	6.8	15.3	9.2	12.2
Healthcare Provider Follow-up Visit				
Not scheduled	4.3	4.7	4.1	4.4
Head-to-Toe Assessment***				
1 abnormal area	3.4	14.5	13.4	13.5
2 abnormal areas	0.9	2.3	2.9	2.5
3 or more abnormal areas	0.0	0.5	0.7	0.6
Feeding				
Inadequate suck/swallow coordination	0.0	0.1	0.2	0.1
Inadequate latching (if mother breast fed)	4.3	5.4	6.3	5.8
Inadequate formula supply (if mother bottle fed)	0.0	1.8	1.1	1.4
Elimination				
Too few wet diapers (<6 per day; % meeting criteria)	16.7	13.9	8.1	11.3

*Note. Data collection began in October 2010; therefore, column percentages reflect 3, not 12 months of data.
**Newborn hearing is not screened by the nurse during the home visit, but rather at the hospital following birth. Hearing screening results are based on mothers' self-report.
***On average, the most common areas identified as abnormal were mouth (on average, 5.4% of newborns), skin (4.8%), eyes (2.9%), and genitalia (2.7%).

Table 2 presents a specific list of newborn medical health needs identified during the home visit. At the time of the home visit, the vast majority of mothers had already completed a healthcare provider follow-up visit or at least had a visit scheduled for their newborn. Each year, less than 5% of infants did not have an appointment scheduled at the time of the home visit. Of note are the roughly 12% of newborns with a birth complication categorized as "Other" as well as the approximately 13.5% of newborns with at least one head-to-toe area falling outside normal limits. The most common areas identified as abnormal were mouth (on average, 5.4% of newborns), skin (4.8%), eyes (2.9%), and genitalia (2.7%). Present, but relatively rare, were the following abnormal areas: fontanels, ears, nose, neck, torso, extremities, umbilical cord, and bowel sounds. Of the feeding areas assessed, inadequate latching if mother breast fed was most common across all three time points. On average, 11.3% of newborns were reported to have less than 6 wet diapers a day, considered too few and a possible sign of dehydration or other medical issue. Given the way newborn elimination was assessed, however, we are unable to determine whether these newborns actually had too few wet diapers or were not changed when they had a wet diaper.

