Implementing a Community Engagement Model to Develop a Community-Driven Oral Health Intervention

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ABSTRACT

Background. Utilizing community-engaged research may result in interventions that reduce infant oral health disparities in underserved populations.

Objective. Develop community partnerships to create a sustainable infant oral health program that meets specific community-identified needs and provides an interprofessional education experience.

Methods. Partnering with the Homewood Community Engagement Center, researchers engaged and surveyed key community partners to assess the need for an infant oral health invention.

Lessons Learned. Community-identified organizing principles and barriers became the framework for, "Healthy Teeth, Healthy Me," a community-driven infant oral health program. Barriers, like access to care, were addressed with community-specific solutions like agreements with local dental clinical for referrals.

Conclusions. Community partnerships can be leveraged to develop oral health programs that fit specific community needs and provide resources to families at greatest risk for child dental caries. Community engagement can be utilized to modify the intervention to meet oral health needs of other vulnerable communities.

KEYWORDS: Health Education, Dental; Oral health; Infant; Community-Based Participatory Research; Stakeholder Participation; Interprofessional Education

BACKGROUND

Community-engaged research (CER) offers a framework for successful university-community partnerships aimed at improving oral health within communities.[1-4] CER recognizes that there is knowledge and mutual benefit in the shared partnership between academia and community.[5] Community members and collaborators, who are experts by experience, provide ideas alongside researchers who provide technical expertise and resources. The resulting interventions are more functional and sustainable because they are relevant to the life circumstances of people within the community.[3,5,6] Although several successful CER oral health interventions in various disadvantaged communities have been described in the literature,[7-9] more in-depth case studies describing the process of CER endeavors are needed. This manuscript fulfills this need specifically related to dental caries prevention.

Dental caries is the most common chronic disease of childhood, and can affect basic vital functions such as eating, speaking, and sleeping and impair growth and development.[10] Children from low-income, minority families have more caries and are less likely to receive treatment compared to children from white families with moderate- or high-income.[10,11] Communities may suffer disproportionately from chronic disease conditions, like poor oral health, because the social determinants of health heavily contribute to health disparities. CER offers a useful approach to reduce dental health disparities within a community because it engages those most impacted by the design and implementation.[3.5]

Engaging health professionals outside of dentistry is necessary when addressing oral health disparities in young children. Primary care providers are more likely to see infant patients than dentists and play an important role in promoting oral health and providing preventative oral health services.[11-15] Health care payors, such as Medicaid, recognize the effectiveness of

preventive oral health care provided in pediatric primary care settings,[15] and reimburse providers for preventive oral health services.[16] Social workers are in a unique position to implement multilevel interventions for those experiencing inequalities related to oral health.[17] Utilizing interprofessional education (IPE) in infant oral health is efficient, fosters collaborative care and adds to the educational experience of health professionals.[18-23] Despite the success of IPE in improving skills, knowledge, and attitudes of health professional trainees related to infant oral health, it has not been studied in the context of a CER intervention.

The aim of this paper is to describe the development of a CER initiative between an interprofessional research team and engaged community collaborators to develop "Healthy Teeth, Healthy Me," a sustainable infant oral health program that meets specific community needs and provides an IPE experience for health sciences trainees.

METHODS

Developing Partnerships

For this CER initiative, researchers from multiple health sciences disciplines at the University of Pittsburgh collaborated with key stakeholders and community members from Homewood, a predominantly Black neighborhood[24,25] in Pittsburgh, PA. Once a thriving working-class neighborhood, Homewood has declined in population and employment due to disinvestment. More than one-third of Homewood now lives in poverty, a rate much higher than that for Pittsburgh at large.[24] Despite being within a short physical distance of world-renowned medical centers and research institutions, the community has many unmet needs related to health, safety, education, and employment. To address these challenges, organizations within the community engaged in partnerships beyond Homewood to develop strategic revitalization plans and improve quality of life for its residents.[24-27]

Establishment of the Pitt Community Engagement Center (CEC) in Homewood in 2018 provided a physical space within the community where community partners can access expertise and resources from the University of Pittsburgh to provide residents with opportunities to improve their quality of life. Establishing a location within the neighborhood and making a long-term commitment to the community promotes the development of sustainable programs and builds trust with residents. In turn, the CEC provides a significant resource to the University by fostering community-partnerships and guidance for community-based work.[28]

The CEC served as an essential bridge between the researchers and community partners, playing a key role in engaging partners in the community. As an established and trusted presence in the community, the CEC enabled the development of reciprocal relationships with the following community partners:

