






Addressing food insecurity: a paediatric academic advocacy collaborative quality initiative

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ABSTRACT

Objective This quality improvement (QI) initiative aimed to address food insecurity (FI) by improving FI identification and referral to food assistance programmes for the families served by the eight paediatric academic institutions in North and South Carolina.

Methods The primary process measures were screening 80% of eligible families for FI and coding for FI. The outcome measure was referring 80% of families identified with FI to appropriate resources. The balancing measure was maintaining a rate below 20% of missed opportunities for referral. Change ideas were organised into four main key drivers. The eight teaching clinics of the Carolinas Collaborative completed monthly chart audits using the Quality Improvement Data Aggregator (QIDA). Baseline was December 2020 and implementation occurred January 2021–May 2022. Creation of run charts was later transferred to statistical process control charts. Standard probability or Montgomery rules were used to identify special cause variation. Sites used individual QIDA data to conduct Plan-Do-Study-Act cycles; aggregated data were shared during bimonthly meetings.

Results A total of 4270 eligible charts were audited, 3430 patients screened and 525 identified as having FI. The rate of FI screening shifted from 68.5% to 86%. The rate of FI identified remained at 15%, and food referrals were consistently offered 90% of the time. While FI diagnostic coding did not reach the 80% goal, there was a shift from 38.3% to 70.5%. The balancing measure remained well below the goal of less than 20% of missed opportunities to discuss positive FI (centreline of 9.5%).

Conclusions A paediatric academic collaborative QI initiative focused on FI demonstrated collective improvement and allowed for rapid implementation, dissemination and spread.

Food insecurity (FI) is a complex challenge with negative associations for children and families, particularly those families living in poverty.¹ Children living in households with FI are at increased risk for hospitalisations, developmental delays, behavioural and mental health problems, dental decay, malnutrition and poor overall health.^{2–4} Families with FI also spend 20% more in total healthcare expenditures compared with families with food security.⁵

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ FI is a significant public health issue linked to various negative outcomes for children and increased healthcare costs. While paediatricians are encouraged to screen for FI and connect families to resources, health systems and practices experience barriers to implementing universal screening and referral processes that are effective and sustainable.

WHAT THIS STUDY ADDS

⇒ Collaboratives can scale FI screening and referral pathways across institutions and states. The paper provides a blueprint for implementing a collaborative approach to addressing FI in the paediatric outpatient setting and emphasises the importance of knowledge sharing and peer support among different institutions in achieving common quality improvement goals.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study demonstrates how the formation of collaboration to address complex child health issues like FI encourages collective improvement and allows for rapid implementation, dissemination and spread.

Paediatricians are uniquely positioned to address social drivers of health (SDOH) beginning at birth. While the American Academy of Pediatrics (AAP) recommends screening for SDOH and referring to community resources as part of routine care, less than half of the paediatricians are screening for FI, and even fewer are assisting children and families who report FI during screening.^{6,7} Although studies have shown that the International Classification of Diseases (ICD) codes for SDOH are underutilised^{8,9} due to barriers such as time constraints, lack of adequate resources to address positive screens, and stigma,^{10,11} billing guidelines that now incorporate SDOH have the potential to impact reimbursement as Centers for Medicare and



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Medicaid Services and The Joint Commission are starting to use SDOH screening as a quality metric in an attempt to reduce health disparities.^{12–14}

The degree and variability of FI can be influenced by many factors, including job loss, seasonality, transportation challenges, local food environments, and both eligibility and accessibility to state or federal nutrition programmes, which are known to mitigate FI and improve health outcomes.^{15 16} The number of children in the USA experiencing FI increased during the pandemic from one in seven to one in four children.² In North and South Carolina, 21% and 19% of households with children experience FI, respectively, while the utilisation rate for the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in both states is below the national average.^{17–20} Addressing SDOH has been identified as a public health priority in both states.^{21 22}

Quality improvement (QI) collaboratives are an approach used by healthcare systems to improve clinical processes and patient outcomes through shared learning.²³ Developed with coaching by the AAP's Community Pediatrics Training Initiative, the Carolinas Collaborative (CC) is a cohesive network of academic paediatricians who are child health advocacy experts from the eight paediatric academic institutions across North and South Carolina.^{24–27} Since 2015, the CC has developed trust, robust communication and extensive community partnerships using population health strategies to mitigate health inequities.²⁸ With this infrastructure, the CC was well positioned to pursue this unifying project to address FI. Every CC institution had at least one member who was engaged in influencing change in their local institution around the identification and management of FI.