Home Safety Risk Factors Identified During Home Visit

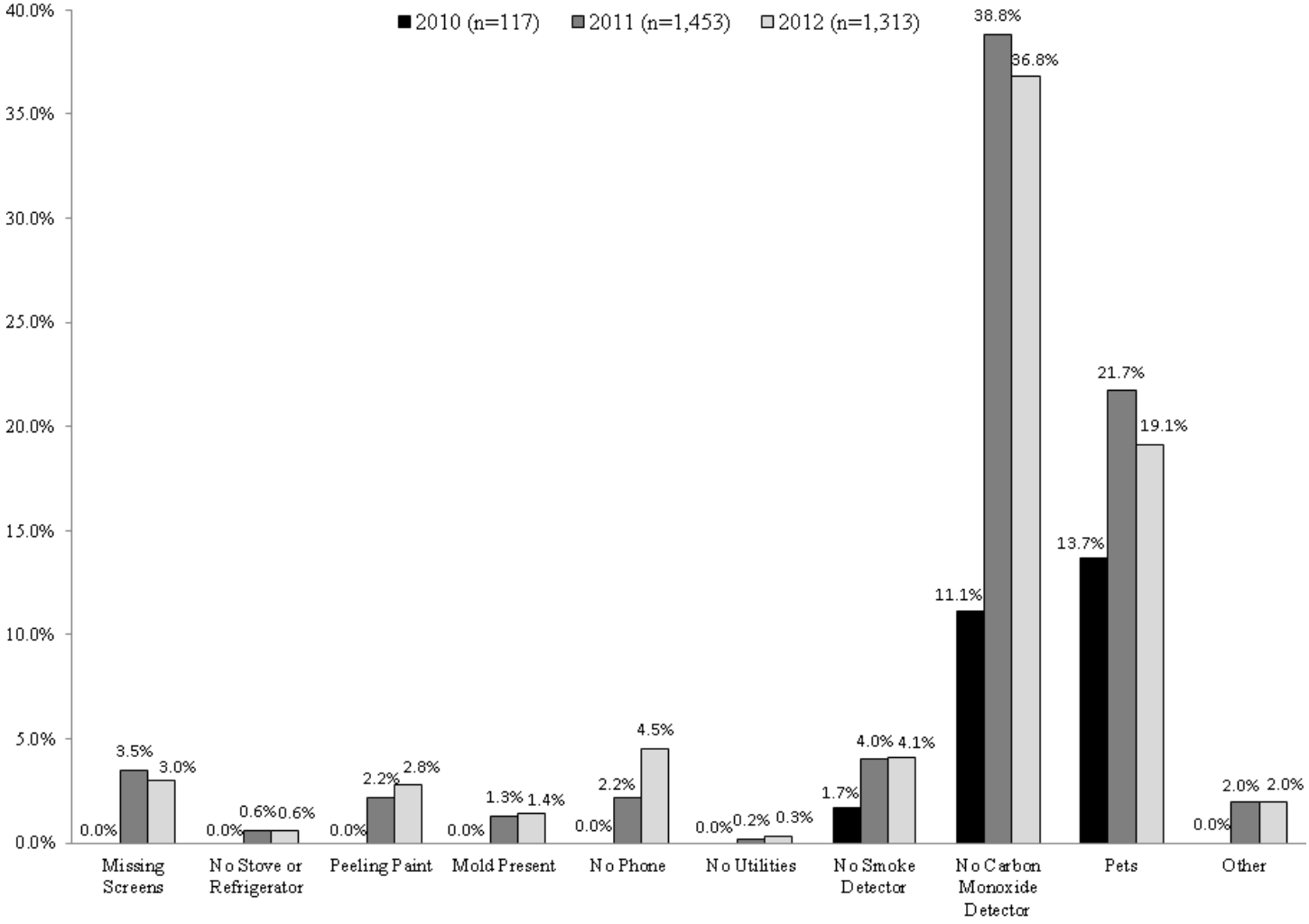

Figure 7. Percent of Families with the Following Home Safety Concerns Identified during Home Visit.

Across all three years, home safety concerns were identified in 55.1% of home visits. The number of safety concerns identified ranged from 1 to 6 with 40.4% of home visits identifying one safety concern, 11.2% identifying two safety concerns, 2.1% identifying three concerns, 0.9% identifying four concerns and 0.2% identifying five or six. At each time point, the most common home safety concerns noted were the absence of a carbon monoxide detector and pets (Figure 7). Safety concerns categorized as "Other" were most often cigarette smoking in the home, either by the mother or another person living in or visiting the home.

Table 3. Percent of Families with Other Environmental Concerns Identified During Home Visit

	*2010 (*n*=117)	2011 (*n* =1,453)	2012 (*n* =1,313)	Total (*N* = 2,883)
Smoking in home or car	15.4	27.4	20.7	23.7
Alcohol use	4.3	14.1	6.6	9.9
History of /current illicit drug use (% yes)	0.0	0.8	1.6	1.1
Domestic violence concern for self / family (% yes)	0.0	0.9	0.6	0.7
Guns/Ammunition in house	1.8	1.9	2.3	2.0
SIDS risk				
Co-sleeping	12.0	10.7	5.0	8.1
Items in sleeping area	0.9	4.4	2.1	3.2
Stomach sleeping	4.3	1.8	1.1	1.6
No dedicated sleep space	0.0	1.8	1.7	1.7
Inadequate baby care supplies (% yes)	0.0	2.9	4.7	3.6
No car seat or unsafe car seat	0.0	0.3	0.2	0.3

*Note. Data collection began in October 2010; therefore, column percentages reflect 3, not 12 months of data.

The most prevalent environmental risk factors identified were smoking in the home, using alcohol, and co-sleeping (see Table 3); however, reports of co-sleeping declined from 2010 to 2012. Less than 1% of mothers reported dealing with domestic violence, not having a car seat or having an unsafe car seat. More prevalent but still relatively uncommon were self-reported illicit drug use, having guns and ammunition in the house, having items in the newborn's sleeping area, putting the newborn on their stomach to sleep, not having a dedicated sleep space for the newborn, and not having adequate baby care supplies.

CONCLUSION: EVALUATION QUESTION 1

Taken together, Tables 1 through 3 and Figures 2 through 7 present information on the sample's baseline level of functioning. The high prevalence of risks identified is evidence that the NBHV program is successfully targeting the population most in need of services; however, of note are the declining rates of first time parents and low birth weight newborns, presumably higher risk populations, receiving a NBHV.

FINDINGS

EVALUATION QUESTION 2: IS THE VISIT BENEFICIAL IN PROVIDING RESOURCES AND SUPPORT TO THE TARGET POPULATION? ARE FAMILIES REFERRED TO THE AGENCIES THAT WILL MEET THEIR IDENTIFIED NEEDS?