1. Alma Illery Dental Clinic: a dental clinic within the primary health care center located in Homewood. The CEC facilitated development of a partnership with the Alma Illery Dental Clinic. To ensure families who participate in dental education programs through the CEC have access to this easily accessible dental clinic that accepts Medicaid insurance and provides services to young children, a Memorandum of Understanding (MoU) was developed in 2019 between Alma Illery and the University of Pittsburgh Schools of the Health Sciences.
2. Trying Together: a regional organization that supports high-quality early childhood education and runs The Homewood Early Learning Hub & Family Center.[26] They have ties to all the early childhood education initiatives in Homewood.
3. Homewood Children's Village: an organization that takes a dual-generation approach to transform families and the community by empowering parents with skills to maintain

stable, engaged, and healthy families, while providing educational support and programs to children so they can reach their academic potential and go on to earn meaningful employment, further strengthening the community.[27]

4. Homewood Early Learning Steering Committee: brings together community organizations and individuals who wish to provide a strong foundation during early childhood to the children of Homewood.[26]

Assessing Community Need

Researchers developed a community partner survey to ascertain whether an infant oral health program would meet a community need and to inform the development of a high-quality, tailored program. This cross-sectional survey included a mix of Likert-style, Yes/No and open-ended questions. The survey was reviewed by the CEC, Pitt Center for Teaching and Learning, and the Pitt Office of Child Development Research and Evaluation Team and deemed exempt by the Institutional Review Board at the University of Pittsburgh.

The survey was distributed to 20 longstanding community partners in Homewood and 11 responses were received. Survey results indicated a community need for infant oral health education. All (n=11, 100%) community partners responded, “definitely yes” or “somewhat yes” to the question, “Do you think that families in Homewood would be interested in learning about infant oral health?” The majority of community partners (n=9, 82%) responded “definitely yes” to the question, “Would a program that promotes infant oral health in Homewood support your organization’s mission?” Almost all community partners (n=10, 91%) responded “definitely yes” or “somewhat yes” to the question, “Do you think that families in Homewood experience barriers or challenges to keeping their children’s teeth and mouths from being healthy?”

Most importantly, the survey ascertained what infant oral health information was most desired by families in Homewood with the question, “What early childhood oral health education needs do you see in the community?” The most frequently identified needs were:

1. When should my child start going to the dentist?
2. How to keep teeth free from cavities
3. Toothbrushing assistance

Lastly, an open-ended question asked what barriers or challenges families in Homewood may experience that prevent keeping children's teeth and mouth healthy. The described barriers were analyzed using a rigorous inductive analytical technique known as memo writing, which involves actively interpreting and summarizing data, and refining the themes through a constant comparative method. Four common themes emerged:

1. Limited access to healthy food
2. Oral hygiene routines
3. Limited education
4. Poor access to care

See Figure 1 for example quotations that led to the development of the themes. The identified community needs became the organizing principles of the program, “Healthy Teeth, Healthy Me.” Solutions to barriers were incorporated into program development. Survey results were disseminated to all formal and informal community partners in the form of a newsletter.

Community Generated Intervention: Family Virtual Televisit

Originally, the intervention was planned as an in-person educational session by a dentist and health professional trainees at the CEC for families with children under the age of 3 years living

in Homewood. Families were to be provided with information about promoting oral health. The children would then receive an oral health assessment and topical fluoride application. For children who required follow-up care, referrals would be facilitated.

Ultimately, the COVID-19 pandemic necessitated changes to protocol. In-person visits became virtual televisits with families through Zoom. This session included a toothbrushing demonstration with fluoride toothpaste and review of resources and study materials which were provided to the participating families through contact-free porch drop-off. The information and resources were tailored to address the needs identified in the community partner survey (Table 1).

The organizing principles that formed the foundation of the televisit were focused to specifically address the following areas:

"When should children start going to the dentist?" The family televisit emphasized the recommendation that the first dental visit occur by 1 year of age.[13,29] To facilitate scheduling of dental visits, a dental provider referral sheet was included in the porch drop-off materials. The referral sheet listed providers who accept children under 3 years-old with Medicaid insurance in the local area. The aim of informing families when children should start seeing the dentist and facilitating the scheduling of the dental visit was to improve families' access to early dental services and addressed themes 3 and 4 identified by the community partner survey.

"How to keep teeth free from cavities." During the family televisit, the impact of diet on dental disease was emphasized. Members of the research team from the School of Social Work developed recommendations for promoting a healthy diet in the context of a food dessert and the diet information was included in the porch drop-off. This addressed theme 1.

"Toothbrushing assistance." The family televisit included a demonstration of tooth-brushing with fluoride toothpaste. Families were also provided with toothbrushes and fluoride toothpaste in the porch drop-off. Strategies for overcoming barriers to establishing morning and evening oral hygiene routines were discussed including the presence of multiple caregivers, brushing teeth in the car, in the bath, and promoting the American Academy of Pediatrics "Brush, Book, Bed" evening routine. This information was included to address theme 2.