Using a collaborative approach to support our learning, implementation and information dissemination, we aimed to address FI by improving FI identification and referral to food assistance programmes for the families served by the eight paediatric academic institutions in North and South Carolina.^{29–31}

METHODS

Context and setting

This QI project was conducted in the eight safety-net residency continuity clinics that make up the CC: Atrium Health Levine Children's Hospital in Charlotte, NC; Duke University School of Medicine in Durham, NC; East Carolina University in Greenville, NC; Medical University of South Carolina in Charleston, SC; Prisma Health Midlands in Columbia, SC; Prisma Health Upstate in Greenville, SC; University of North Carolina in Chapel Hill, NC; and Wake Forest University School of Medicine in Winston-Salem, NC. Collectively, our clinics serve as training sites for approximately 400 residents annually. Grant funding allowed protected time dedicated to this project for at least one faculty member at each institution.

The study was considered exempt by the AAP Institutional Review Board. The American Board of Pediatrics Part IV Maintenance of Certification was offered to participating clinicians.

Study population and study period

Any child aged 0–19 years of age cared for at the participating outpatient clinics was eligible for inclusion. Each site decided their target population and screening frequency based on internal priorities and resources (table 1). Collectively, these participating clinics conduct over 400 000 primary care visits each year. The study period was December 2020–May 2022. A December 2020 chart audit served as the baseline; January 2021–May 2022 served as the intervention period.

Patient and public involvement

Clinic families were not directly involved in the initial design of this QI project; however, one of the four key drivers was engaged patients and families, and CC sites sought informal family feedback on connection to food resources throughout the project period.

Interventions

This collaborative QI initiative followed the Model for Improvement with rapid Plan-Do-Study-Act (PDSA) cycles as the framework to approach the work.³² The CC physicians performed a literature review and compiled each site's baseline FI screening process, management practices, barriers and facilitators to existing food programmes to set the aim, plan and organise the main change interventions for the project.^{33–35} All institutions had some existing community partnerships with local food assistance programmes, including food pantries, food shares and farmers' markets, but only one site was offering active food provision at the beginning of this project and one site was not yet screening for FI in any capacity.

Based on the information gathered, the overarching change ideas were organised under the following four main drivers: (1) Informed, Activated Team-based Care; (2) Culture of QI and Shared Data and Performance Measurements; (3) Standardised and Streamlined Processes; and (4) Engaged Patients and Families (figure 1).

All change ideas were designed to provide guidance only, allowing each of the teams to tailor specific PDSA cycles based on their setting and resources available. The change ideas were centred around setting up an infrastructure, getting buy-in and preparing all members of the clinic teams to reliably screen, document, and refer/connect any family with positive screening to appropriate resources.

Each site was tasked with recruiting its own multidisciplinary team including but not limited to physician and resident champions, nurses, business managers, social workers, case managers and when available care navigators, community health workers and QI/data supports. Each QI team worked on defining its target population,