Table 4. Types of Referrals Offered and Percent of Families that Received Each Referral

	*2010 (n = 117)	2011 (n = 1,453)	2012 (n = 1,313)	Total (N = 2,883)
Referrals				
Mother's healthcare provider	4.3	23.5	10.7	16.9
Help Me Grow	11.1	16.7	11.5	14.1
Smoking cessation program	6.0	21.9	4.6	13.4
Baby's healthcare provider	0.9	15.8	10.1	12.6
Lead / Healthy homes	0.0	11.7	3.3	7.4
Early Head Start / Head Start	40.2	7.7	0.4	5.7
Maternal behavioral health	1.7	5.5	3.9	4.6
Material resources (clothing/diapers/formula/car seat/crib/ bassinet)	n/a	5.7	3.5	4.3
Fire department	2.6	4.4	1.8	3.1
WIC (food supplements)	n/a	0.7	0.4	0.5
Employment and Family Services	n/a	0.5	0.1	0.3
Child Welfare Agency	n/a	0.2	0.1	0.1
Drug treatment resources	n/a	0.1	0.2	0.1
Starting Point	n/a	0.1	0.0	0.0
Alcohol abuse resources	n/a	0.1	0.0	0.0

*Note. Data collection began in October 2010; therefore, column percentages reflect 3, not 12 months of data.

The number of referrals received ranged from 0 to 34. From 2010 to 2012, approximately 21.7% of families received 1 referral, 11.8% received 2 referrals, and 15.1% received 3 or more referrals. From 2010 to 2012, families received an average of 1.49 (*SD* = 3.08) referrals. However, there was a statistically significant decline in the average number of referrals offered from 2011 (M= 2.13, *SD* = 3.70) to 2012 (M=0.77, *SD* = 1.89), $t(2764) = 12.06$, $p < .01$ as well as the percent of families receiving at least one referral, 59.7% of families in 2011 to 35.4% in 2012.

The most commonly provided referrals were to the mother's healthcare provider, Help Me Grow, smoking cessation services, and the baby's healthcare provider. It is important to note that several referral sources were added in mid-2011 and therefore, were not available to families who received a NBHV in 2010. These included: material resources, WIC, employment and family services, child welfare agency, drug treatment resources, Starting Point, alcohol abuse resources.

There were a few discrepancies between needs identified during the home visit and referrals provided. For example, on average, 23.7% of NBHV identified smoking in the home or car as an environmental concern; however, only 13.4% of families received a referral to a smoking cessation program. This may be the result of only offering referrals to the mother as opposed to other smokers in the home. For example, if a mother reported that her partner smoked, but her partner was not present at the NBHV, the home visitor would not offer the partner a referral to a smoking cessation program. As an alternative to providing a referral, home visitors can provide education about a specific risk factor identified. On average, from 2010 to 2012, 23.3% of families received education.

To explore whether level of need was related to number of referrals received, we created a continuous variable of risk which included the following 11-items measured during the home visit: 1) whether the mother was a first time parent; 2) whether the mother was a teenager; 3) whether the mother was single; 4) whether the mother had at least 1 perinatal complication; 5) whether the mother had at least 1 postpartum complication; 6) whether the mother met EPDS criteria for depression at the time of the home visit; 7) whether the infant was born preterm; 8) whether the infant had a NICU stay; 9) whether the infant's weight was low at birth; 10) whether the infant had at least 1 head-to-toe area designated as abnormal; and 11) whether the home visitor identified at least 1 home safety concern during the visit (this included a risk for SIDS, an unsafe car seat, and all items presented in Figure 7).

Risk ranged from 0 to 8 with 1.1% of families (31 families) having 0 risks and 0.2% (7 families) having 8. Most common were families with 3 risks (27.9% of families between 2010 and 2012).