Community-Generated Intervention: Interprofessional Infant Oral Health Education

As part of "Healthy Teeth, Healthy Me," researchers developed and provided infant oral health education program for dental trainees, pediatric medical residents, pediatric nurse practitioner students and social work trainees with the goal of providing infant oral health education to all trainees and fostering collaboration between them. The development of each session occurred with the organizing principals and themes identified by community partner survey in mind. During the first session, trainees attended an infant oral health presentation. The presentation included quotes from the community partner survey as rationale to trainees about the importance of their role in promoting infant oral health. For example, "It may also be helpful to increase networking with pediatricians to encourage the dental visit before the teeth erupt." Trainees then discussed a case study in small interprofessional break-out groups. The case study was set in Homewood and designed specifically for this educational session with the organizing principals and themes woven throughout the case. Group discussions focused on identifying barriers and developing practical solutions that each profession could contribute to overcome the barriers faced by the family. The second session provided trainees with hands-on practice in applying fluoride varnish and discussing children's oral health with families. This session reinforced the organizing principals and themes discussed in the first session, including the importance of

consistent oral health messaging across providers. During the optional third session trainees were able to observe a "Healthy Teeth, Healthy Me" virtual televisit with a family in Homewood. By the end of the first year, 78 trainees (22 social work, 4 pediatric nurse practitioner, 38 pediatric medicine residents, and 14 pediatric dentistry residents) participated in the program.

Seeking Continual Feedback

Although feedback was sought from the community in the initial stages of developing this intervention, the researchers wanted to ensure that all the identified community needs were adequately addressed. The researchers utilized their partnership with the CEC to facilitate a presentation to the Community Research Advisory Board (CRAB) at the University of Pittsburgh. The CRAB consists of faculty and community collaborators and is designed to provide feedback to researchers planning projects with historically underrepresented or vulnerable populations to ensure the projects are culturally sensitive and relevant to them.[30] The CRAB provided valuable feedback that the researchers were able to incorporate (Table 2).

LESSONS LEARNED

"Healthy Teeth, Healthy Me" is an innovative method to provide information and resources to families at greatest risk for child dental caries that also provides an IPE experience for health professional trainees. Utilizing collaborator engagement throughout design of the intervention facilitated development of a program that met the specific needs of the Homewood community. Collaboration with the community at every stage of project development is critical for successful CER.[31] Conducting CER that simultaneously meets the needs of the community and researchers may seem like a daunting task. Through the experience with this project, the researchers learned that the solutions and interventions were easy to develop after seeking out information from the community. The community members and collaborators are experts in their community, its

resources, and its needs. They provided the researchers with the information needed to develop an intervention that addressed met their needs. Each community partner provided unique contributions related to the project development, recruitment, and implementation. In turn, the researchers provided service to the community including facilitating donations or providing educational expertise at events sponsored by community partners in Homewood. The reciprocal nature of these actions strengthened the relationship between the researchers and community partners, which strengthened the researchers' ties to the community.

Another unique aspect of this program was the development of the MoU with the local community health clinic. The goal of the MoU was to build trust by supporting the priorities of the community and protecting the financial interests of the community health system. This formal agreement fostered a sustainable, long-term relationship to equalize the partnership and promote mutual benefit. This MoU sets the stage for other investigative teams at the University by providing a new mechanism to facilitate work within and beyond the University.

Additionally, the researchers trained Alma Illery dentists and staff with the same infant oral health curriculum used by the "Healthy Teeth, Healthy Me" program to ensure consistent messaging between the program and in the clinic.

Seeking continual and iterative feedback throughout the development of the intervention connected researchers with new community partners, such as the CRAB. Each revision of the protocol was driven by new information collected from the community and enriched the final product. The strength of this CER oral health project, including the sustainability through the COVID-19 pandemic, rested on the strength of the structured relationship of the academic-community partnership in which the power-sharing dynamic was transparent and protected through continuous engagement.

Including an interprofessional training component to the program was another strength of this CER initiative. The methodological complexity and diverse skills needed to conduct CER and address the multifactorial causes of dental caries, necessitated an interdisciplinary research team. The researchers felt it was important to promote that same collaborative spirit within health professional trainees because interprofessional collaboration is key to improving patient outcomes and reducing fragmentation of care.[32] By giving dentistry, medicine, nurse practitioner, and social work trainees the opportunity to train and work together, trainees were able to develop a deeper understanding of the role each profession can play in solving complex community problems. Feedback from the IPE component will be fully described elsewhere, but, briefly, it was overwhelming positive and resulted in increased competence related to infant oral health and fluoride application. These results support the body of evidence that IPE experiences in oral health improve trainee knowledge and skills.[18-23] A unique aspect of the IPE component of this program was including social workers. Although social workers cannot provide preventative oral health services, they can use the increased knowledge to promote infant oral health and link clients to services that reduce oral health disparities. Additionally, the successful IPE component promotes sustainability of the project. The IPE content has been incorporated to the curriculum in each of the health sciences schools. Each new cohort of trainees provides incentive to keep the program active. To date, two cohorts of trainees have participated.