Table 1 Food insecurity (FI) screening process overview by site

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Additional QI team members beyond CC physician and resident champions	Advanced practice providers, front desk/ registration staff, nurses, QI coach, social worker	Community health worker, social worker, student volunteers	Medical assistants, social worker	Business office staff, social worker, nurses	Medical students, nurse manager, social worker	Business office supervisor, Hispanic community health worker, nurse supervisor, master's student food resource navigators, practice manager, social workers	Business office staff, medical-legal partnership lawyer	Onsite food pharmacist
Screening for FI at baseline?	Yes	Yes	Early pilot	No	Yes	Yes	Yes	Yes
Ages screened	All	6–11 year-olds	18-year-olds	6 month, 12 month, 15 month, 30 month, 3 year, 4 year olds (times when other screeners not performed)	4 month, 15 month, 3 years, 4 years expanded to all ages	1 month through 11-year-olds	All	All
Visits designated for screening (well, sick, nurse, telehealth)	Well visits	Well visits	Well visits	Well visits	Well visits	Well visits	Well visits	All
Frequency of screening (universal, every well visit, annually)	Every well visit	Annually	Every well visit	Well visits for ages listed above	Every well visit	All well visits 1 month through 11 years	Every well visit	Universal
Method of screening (paper, electronic, verbal**)	Paper	Paper then transitioned to electronic	Paper	Paper	Paper	Paper then transitioned to electronic	Paper (in-person visit) or verbal (telehealth)	Paper (in-person visit) or verbal (telehealth)
FI screener used	Hunger vital sign	Hunger vital sign	Hunger vital sign	Health leads	SEEK or hunger vital sign	SWYC or hunger vital sign	SWYC or hunger vital sign	Hunger vital sign

*Verbal used when caregiver speaks a language other than Spanish/English or when does not read.

CC, Carolinas Collaborative; QI, quality improvement; SEEK, Safe Environment for Every Kid; SWYC, Survey of Well-being of Young Children.

building its own process flow for both screening and addressing FI, building and/or reinforcing partnerships with governmental and community programmes, as well as documenting tests of change/PDSA cycles on PDSA trackers. The Hunger Vital Sign³⁶ was chosen as the standard validated screening tool, and a minimal cadence of screening was set to once a year as part of routine care during visits designated as eligible for FI screening by each site. When the FI screen was positive, teams additionally noted whether there was documentation that FI was discussed with family, if food resources were offered

and if the ICD-10 code Z59.4 was used. The collaborative met bimonthly to review the data and learnings. These meetings also ensured all teams were actively involved and applying PDSA cycles.

To address the first two key drivers of having informed activated teams and building a QI culture, the collaborative created a workgroup focused on building resident and provider curriculum around the topic of FI, as well as education resources for all team members from expert sources such as the Food Research & Action Center, Nutrition and Obesity Policy Research and Evaluation