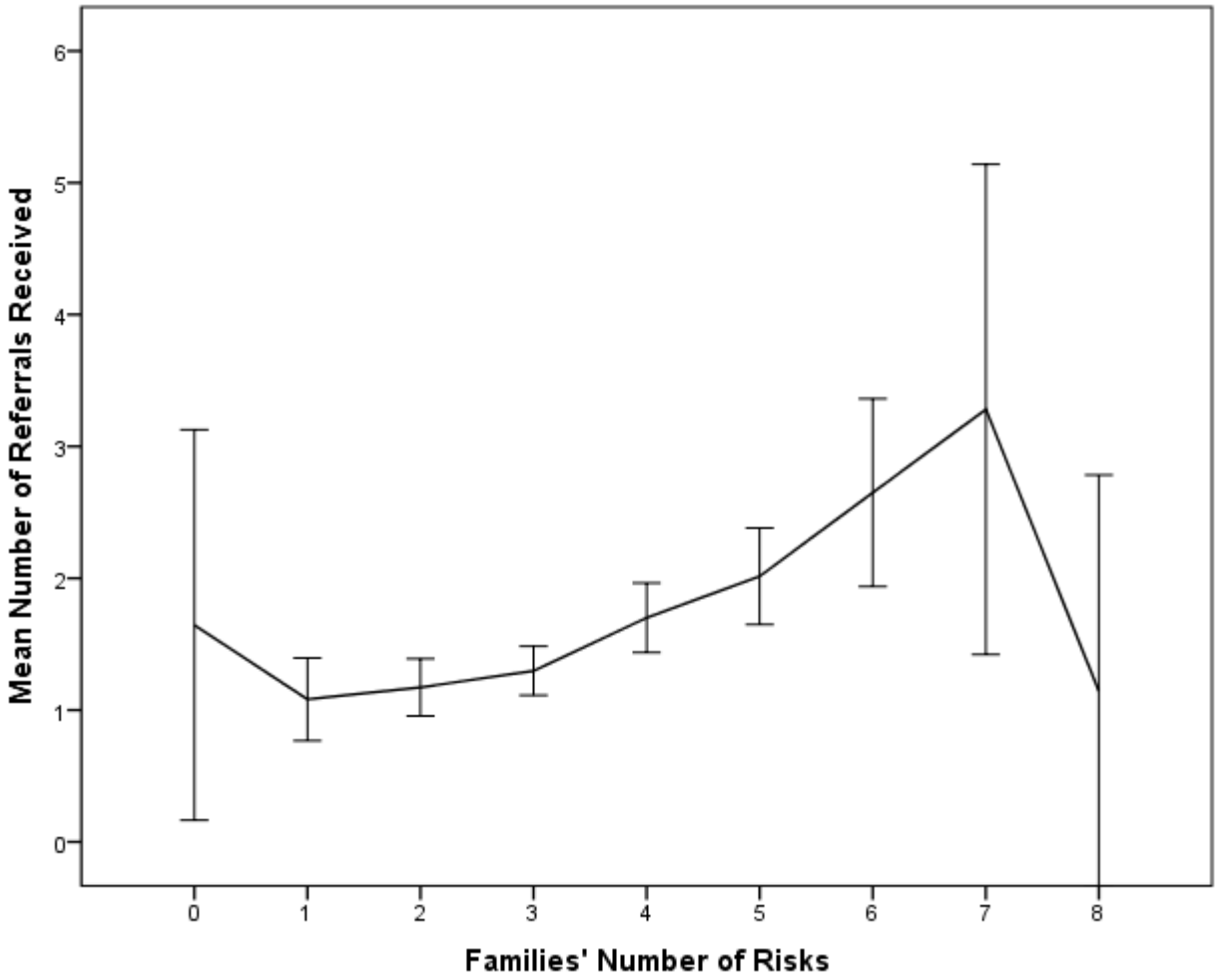

Figure 8. Average Number of Referrals Received (and 95% Confidence Intervals) by Number of Risks Identified During Home Visit.

Level of risk was significantly positively correlated (r = 0.12) with total number of referrals received during the home visit (see Figure 8). On average, families with more risks received more referrals. Point bi-serial correlation analyses were

conducted to explore the relationship between specific risks and number of referrals received. Results revealed several risk factors that were not significantly associated with number of referrals received. These included: 1) being a first time parent; 2) being a single mother; 3) having a preterm birth; 4) having a NICU stay; and 5) having a low birth weight infant. Items that were related to number of referrals received included: 1) being a teen parent; 2) having at least one perinatal complication; 3) having at least one postpartum complication; 4) meeting EPDS criteria for depression at the time of the home visit; 5) having a head-to-toe area fall outside of normal limits; and 6) having at least one home safety concern.

CONCLUSION: EVALUATION QUESTION 2

Almost half of all families receiving a NBHV also received at least one referral to another service provider; however, there are three areas regarding referrals that warrant additional investigation. First, the average and total number of referrals provided to families from 2011 to 2012 declined significantly. It does not appear that this was due to a declining level of risk in the NBHV population. For example, fewer home visits were delivered to teen mothers from 2011 to 2012, but the percent of families evidencing the remaining predictive risk factors did not change during that time period.

There were discrepancies between the amount of risk identified and the number of referrals provided. For example, significantly more families were noted for smoking than actually received a referral. Lastly, some risk factors (e.g., being a single mom, having a preterm birth) were not related to receiving a referral. This may be due to the absence of an appropriate referral agency that could ameliorate these risks. For example, many families were identified as not having a carbon monoxide detector in their home. However, home visitors do not refer these families to the fire department as the fire department does not have the money to provide carbon monoxide detectors.

FINDINGS

EVALUATION QUESTION 3: DOES THE NEWBORN HOME VISIT INCREASE MOTHERS' COMPETENCE ABOUT CARING FOR THEIR NEWBORN?

