Forging a Pediatric Primary Care–Community Partnership to Support Food-Insecure Families

abstract

BACKGROUND AND OBJECTIVES: Academic primary care clinics often care for children from underserved populations affected by food insecurity. Clinical-community collaborations could help mitigate such risk. We sought to design, implement, refine, and evaluate Keeping Infants Nourished and Developing (KIND), a collaborative intervention focused on food-insecure families with infants.

METHODS: Pediatricians and community collaborators codeveloped processes to link food-insecure families with infants to supplementary infant formula, educational materials, and clinic and community resources. Intervention evaluation was done prospectively by using time-series analysis and descriptive statistics to characterize and enumerate those served by KIND during its first 2 years. Analyses assessed demographic, clinical, and social risk outcomes, including completion of preventive services and referral to social work or our medical-legal partnership. Comparisons were made between those receiving and not receiving KIND by using χ^2 statistics.

RESULTS: During the 2-year study period, 1042 families with infants received KIND. Recipients were more likely than nonrecipients to have completed a lead test and developmental screen (both $P < .001$), and they were more likely to have received a full set of well-infant visits by 14 months (42.0% vs 28.7%; $P < .0001$). Those receiving KIND also were significantly more likely to have been referred to social work (29.2% vs 17.6%; $P < .0001$) or the medical-legal partnership (14.8% vs 5.7%; $P < .0001$). Weight-for-length at 9 months did not statistically differ between groups.

CONCLUSIONS: A clinical-community collaborative enabled pediatric providers to address influential social determinants of health. This food insecurity–focused intervention was associated with improved preventive care outcomes for the infants served. *Pediatrics* 2014;134: e564–e571

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KEY WORDS

food insecurity, hunger, pediatric, primary care

ABBREVIATIONS

ASQ—Ages & Stages Questionnaire
CCHMC—Cincinnati Children's Hospital Medical Center
ED—emergency department
EMR—electronic medical record
FI—food insecurity
FSFB—Freestore Foodbank
KIND—Keeping Infants Nourished and Developing
MLP—medical-legal partnership
PPCC—Pediatric Primary Care Center
SNAP—Supplemental Nutrition Assistance Program
WIC—Supplemental Nutrition Program for Women, Infants, and Children

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The socioeconomic context in which a child is raised has a critical impact on growth, development, and health.[1–3] Children from disadvantaged households are often affected by food insecurity (FI), defined as "the lack of access to enough food to fully meet basic nutritional needs at all times due to lack of resources."[4–8] Many Americans experience FI or marginal food security[9]; 21% of all US households with children are food insecure, with households in poverty known to be at greatest risk.[10]

Primary care clinics in academic medical centers often care for children from these high-risk, underserved populations.[11] At our institution's Pediatric Primary Care Center (PPCC), roughly 1 in 3 households were classified as food insecure, well above the national average.[12,13] Moreover, 15% of households with infants in our clinic reported stretching, diluting, or limiting formula to make supplies last. FI was also significantly more common among those receiving public benefits, such as the Supplemental Nutrition Assistance Program (SNAP) and Supplemental Nutrition Program for Women, Infants, and Children (WIC), compared with those not receiving benefits (39% vs 22%).[12]

FI and formula stretching are associated with negative health effects. Infants are especially vulnerable to FI-related health consequences, including anemia, developmental delay, acute illnesses, and increased hospitalizations.[6–8,14–18] Still, given normal growth parameters for the vast majority of food-insecure infants, detecting FI in the clinical setting can be difficult.[12] Efforts to increase identification of FI in our PPCC have been successful,[19] but an intervention to respond to FI when identified was deemed necessary.

The Keeping Infants Nourished and Developing (KIND) program grew out of collaboration between the PPCC and the Freestore Foodbank (FSFB), our region's largest food bank. The goal was to address FI in households with infants via provision of supplemental infant formula, tailored education, and connection to clinic and community resources or public benefit programs. Here, we describe (1) the initial steps required to design, implement, and refine this partnership; and (2) an evaluation of outcomes from the program's first 2 years.