Addressing Food Insecurity in Primary Care

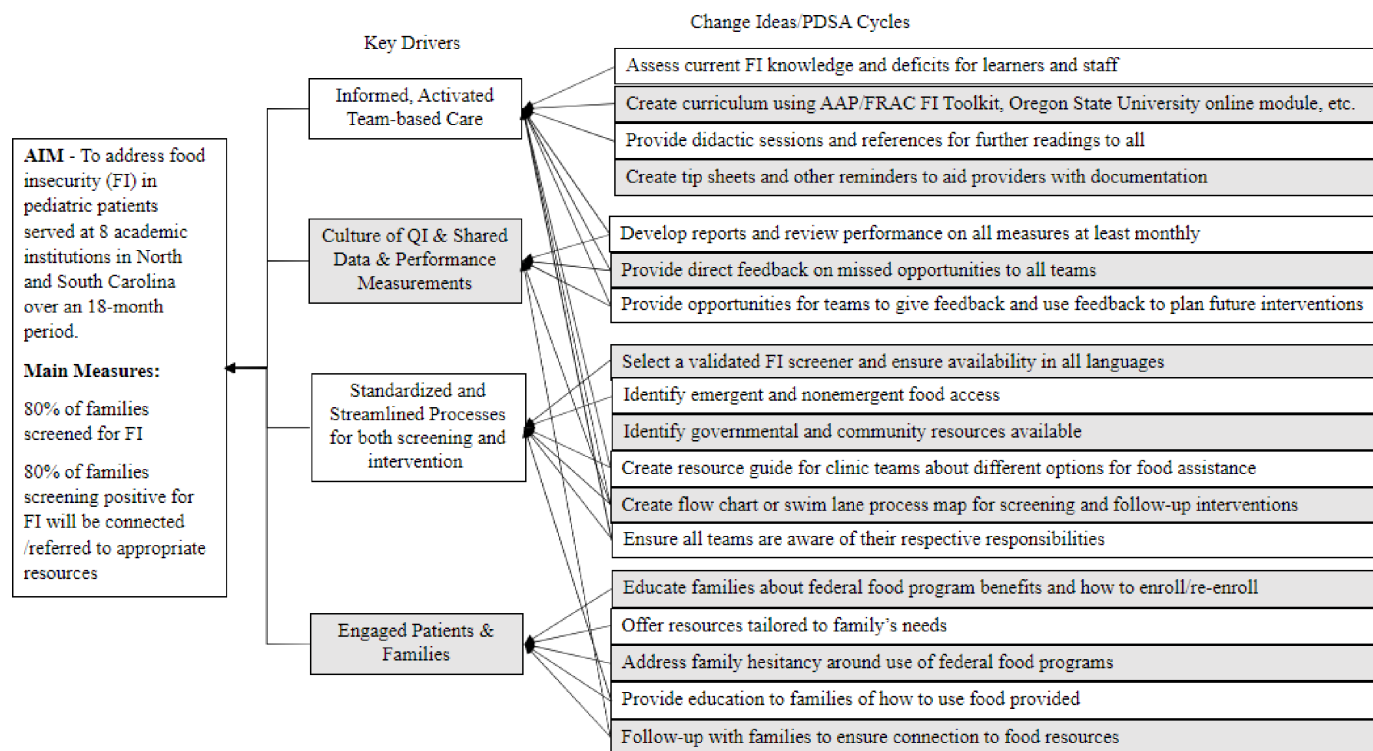


Figure 1 Key driver diagram used to address food insecurity in the eight safety-net paediatric primary care clinics that constitute the Carolinas Collaborative.

Network, Oregon State University and the CC Medical-Legal Partnership lawyer. All teams used the information provided, coupled with the process flows, to educate their teams. Sites used pilots to test educational tools and process flows on a small scale to both give and receive feedback prior to full implementation. These pilots led to the modification of the tools as needed and the ability to fill in any additional knowledge gaps. Clarity on purpose and process quickly allowed all teams to build reliable screening processes, and by June 2021, all teams were screening at or above goal (figure 2A) with a high percentage of FI being identified (figure 2B).

The specific PDSA cycles addressing the drivers of Standardized and Streamlined Processes and of Engaged Patients and Families were more individualised and provided the greatest opportunity for learning. To improve screening rates, two sites transitioned from paper to electronic screening during the QI period.³⁷ Two other sites offered telehealth well visits with verbal FI screening during the COVID-19 pandemic. Other successful interventions were formal FI didactic sessions and expansion of FI screening to occur during all well visits (figure 2B). For connecting families to resources, most teams started this project with the ability to only offer passive referrals, such as providing lists of local food resources or handouts for SNAP and WIC. Since the goal was addressing FI more comprehensively, every team worked to improve the quality of connection to resources by expanding to active referrals, including direct food provision and care navigation

programmes. Care navigators were able to tailor recommended resources to families' degree of need, geographical location and cultural preferences, as well as directly link patients to food resources with follow-up phone calls to assess success rate for resource connection.³⁸⁻⁴² Some clinics established in-house food pantries or provided gift cards to purchase food via funds from grants or charitable foundations. Some worked in partnerships with local foodbanks and offered food boxes of shelf-stable foods, while others had teaching food pantries where patients received guidance on how to prepare the food being provided or an in-house food pharmacist to offer onsite assistance. Partnerships with local WIC departments were strengthened by initiating quarterly check-in meetings with clinic leadership, co-locating WIC services within the clinic, or by identifying contacts in local WIC offices to offer direct assistance. Some groups implemented food resource navigator programmes to follow up with families screening positive for FI after the visit. One site collaborated with their local food security coalition to start a community formula bank. Learning from each other's success helped all teams to build more robust and immediate support systems for those families identified as having FI³¹ (figure 2C). Coding rates were improved by use of electronic health record (EHR) best practice advisories, coding reminders and provider education/training (figure 2D).