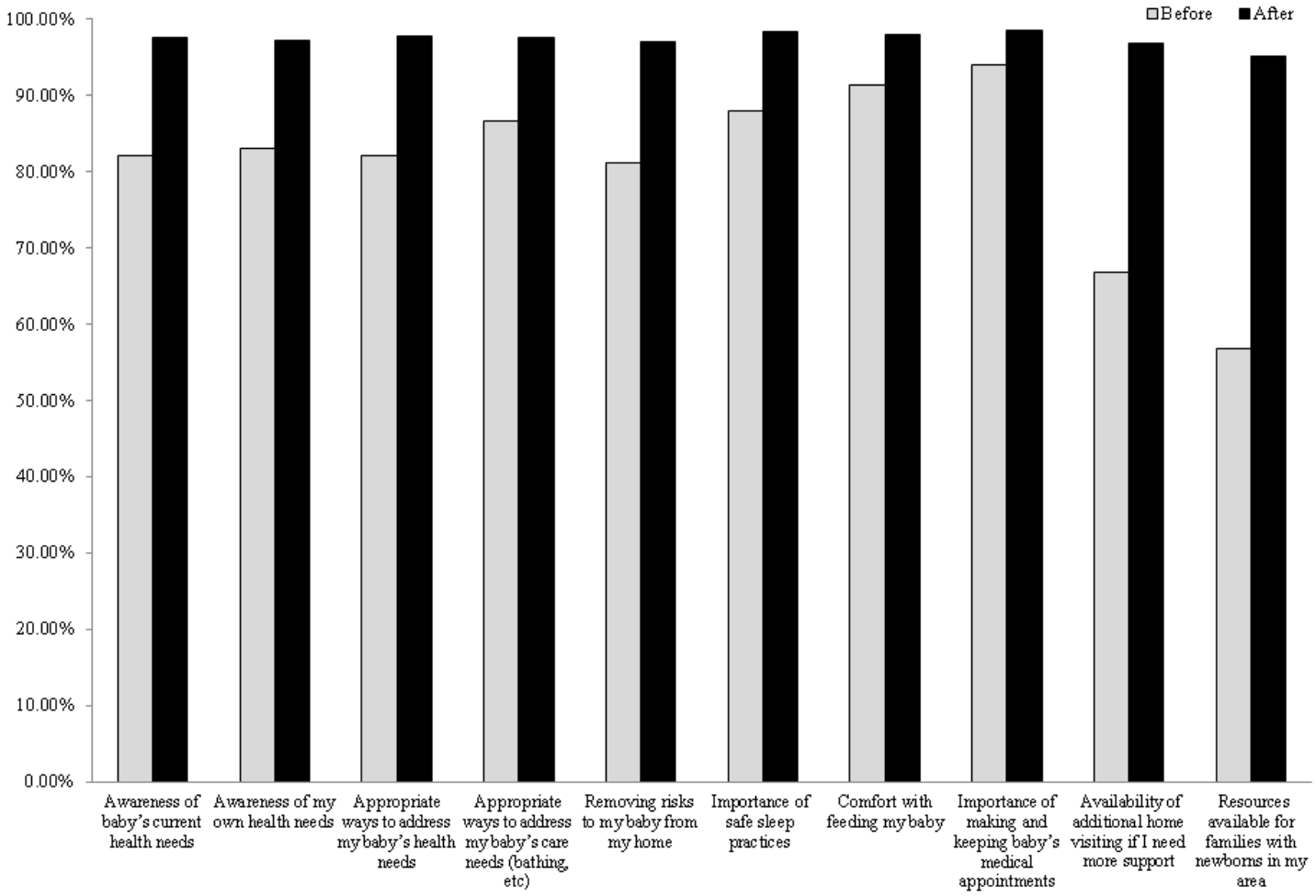

Figure 9. Parents' Understanding of Each Area BEFORE and AFTER NBHV. Ratings combine top two response categories : "Quite a bit of understanding" and "Almost complete understanding" (*N* = 2,866).

When combining ratings from the top two categories ("Quite a bit of understanding" and "Almost complete understanding"), parents reported statistically significant gains across all ten areas of knowledge ($p<.05$ using Wilcoxon Signed Ranks test; see Figure 9). Parents reported the largest gains in knowledge of "resources available for families with newborns in my area" (56.8% before to 95.1% after) and "availability of additional home visiting if I need more support" (66.7% before to 96.7% after). Parents reported substantial gains in knowledge in three areas relating to their baby's health and wellness: "appropriate ways to address baby's health needs" (82% before to 97.8% after), "awareness of baby's

current health needs" (82.1% before to 97.6% after), and "removing risks to my baby from my home" (81.2% before to 96.9% after). Overall, 98% of parents reported that the home visit was helpful to them, 97.2% reported that the nurse addressed their concerns during the visit, and 98.4% would encourage others with a new baby to accept a nurse visit.

FINDINGS

EVALUATION QUESTION 4: HOW MANY FAMILIES ARE INVOLVED WITH THE COUNTY CHILD WELFARE AGENCY WITHIN 12-MONTHS OF THEIR HOME VISIT?