METHODS

Setting

KIND was developed and implemented in the PPCC, a large, urban, academic pediatric primary care clinic adjacent to the free-standing Cincinnati Children's Hospital Medical Center (CCHMC). The PPCC has 35 000 annual patient visits with roughly 150 infants seen each week for well care. Care is provided by attending pediatricians, pediatric residents, and medical students. On-site ancillary staff include social workers, registered dieticians, and legal advocates as part of a medical-legal partnership (MLP).[20]

Patients are predominantly socioeconomically disadvantaged (∼90% Medicaid); therefore, social history prompts and templates have been continuously adapted to address patients' and families' needs.[19,21] By 2011, quality improvement efforts had increased the rate at which food-insecure families were identified from 1% to ∼12%, but providers expressed concern over the lack of tangible interventions available.[19]

The FSFB is a large, Cincinnati-based agency serving 20 counties in Ohio, Kentucky, and Indiana. It distributes nearly 20 million meals annually through a network of more than 275 community-partnering agencies.[22] Although the FSFB has extensive experience addressing FI, they have, historically, had limited access to at-risk infants. KIND was designed to begin to fill this gap, partnering the PPCC, a clinic with excellent access to food-insecure households with infants <12 months of age, with the FSFB, a community agency poised to provide needed assistance.

Building Connections Between Clinic and Community

KIND's first step in development was the identification of a defined service gap: high rates of FI among households with infants <12 months of age without a discernible intervention. This gap was thought best filled by a community-based FI expert, such as the FSFB. Thus, PPCC physicians approached FSFB leaders with information on FI prevalence among the clinic's households with infants. This initiated discussions around possible collaborative interventions. Programmatic champions were identified, and a core team was established to develop KIND, determine budgetary needs, and identify key processes and resources.

FSFB defines food as "a vehicle for a larger conversation, aimed at helping to create stability and self-reliance."[22] Thus, it was determined that KIND would include provision of supplementary infant formula along with educational materials and referrals to clinic (eg, social work, MLP) and community (eg, food banks or pantries, job-training programs) resources, as indicated. For example, advocates from the MLP could help families obtain public benefits (eg, SNAP, WIC, or others) or intervene on coexistent housing conditions, when identified. After a pilot phase with formula donated by FSFB, a successful grant was jointly crafted to purchase a generically branded milk- and soy-based formula supply and provide limited administrative support for the program. The FSFB obtained formula at reduced cost (∼$10.25 per can) through established relationships with distributors. A clinic assessment provided estimates of formula that would be needed weekly and monthly. Short- and long-term formula storage sites were

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identified within the clinic, and delivery processes were established. Educational brochures were codeveloped de novo, with input from the PPCC's social workers and dieticians, focusing on infant nutrition, food budgeting, and key community resources.

KIND Implementation

An on-site physician, social worker, and dietician collaborated to define KIND eligibility criteria. The PPCC had recently introduced 2 evidence-based screening questions into the well-infant social history section of the electronic medical record (EMR) to facilitate FI identification (97% sensitive and 83% specific for FI identification).[19,23] If an infant's caregiver answered yes to either question, they were automatically eligible for KIND. The clinical provider was given latitude, however, to deem families KIND-eligible should they identify FI, stretching formula, or barriers to obtaining nutrition separate from the 2-question screen. Other reasons for eligibility included failure to thrive or need for formula supplementation, and complications with public benefit programs. Families were eligible for KIND at each of their well or ill visits.

The clinical provider then provided KIND-eligible families with a can of generic formula. Patients receiving KIND formula were tracked in a log in case of formula recall. Providers were also encouraged to document why they provided the patient with a can of formula (eg, FI/stretching, need for supplementation, or complications with public benefits). Families were also given the previously described educational information. Well-infant visits also included prompts for additional social risks (eg, parental mental health, housing or public benefit insecurity, and domestic violence).[21] Providers were encouraged to explore such risks and provide additional education or referrals, if indicated. Infants who were exclusively breastfed, or who required a specialty formula (eg, elemental), were offered the same education and linkages plus referrals to CCHMC's Center for Breastfeeding Medicine.