Each site completed monthly de-identified chart audits of eligible visits during which patients would have been

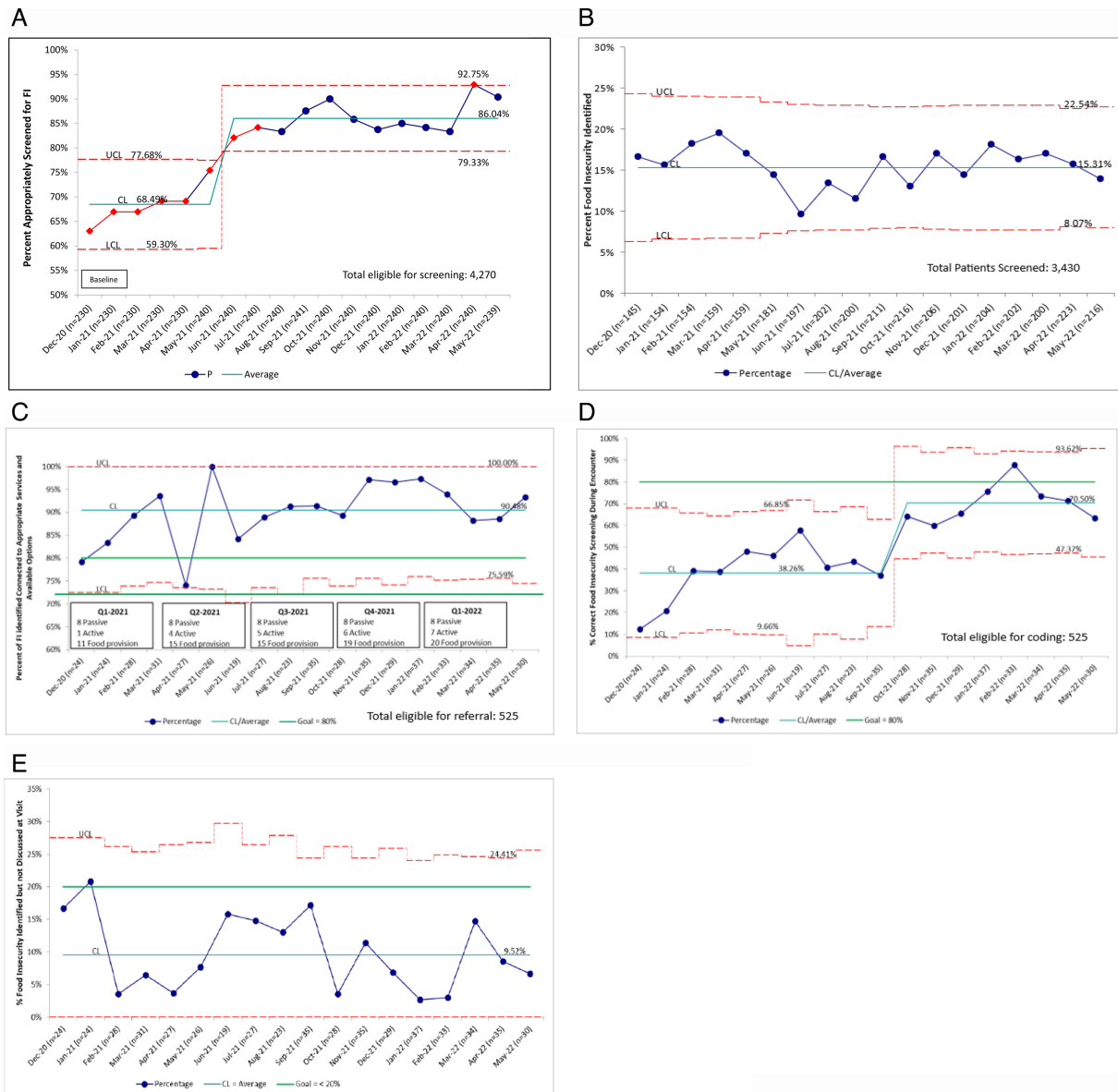


Figure 2 (A) Food insecurity (FI) screening rates during designated visits across all sites. Goal was to increase screening rate to 80% or higher (green line indicates goal). At baseline (December 2020), one of the eight sites was not screening yet, four sites were only screening on a small scale and three sites were already above a FI screening rate of 80%. Noted sustained improvement over goal in July 2021. (B) Percentage of food insecurity identified during designated visits across all sites. Centreline sustaining at 15%. (C) Percentage of food insecurity identified, and food referral offered across all sites. The 525 patients identified as FI were eligible for referral. Passive referral: patients given information about available food-related resources. Active referral: personalised assistance given to connect patients with community/government agencies that provide food-related resources tailored to the patient's needs. Food provision: provide vouchers or financial incentives at local grocery stores or farmers' markets to purchase fruits and vegetables or provide food either on site or through meal delivery programmes. (D) Percentage of food insecurity identified with documented International Classification of Disease, tenth revision (ICD-10) Code Z59.4 across all sites. Physician education, reminder billing cards for computers and Best Practice Advisories for social drivers of health coding showed 2 special cause signals resulting in an increase from 38.3% to 70.5%. (E) Balancing measure of percentage of food insecurity identified but not discussed with families across all sites. Our goal was to stay below 20% during the project period (indicated by the green line).

screened for FI using a standard chart audit tool (online supplemental appendix I). The audits consisted of 20–30 charts, which were extracted by QI teams starting with the last eligible patient seen on the last business day of the month and working backwards chronologically to minimise duplication of newborns seen multiple times in

a month. This system of sampling was consistent with a state QI network that all three SC sites participate in. Data were entered into the AAP Quality Improvement Data Aggregating (QIDA) database to generate run charts with annotated PDSA cycles for clinical site internal review. Run charts were compiled from all sites for comparison