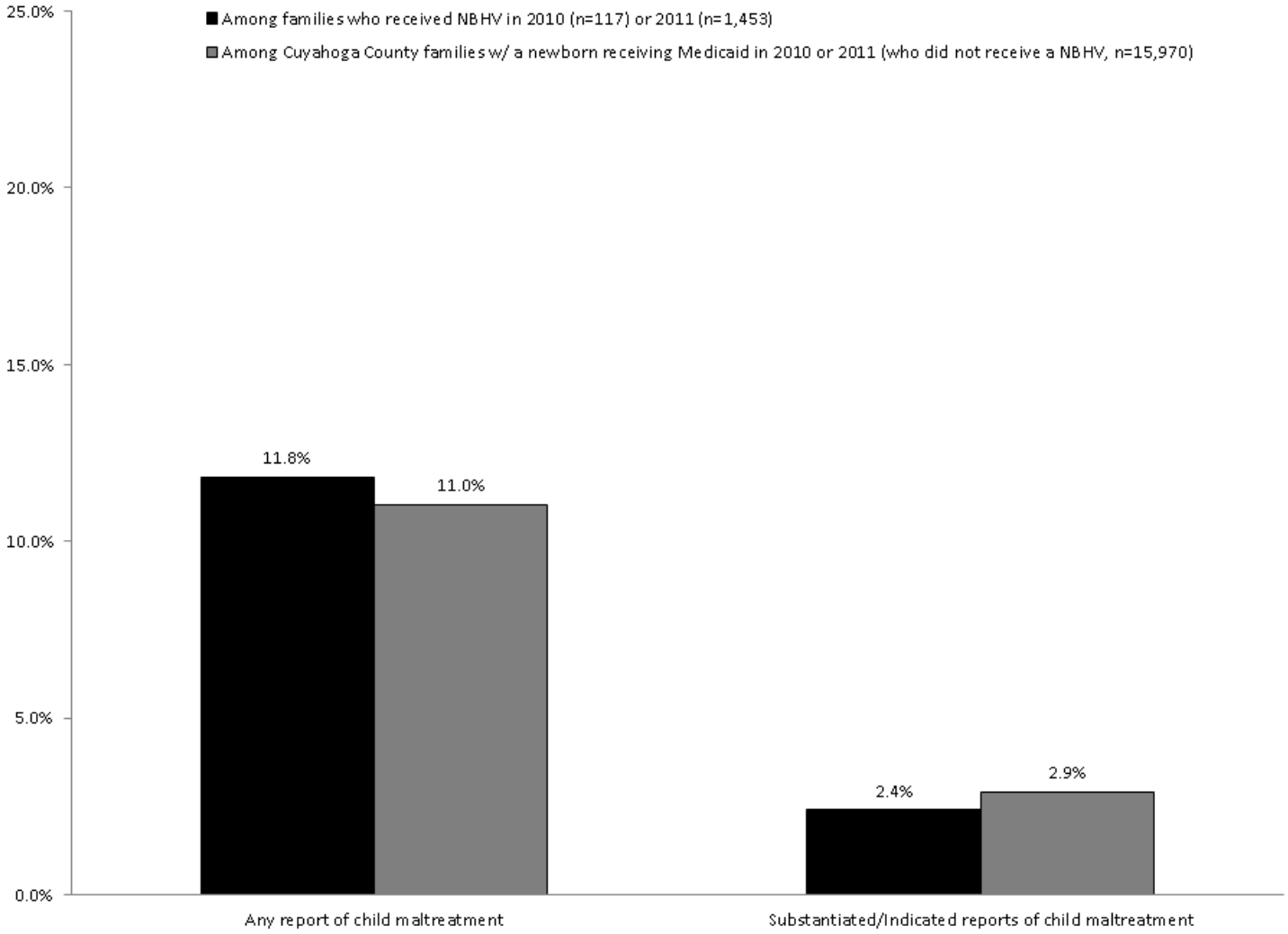

Figure 10. Percent of Families who received a NBHV in 2010 or 2011 and are involved with the County Child Welfare Agency within 12-Months of NBHV compared to child welfare involvement among Cuyahoga County families with a newborn receiving Medicaid in 2010 or 2011.

Of the 117 families who received a NBHV in 2010 and the 1,453 families who received a visit in 2011, approximately 12% are involved with the county child welfare agency within 12 months of the home visit; less than 2.5% of these cases resulted in substantiated or indicated incidents of child maltreatment in both years (see **Figure 10**). Child maltreatment data on families who received a NBHV in 2012 are not yet available. For comparison purposes, we explored child welfare involvement among families receiving Medicaid within 3 months of the birth of their child in 2010 and 2011 who did not receive a NBHV (N=15,970). These families are considered most comparable to the families served via the NBHV program. Among this sample of Medicaid receiving families, 11% received a report of child maltreatment within 1 year of their child's birth. Approximately 3% of these reports resulted in substantiated/indicated claims of child maltreatment.