Before KIND implementation in March 2011, the program was introduced to providers and ancillary staff via e-mail and during divisional meetings and educational sessions focused on FI's impact and on new in-clinic processes. All pediatric residents, as part of an advocacy rotation, also received a tour and on-site training at the FSFB Customer Connection Center, a facility that provides emergency food services along with initiation of referrals to partnering agencies.[22,24] Additionally, attending physicians and ancillary staff had the opportunity to participate in this training.

Data Collection and Analysis

The KIND log tracked formula cans provided over time. A time-series analysis illustrated how KIND was ramped up and sustained; it was depicted using an annotated run-chart of KIND formula cans distributed per month.[25] This analytic technique facilitated identification of how many cans would be needed on a month-to-month basis.

Key data elements that would enable evaluation of KIND's first 2 years were available starting June 2011, on introduction of a new EMR. Patient-level demographic, clinical, and preventive care and social risk data were extracted. Demographic data included patient gender, race, and insurance. A priori, we assessed clinical problem lists for presence or absence of failure to thrive, developmental delay, or prematurity. We also identified weight-for-length percentile measured at 9 months of age and emergency department (ED) use during the first 14 months of life (to further examine possible problems with primary care connectedness). Quality of preventive services offered during well-infant care was assessed via (1) receipt of a lead level within the first 14 months of life (PPCC recommends lead level at 9 months); (2) developmental screening via an Ages & Stages Questionnaire (ASQ)[26] at 9 months in accordance with American Academy of Pediatrics recommendations; and (3) the PPCC-recommended 5+ well-infant visits in the first 14 months. Social risks, including FI, parental depression, housing, public benefits, and domestic violence also were assessed by using the PPCC's standardized social history with any positive during the first 14 months counted if present.[21] Finally, we identified patients who received a referral to either social work or our MLP.

All patients seen for well-infant care between June 1, 2011, and May 31, 2013, were identified as having received or not having received KIND. Demographic information, clinical problem list components, and subsequent interventions were compared by using χ^2 statistics. To analyze differences with respect to weight-for-length, lead, ASQ, number of well-infant visits, number of ED visits, and social risks, we needed to ensure that patients had at least 14 months of follow-up time. Thus, these analyses were limited to those children with birthdays between June 1, 2010, and May 31, 2012. Comparisons were once again made by using χ^2 statistics. This study was approved by the CCHMC Institutional Review Board.

RESULTS

Between June 1, 2011, and May 31, 2013, there were 5071 infants seen at PPCC. During this period, 1601 cans of KIND formula and educational brochures were distributed to 1042 unique families with infants (Table 1). The run-chart depicts that by July 2011 ~70 cans were being distributed each month (Fig 1). This amounts to roughly 15 to 20 cans per week. Given ~150 weekly well-infant visits, we estimate that KIND was being provided at 10% to 15% of all

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such visits. Providers logged a rationale for KIND provision for 1444 of the distributions. Although nearly 60% of KIND recipients had a positive response to 1 or both of the FI screening questions during their first 14 months, providers noted that FI or running out/stretching formula was their reason for distribution 92% of the time (n = 1328). Other reasons included failure to thrive or need for formula supplementation (n = 89; 6%), and complications with obtaining public benefits (n = 27; 2%).

The median age of KIND recipients was 5.80 months (interquartile range 2.00–8.56). Children receiving KIND were more likely than those not receiving KIND to be African American (78.6% vs 69.2%; $P < .0001$) and publicly insured (84.4% vs 82.9%; $P = .02$). There were no differences with respect to presence of failure to thrive or developmental delay on the problem list (both $P > .05$). Those not receiving KIND, however, were slightly more likely to have been documented as premature ($P = .009$).