and collaboration. CC members shared their institutional successes and challenges during bimonthly collaborative meetings.

Measure(s)

Each site decided their target population and screening frequency based on internal priorities and resources (table 1). The primary process measures were screening 80% of eligible families for FI and appropriately coding for FI using the ICD-10 code, Z59.4 'Lack of adequate food'. The outcome/process proxy measure was offering food resource referrals to 80% of patients/families screening positive for FI. The balancing measure was maintaining a rate below 20% of missed opportunities for referral. A missed opportunity was defined as when a patient screened positive for FI, but it went unrecognised by providers/staff, resulting in a 'double loss' for families who revealed sensitive information without gaining benefit.³⁴

Screening results and family discussion, as well as passive and active referrals, had to be clearly documented within the EHR as occurring within a year of the chart audit to qualify. Passive referrals could be food resources added to a patient's after visit summary or a note in the chart stating a resource sheet was provided. For those

patients who had been screened earlier in the year prior to the chart audit, CC members were able to comment on whether it was stated during follow-up encounters that the family had or had not been able to connect to the recommended food resources.

Analysis

The AAP's QIDA platform was used for documentation of monthly chart audit metrics. Practices received individual site and aggregated data in monthly practice reports during the intervention phase, and all run charts were created with QI Macros 2022 Software Package Plugin for Excel. Creation of run charts was later transferred to Statistical Process Control Charts. Standard probability or Montgomery rules were used to identify special cause variation. All centreline shifts use the 8-point rule that corresponds to a p-value <0.01.^{43 44}

Results

During the project period, 4270 chart audits were completed, 3430 paediatrics patients were screened appropriately for FI and 525 were identified as experiencing FI. Twenty-three per cent of patients identified as Hispanic/Latino and 32% who were uninsured screened positive for FI (table 2). Of those identified,

Table 2 Demographics of paediatric patients screened for and identified with food insecurity at CC clinics (December 2020–May 2022)