Given the number of families who received a NBHV and subsequently became involved with the county child welfare system, we examined factors associated with reported child maltreatment. Chi-square analyses returned six statistically significant variables associated with reported child maltreatment: 1) mother's self-reported history of or current mental illness; 2) an EPDS score of 10 or greater at the time of the home visit; 3) an EPDS score of 10 or greater at the 2-week follow-up assessment; 4) low birth weight newborn; 5) at least one newborn head-to-toe complication; and 6) families with 4 or more risks (see **Figure 8** for explanation of the risk variable). These relationships indicate that proportionally more families received a child maltreatment report when the mother self-reported dealing with mental illness (17.5% vs. 9.6%) or scored in the possible depression range at baseline (15.6% vs. 9.9%) or follow-up (16.7% vs. 8.7%) as compared to families where the mother did not self-report mental illness or screen for possible depression. Similarly, proportionally more families received a child maltreatment report where the newborn was born with low birth weight (17.3% vs. 9.7%) or had at least one head-to-toe complication (15.4% vs. 9.7%) as compared to families without these newborn health concerns. Lastly, families with more than 4 risks were more likely to receive a child maltreatment report than families with 0 to 3 risk factors (12.2% vs. 9.7%).

FINDINGS

EVALUATION QUESTION 5: HOW MANY FAMILIES WHO RECEIVED A REFERRAL TO HELP ME GROW (HMG) PARTICIPATE IN HMG HOME VISITING WITHIN 12-MONTHS OF THE NBHV?