Completion of preventive care services was significantly more common among KIND recipients (Table 2). Indeed, KIND recipients were more likely than non-recipients to have had a completed lead test and ASQ (both $P < .001$). They also were more likely to have received a full set of well-infant visits by 14 months (42.0% vs 28.7%; $P < .0001$). There were no significant differences, however, with respect to weight-for-length percentile at 9 months of age, numeric lead level, or ASQ failure. Families not receiving KIND were more likely to visit the ED once; those receiving KIND were more likely to visit the ED more than once ($P < .0001$).

KIND recipients also were more likely to report issues related to parental depression, housing, public benefits, and domestic violence (all $P < .0001$). Children receiving KIND were significantly more likely to be connected to additional clinic resources, including social work (29.2% vs 17.6%; $P < .0001$) and our MLP (14.8% vs 5.7%; $P < .0001$).

This clinical-community collaborative model has subsequently been used to spread KIND to 5 additional clinics in high-risk geographic regions of Greater Cincinnati: 2 affiliated with CCHMC (the hospital's foster care clinic and an off-site practice), 1 with the Cincinnati Health Department, and 2 independent community health centers (Fig 2).

TABLE 1 Demographic Characteristics of Unique Children Seen for Well-Infant Care Between June 1, 2011, and May 31, 2013, Including Comparisons of Those Receiving KIND and Those Not Receiving KIND Distributions

Characteristic	All, n = 5071, n (%)	KIND, n = 1042, n (%)	No KIND, n = 4029, n (%)	P Value[a]
Gender				.08
Male	2640 (52.1)	568 (54.5)	2072 (51.4)	
Female	2431 (47.9)	474 (45.5)	1957 (48.6)	
Race				<.0001
African American/Black	3608 (71.2)	819 (78.6)	2789 (69.2)	
White	859 (16.9)	126 (12.1)	733 (18.2)	
Other	481 (9.5)	78 (7.5)	403 (10.0)	
Unknown	123 (2.4)	19 (1.8)	104 (2.6)	
Insurance				.02
Public	4220 (83.2)	879 (84.4)	3341 (82.9)	
Private	229 (4.5)	30 (2.9)	199 (4.9)	
Military insurance	20 (0.4)	2 (0.2)	18 (0.4)	
Self-pay or missing	602 (11.9)	131 (12.6)	471 (11.7)	
Problem list components				
Failure to thrive	253 (5.0)	62 (6.0)	191 (4.7)	.1
Developmental delay	135 (2.7)	31 (3.0)	104 (2.6)	.5
Prematurity	73 (1.4)	6 (0.6)	67 (1.7)	.009

[a] χ^2 statistics.

DISCUSSION

Limited availability and access to nutrition is the reality for many households with infants. Although primary care centers are common contact points for such households, providers rarely have the means to intervene. We developed and implemented KIND, a collaborative program that partnered a pediatric primary care center with a community food bank poised to address this critical social determinant of health. In KIND's first 2 years, more than 1600 cans of formula and educational materials were distributed to more than 1000 families with infants. Those receiving KIND were more likely to have had completed preventive services, including a full set of well-infant visits, and be linked with key additional resources (eg, social work, an MLP). This targeted approach to FI has the potential to improve quality-of-life and health outcomes for households at highest risk.