Population demographics for patients screened for food insecurity (FI)*				
	N eligible charts audited	N (%) screened	N (%) with FI	N (%) without FI
Age				
Birth to 11 months	1076	898 (83)	125 (14)	773 (86)
12 months to 5 years	1772	1473 (83)	159 (11)	1314 (89)
6 years to 11 years	1022	768 (75)	175 (23)	593 (77)
12 years to 19 years	400	291 (73)	66 (23)	225 (77)
Race/ethnicity				
Black, non-Hispanic	1646	1255 (76)	131 (10)	1124 (90)
Asian, non-Hispanic	101	77 (76)	4 (5)	73 (95)
White, non-Hispanic	476	342 (72)	28 (8)	314 (92)
Hispanic/Latino	1670	1491 (89)	335 (23)	1156 (77)
Multiracial	53	45 (85)	2 (4)	43 (96)
Other	121	79 (65)	13 (16)	66 (84)
Unknown race/ethnicity	203	141 (69)	12 (8)	129 (92)
Insurance				
Public insurance	3602	2947 (82)	465 (16)	2482 (84)
Private insurance	480	321 (67)	10 (3)	311 (97)
Uninsured	171	148 (87)	48 (32)	100 (68)
Unknown insurance status	17	14 (82)	2 (14)	12 (86)
Total	4270	3430 (80)	525 (15)	2905 (85)

*Combined numbers from all CC clinic sites.
CC, Carolinas Collaborative.

24 patients were in the baseline data collection period. At baseline, one of the eight sites was not screening yet, four sites were screening on a small scale and three sites were already above the FI screening rate of 80%. The rate of FI screening shifted from a centreline of 68.5% to 86% with sustained improvement noted over twelve months, starting in June 2021 (figure 2A). The rate of positive FI screens was 15% throughout the project period (figure 2B). Food referrals offered to families reporting FI remained at 90%, which was above the goal of 80% throughout the project period, though variation decreased around the centreline. While all eight sites had passive referral processes (food resource handouts) in place at the project onset, during the QI period, the CC expanded from one to seven sites with active referral processes and increased access from 11 to 20 food provision services (figure 2C). FI diagnostic coding remained below the goal of 80% during the project period (except in month 15), but there was improvement noted with an increase from 38.3% to 70.5% in month 11 (figure 2D). The balancing measure remained well below the target of 20% of missed opportunities to discuss positive FI with a centreline of 9.5% (figure 2E). Dashboards were created of individual site run charts to highlight key local learning and practical strategies (online supplemental appendix II).

One medical student, one Master of Public Health Student, four Master of Science in Community Engaged Medicine students and 158 resident physicians were directly involved in FI advocacy and QI work during this project period. Through this QI effort, we were able to educate and train all paediatric trainees in two states, in total over 400 resident physicians, about how to address FI.

DISCUSSION

Summary

A two-state multisite QI project in a paediatric academic collaborative focused on FI showed collective improvement in all measures, particularly in rates of FI screening (shift from a centreline of 68.5% to 86% with sustained improvement noted over twelve months) and ICD-10 coding (increase from 38.3% to 70.5%), as well as in the variety of food resource referrals (increase from 11 to 20 food provision services). Twenty-three per cent of patients identified as Hispanic/Latino and 32% who were uninsured screened positive for FI, and teams were able to work with social workers (SW) and community health workers (CHWs) to tailor education and outreach efforts to assist these populations during the project period. The collaborative approach allowed for rapid implementation, dissemination and spread strategies for screening and building capacity to address FI.

Clinics were at different stages of FI screening at the onset, and run charts show improvement in screening rates at those sites in early phases and sustainment in screening rates at sites with more established workflows.

Clinics also showed significant improvement in documentation of ICD-10 codes for SDOH needs when identified. Accurate SDOH coding is critical to burgeoning efforts for reimbursement for SDOH screening and referral. This project assisted participating NC clinics in preparing for an alternative payment model that NC Medicaid launched in 2023 that required ICD-10 codes to meet the quality metric for FI screening and referral.