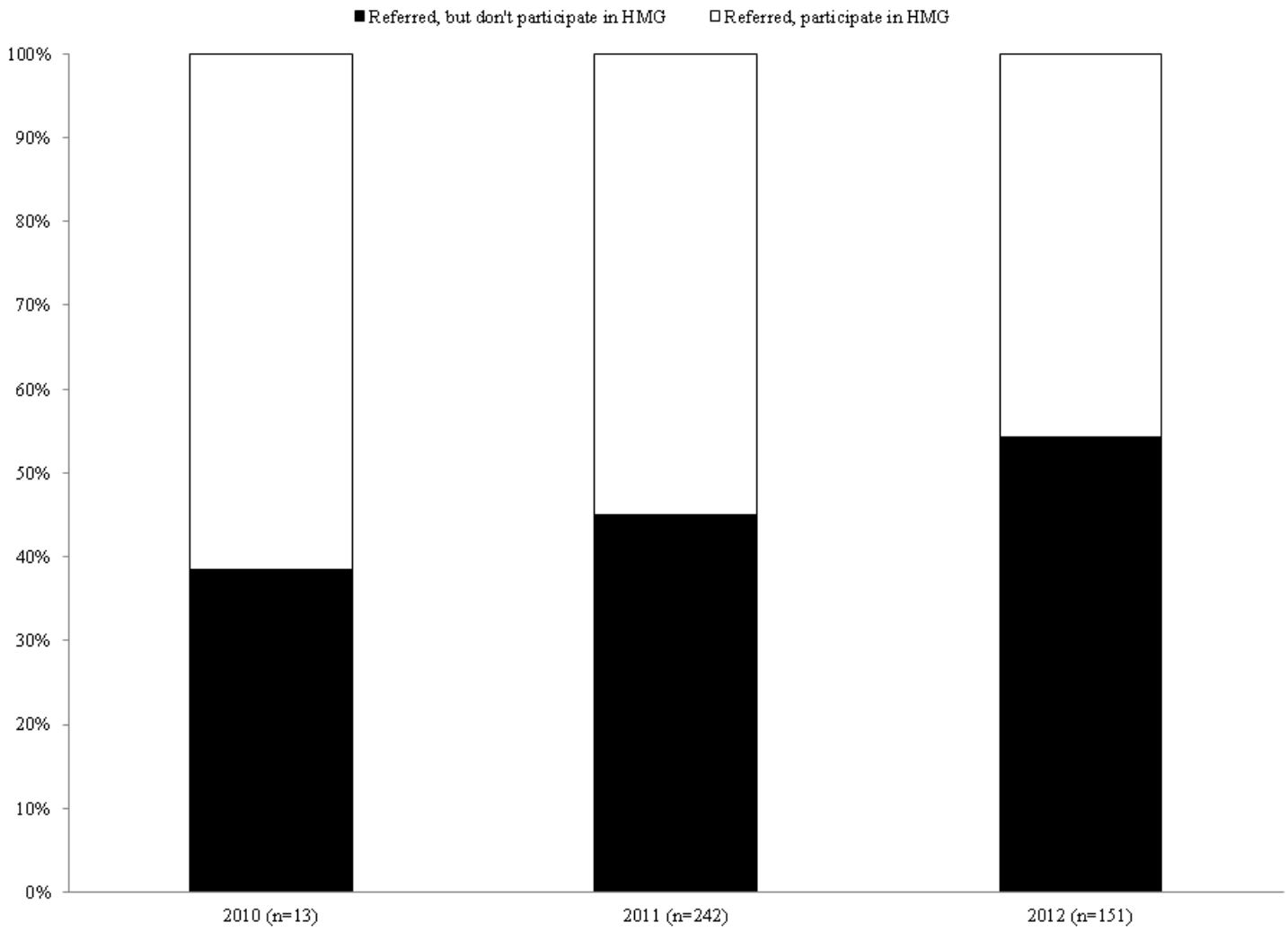

Figure 11. Participation in HMG among Families who received a HMG Referral during the NBHV.

In 2010 and 2011, more families that were referred to HMG participated in HMG's home visiting programs than did not (Figure 11). The situation was reversed in 2012 where 54.3% of families that received a referral did not participate in HMG whereas 45.7% did. Across all three years, an additional 14.3% of families participated HMG even though they did not receive a referral during the NBHV.

OVERALL CONCLUSION

The study described here analyzes data to inform program implementation and evaluation planning. Overall, the data support a conclusion that the NBHV program is reaching high-risk families and providing information regarding child development and infant care. In addition, the visits are identifying a number of physical and mental health, social, and environmental needs and providing referrals to programs and agencies that can offer ongoing services. Unfortunately, the

data do not currently capture what happens to families after they accept a nurse referral. We do not know whether these referrals actually lead to positive outcomes.

In some cases, primarily among families who received a NBHV in 2010, we were able to match their data to records obtained from other administrative data sources through the CHILD System. However, the analyses we conducted using integrated data are limited by sample size. The patterns described offer a preliminary sense of the demographic profile and longitudinal outcomes for this population, but should not be construed as reliable estimates. As more data become available, these analyses should be repeated.

RECOMMENDATIONS

The following recommendations emerged after analyzing the NBHV data and sharing it with county board of health administrators, NBHV nurses, and IIC:

- Data management recommendations
  - Connect every medical and social issue or risk factor identified during the NBHV to nurse response. Document all nurse responses in the data, preferably with quantitative metrics.
  - Expand the currently available nurse response options (i.e., educated and/or reviewed) to include other potential actions such as phoning the doctor, encouraging the mother to call her doctor, calling 911, following-up at a later date with mother, etc.
  - Include additional pre-populated, drop-down options in several areas including perinatal complications (i.e., multiple gestations, GBS+, anemia, home going medications, hyperemesis, UTI, kidney infection, preterm labor, prenatal care, and preeclampsia), postpartum complications (i.e., hypertension, e-scripts, fever and high blood pressure), birth complications (i.e., umbilical cord around neck), and home safety risks (i.e., pests).
  - The current method of having nurses document information about the home visit via qualitative comments is ineffective for evaluation purposes. Valuable information only being captured by nurse comments cannot be mined efficiently for themes. Create close-ended questions to capture this information quantitatively.
  - Modify the consent form used at intake to capture information on previous involvement with the child welfare agency, history of or ongoing domestic violence concern, and history of or current mental illness.
  - The home and social environment section of the assessment form should identify the smoker (e.g., mother or other family member, etc.).
  - Capture when a family declines an offered referral or when they are still considering whether to accept the referral.

- Capture, in a standardized manner, outcomes of nurse referrals made to mothers who score in the possible depression range. For example, how many of these mothers accept and follow through with the nurse provided referral? What are the outcomes for mothers who accept the referral and seek help? What happens to the mothers who refuse an offered referral?

- Programmatic recommendations

  - Use the Newborn Behavioral Observation (NBO) form at every NBHV and document the results in the data system. Offer training to ensure the assessment is implemented to fidelity. In addition, have parents complete the accompanying NBO parent questionnaire.

  - Discontinue use of the parent satisfaction survey. It is not returning actionable information. Replace it with the NBO parent questionnaire.

  - Need a method to understand the outcomes of nurse referrals. For example, how many of referrals actually lead to positive improvements? How many referrals eventually alleviate the problem for which they were given?

  - Explore why so many infants had 'too few wet diapers'. Are these newborns actually dehydrated and if so, what is being done during the NBHV to remedy this medical concern? Or, are these newborns not being changed when wet due to a lack of diapers or neglect?

  - Follow-up with families where a safety issue was identified to make sure the issue was resolved and that newborns are residing in safe environments.

  - Include outcome measures that can quantify the impact of the NBHV. There is currently little data available to truly document the effect of the NBHV program. For example, what would have happened to these families had they not received a NBHV?

  - Document the NBHV protocol and implement it consistently across home visitors. Consider training to ensure every home visitor is aware of and adhering to the protocol.