Given the FI prevalence among households with infants at our PPCC,[12] we felt an urgency to develop and implement an intervention aimed at limiting its impact.[27] Such pediatric clinics have access to at-risk, often hard-to-reach infants and the ability to identify existing problems but often lack the expertise needed to appropriately intervene.[7,21,28] Community agencies often have that expertise but may lack ready access to those at risk; we expected that collaboration had the potential to most efficiently use resources.[29–31] KIND development and success clearly benefited from aligned missions, programmatic champions, stories of FI's impact on patients and families, clear data on the need, and open communication channels. Buy-in from key clinic and community stakeholders was equally essential.[32]

Appropriate screening and identification of at-risk households was critical for KIND's success, as FI can often be "invisible." The lack of consistent

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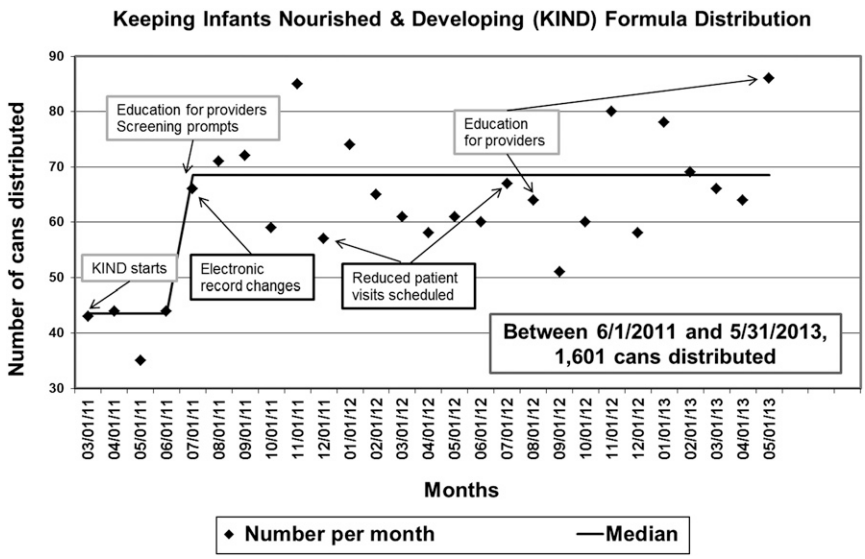

FIGURE 1
Annotated run chart illustrating the uptake of the KIND program.

associations between FI and failure to thrive or abnormal growth parameters is well-supported in the literature; FI cannot, therefore, be routinely identified with such objective cross-sectional measures.[12,13,17,23] Focusing only on infants with abnormal growth may miss many vulnerable infants. Similarly, given that programs like SNAP and WIC are designed to be supplemental, mere eligibility or enrollment does not guarantee food security. Indeed, our own data suggest that those receiving public benefits may be at highest risk of FI.[12] Thus, in addition to efforts directed at screening effectiveness,[19] eligibility criteria for KIND were more focused on social risks than clinical problem lists, abnormal growth parameters, or participation (or lack thereof) in public benefits programs.

This focus was especially relevant given that social risks rarely occur in isolation.[33] The accumulation of multiple social risks often requires households to make difficult decisions that stretch limited resources and perpetuate FI.[2,12,34,35] Given that families receiving KIND were significantly more likely to report risks relating to parental mental health, housing, benefits, and domestic violence, we inferred that we were seeing some of PPCC's highest-risk patients. We further postulate that KIND may have served as a "connector" between these high-risk households and the PPCC. Indeed, patients receiving KIND were more likely to have complete preventive services (eg, lead, developmental screening) and 5+ well-infant visits in the first 14 months. Such connections are critical, given an already low rate of preventive service completion. Families also were more likely to be linked to interventions poised to address multiple and potentially interrelated concerns (eg, social work, the MLP). This aligns with published data suggesting that food can be this "connector." Hoekstra et al[36] illustrated that inner-city immunization rates were improved by pairing vaccination with distribution of WIC vouchers. Thus, it is possible that through KIND, families felt more empowered to return to the clinic for consistent well-care and support for other social challenges.