This QI project was optimised by designing multistakeholder teams to ensure adequate local and institutional support, using small tests of change to make improvements in individual clinics, applying multi-institutional knowledge about successes to spread wide effects of change and engaging resident and staff champions to promote sustainability. The use of a shared data collection and analytic system through QIDA was critical to monitoring improvements of individual and aggregate data.

Interpretation

Our study highlights how utilisation of a collaborative enabled this QI project to meet its goals of achieving and maintaining FI screening and referral rates across two states and eight academic programmes, despite the turnover that is a constant in resident teaching clinics. The CC was successful in meeting project objectives due to grant funding providing dedicated faculty time to engage in this work, a standard data infrastructure and a regular meeting cadence for project accountability and momentum building.

The collaborative provided a supportive quality framework and an infrastructure for rapid practice sharing, especially around capabilities of EHRs, data reports and community partnerships (eg, local WIC, food banks, food security coalitions) that would have taken years for each site to learn individually. Teams readily shared successes and failures that increased the wealth of resources and services available to patients across both states.

Data from individual sites showed similar upward trends in meeting screening and referral metrics per aggregated data. Individual sites cited their most effective and sustainable interventions as use of EHRs for screening and referral and the acquisition of additional staff or volunteers to help connect families to food resources. EHR use for screening was helpful in standardising screening workflows, limiting time spent by staff transcribing paper screens and offering automated prompts for screening and coding. Electronic systems for referral allowed better communication among the health-care team and the opportunity for standardised tracking and follow-up of referrals. Resource connectors took the form of family navigators, student volunteers, community health workers and social workers who could meet with families in-person or by phone to help navigate community resources.

The project period overlapped with the first and second year of the COVID-19 pandemic. Despite challenges in workloads and staffing shortages in primary care, there

was also an increased awareness of the importance of the SDOH and new opportunities to engage with patients via telehealth and with collaborative members via virtual meetings. With the end of the public health emergency, projects such as this highlight the importance of sustained engagement among health systems to address FI and reduce disparities. This work comes at a critical time as healthcare systems and payors recognise the importance of addressing SDOH in population health strategies as a requirement of Joint Commission accreditation and more value-based contracts. Paediatricians in the CC have been able to share lessons learnt with their hospital systems and help lead ongoing conversations and efforts around implementation of universal SDOH screening.

LIMITATIONS

The primary metrics reported in this project represent convenience sampling of deidentified chart audits from patients screened for FI. Charts were chosen in a manner to minimise duplication of newborns seen multiple times in a month and to align with the system of sampling used by the state QI network that all three SC sites participate in;⁴⁵ however, this process could have led to sampling bias. Completed chart audits were small as compared with overall clinic populations and may not be representative of the full sample as displayed in [table 2](#). Six of the eight sites remained below the North and South Carolina averages of 21% and 19% of household FI, respectively. While this may signal that not all patients with FI were identified in these safety net clinics, it also suggests that many were potentially not willing to express the need to their providers. Clinics also noted a change during the pandemic from all in-person visits to a mix of in-person and telehealth encounters. Only two sites screened for FI during telehealth visits ([table 1](#)).

Collaborative participation led to outcomes through different methods, and screening and management practices were not standardised across institutions. Clinic families were not directly involved in the design of this QI project; however, CC sites have sought family feedback on food provisions provided through informal surveys, and there has been more formal work at some CC institutions around eliciting caregiver feedback and experience with FI screening and referral.^{46 47} Additionally, we recognise that it is important to assess the effectiveness of our FI interventions, and while out of the scope of this QI project, several CC sites are individually assessing outcomes related to the effectiveness of food referrals.

CONCLUSIONS

While the AAP recommends addressing SDOH, health systems and practices experience barriers to implementing universal screening and referral processes that are effective and sustainable. Collaboratives, such as the CC, can scale FI screening and referral pathways across institutions and states. This

work reinforces the benefit of multicentre collaboratives for shared learning and to foster effective QI interventions, as well as to generate meaningful, sustainable change that impacts the health of our communities.

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Competing interests None declared.

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