The collaborative partnership has led to discussions between CCHMC and the

TABLE 2 Risk Profiles for Those Receiving and Not Receiving KIND Formula, Including Children Seen Between June 1, 2011, and May 31, 2013, With Birthdays Between June 1, 2010, and May 31, 2012 (to Ensure ≥14 Months of Follow-up)

Risk	KIND, *n* = 727, *n* (%)	No KIND, *n* = 2573, *n* (%)	*P* Value[a]
5+ well-child visits in first 14 mo	305 (42.0)	739 (28.7)	<.0001
Lead complete	590 (81.2)	1930 (75.0)	.0006
Lead level[b]			.2
Below level of detection	371 (62.9)	1137 (59.0)	
1.4–2.4	166 (28.1)	559 (29.0)	
2.5–4.9	43 (7.3)	191 (9.9)	
≥5	10 (1.7)	40 (2.1)	
9-mo ASQ complete	193 (26.6)	51 (20.1)	.0002
Failed 9-mo ASQ[c]	25 (13.0)	58 (11.2)	.7
Weight for length at 9 mo visit[d]			.3
<5th percentile	17 (5.0)	37 (3.7)	
5th–95th percentile	300 (88.5)	871 (87.5)	
>95th percentile	22 (6.5)	87 (8.7)	
Social risks identified during first 14 mo			
FI	404 (56.5)	234 (9.5)	<.0001
Parental depression	76 (11.2)	111 (5.0)	<.0001
Housing issues	106 (14.8)	145 (5.8)	<.0001
Benefit issues	244 (34.1)	359 (14.4)	<.0001
Domestic violence issues	36 (5.4)	51 (2.3)	<.0001
ED visits in first 14 mo			<.0001
0	104 (16.2)	398 (19.5)	
1	160 (24.9)	655 (32.1)	
2+	378 (58.9)	378 (48.5)	

[a] χ^2 statistics.
[b] 2517 patients with data available.
[c] 709 patients with data available.
[d] 1334 patients with data available.

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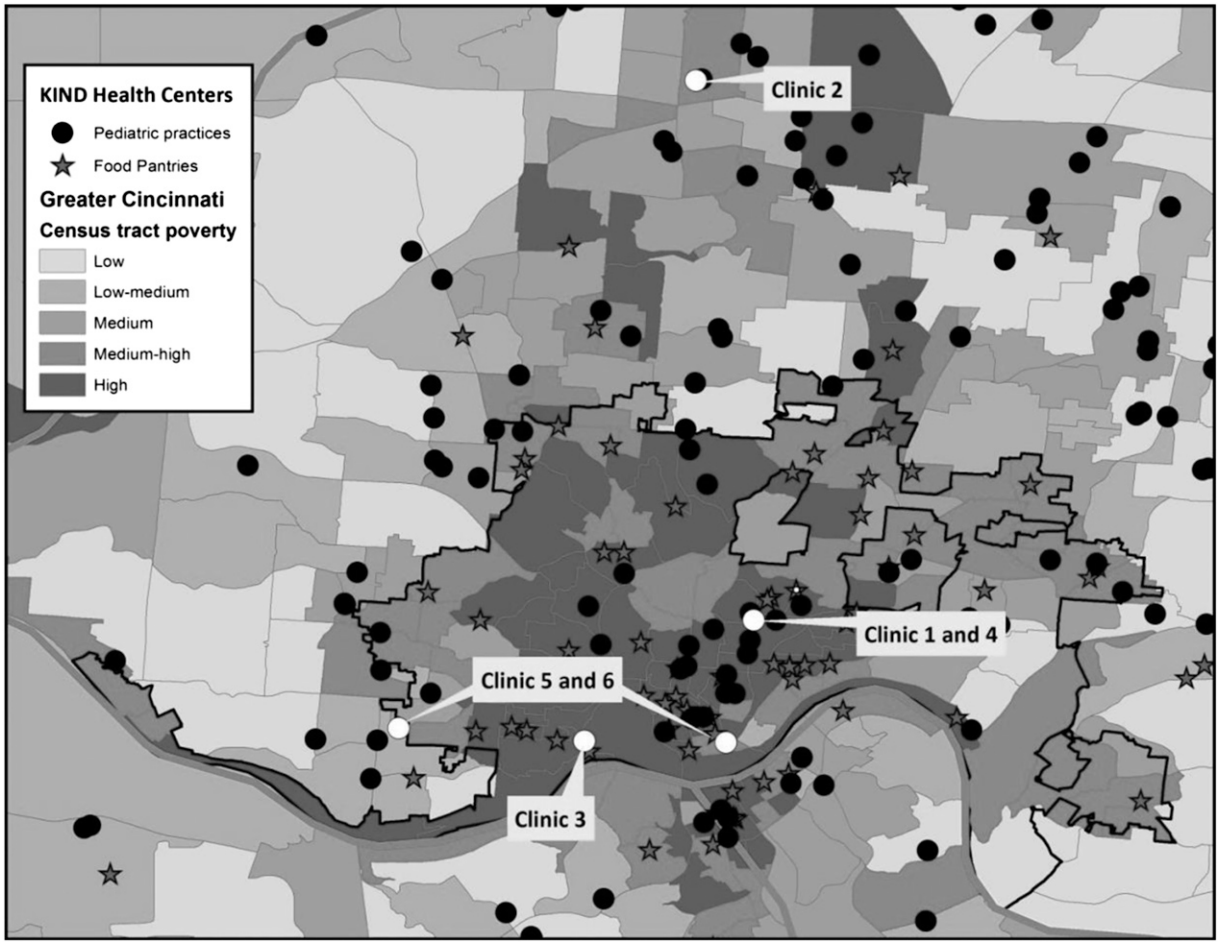

FIGURE 2
Distribution and spread of KIND health centers in Greater Cincinnati.

FSFB about the feasibility of KIND expansion to additional clinics, first regionally and then nationally. To date, KIND has spread to 5 other primary care centers, including a CCHMC-owned, suburban site where providers have been seeing a growing number of newly unemployed families at increased risk for FI.[37] To facilitate further spread, more in-depth exploration of logistics and available resources is needed. We are also actively building on the KIND model of a high-functioning clinical-community partnership by exploring other interventions for at-risk families to help create stability and self-reliance.[32] Such potential interventions, including linkages to job readiness, adult education, and parenting agencies, will allow us to move toward improving health and well-being and potentially preventing FI. The KIND partnership has provided a strong platform on which to build these more comprehensive, upstream interventions for our most vulnerable families.[38,39] Future studies that assess longer-term follow-up and changes in risk levels over time, and also adjust for potential confounders, would further strengthen programmatic evaluation.

This study has several limitations. First, KIND was implemented in a clinic with excellent on-site resources. Thus, our findings may lack generalizability. Second, we are not able to directly determine the effect of KIND on our outcomes; we show strong associations but cannot determine causality. We also are unable to show from data available whether this program directly affected FI status of households in question. However, we expect that improved access to formula and associated resources could mitigate risks associated with FI and potentially improve health (ie, through improvements in preventive care service provision). Third, data extracted from the EMR to assess chronic conditions may not be accurate, as providers need to add diagnoses to problem lists. We expect this would reflect an underrepresentation of children with assessed conditions, and that the misclassification bias would be nondifferential. Finally, the impact of our intervention was likely different for exclusively breastfed infants. We attempted to mitigate this difference by providing similar educational materials and in-clinic and in-community connections

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when indicated. Formula was not provided (or advertised) to women who exclusively breastfed. Still, formula provision remained a key element of KIND, because, like other clinics with similar demographic profiles, breastfeeding rates remain low.[40,41] We do not expect that this intervention influenced parents to decrease breastfeeding given that ~80% of those receiving KIND were older than 1 month.

CONCLUSIONS

Clinical-community collaborations can be instrumental in detecting and addressing social determinants of health. Social interventions in primary care centers can benefit greatly from the expertise of community agencies. Such collaboration also facilitates critical connections between at-risk patients and relevant clinic- and community-based resources. We expect further efforts toward community engagement and collaboration may enhance the care provided to those most disadvantaged.

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