"Healthy Teeth, Healthy Me" was developed in a way that was flexible and could accommodate both in-person and virtual engagement within the community. Cancelation of community meetings and events due to COVID restrictions limited the researchers' ability to be physically present in the community, challenging the team to modify protocols to a virtual platform and find innovative ways to be present in the community, such as video public health announcements.

This highlights the ability of the program to be adaptable to other communities with unique needs. Additionally, decreased access to dental services during the pandemic disproportionately affected communities already experiencing health inequities, like Homewood,[33] underscoring the importance of continuing to develop these creative virtual platforms which allow for continuous engagement.

A limitation of this project is that despite continuous collaborator engagement throughout program development, they did not formally evaluate the collaborators' experiences. Ethical CER should have a formally evaluative component.[34] There are surveys available for evaluating collaborator engagement that can and should be used in future CER efforts. This project was also only implemented at a single site with unique resources and barriers. Although the researchers feel this approach to developing a tailored community intervention could be utilized in other settings, generalizations cannot be made that it will be successful in those settings. Finally, low response rate to the community partner survey was a limitation. However, researchers were reassured that all the community partners who responded were partners focused on the well-being of children and families in Homewood. Those who didn't respond were from organizations addressing other community needs. While their insights would have been valuable, the researchers feel those who did respond adequately described community needs.

CONCLUSIONS

The CER process described in this manuscript is an example of emphasizing the local relevance of dental caries as a public health problem. Future directions could include utilizing this approach to develop similar community-driven interventions in Homewood and to develop tailored oral health interventions for other underserved communities.

DECLARATIONS

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Consent to participate: For this this minimal risk study, web-based consent from all survey participants was obtained using the secure Pitt-licensed software, Qualtrics.

Consent for publication: All authors approved the final manuscript for submission and publication.

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Code availability: Coding software was not used in the preparation of this manuscript.

Authors' contributions: All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Jacqueline M. Burgette and Cynthia Chew. The first draft of the manuscript was written by Cynthia Chew and all authors commented on previous versions of the manuscript. All authors approved the final manuscript for submission and publication.

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Table 1. Oral Health Resources in the "Healthy Teeth, Healthy Me" Contact-Free Porch Drop-Off

Child Oral Health Need Identified by the Community Partner Survey	**Oral Health Resource**
"When should children start going to the dentist?"	• Infant Oral Health Referral Sheet for Children under 3 years-old with Medicaid Insurance
"How to keep teeth free from cavities"	• Healthy Drinks, Healthy Kids "Summary Flyer" of the Cup Infographic: https://healthydrinkshealthykids.org/professionals/ • National Maternal and Child Oral Health Resource Center "Coronavirus Disease and Oral Health: Information for Parents About Promoting Good Oral Health at Home": https://www.mchoralhealth.org/announcements/covid-handouts.php
"Toothbrushing assistance"	• American Academy of Pediatrics "Brush Book Bed" Poster: https://downloads.aap.org/AAP/PDF/BBBPoster.pdf • American Academy of Pediatrics "Brush Book Bed" Parent Handout: https://downloads.aap.org/AAP/PDF/BBB_Parent_Handout.pdf • American Academy of Pediatrics "Fluoride Cavity Fighter": https://ilikemyteeth.org/learn-and-share/fluoride-cavity-fighter/ • American Academy of Pediatrics "Why Do Children Need Fluoride": https://ilikemyteeth.org/fluoridation/effects-of-fluoride/ • Oral Health Supplies: Adult toothbrush (for caregivers), Junior toothbrush (for older children that may be in the family), Infant toothbrush (for the child in the program), Full-size tube of fluoride toothpaste.

Table 2. Response to CRAB Feedback

CRAB Recommendation	**Response**
Change the project name and add a logo to make the program less formal and more appealing to families with young children	• Project name was changed from "Infant Oral Health Project" to "Healthy Teeth, Healthy Me" • Recruitment materials were modified in collaboration with the Clinical Translational Science Institute at the University of Pittsburgh (Figure 2)
Add an incentive for participants	• The researchers applied for follow-on funding to enable provision of participant incentives
Additional recruitment efforts can take place at hair salons and church daycares	• Permission to advertise at church daycares and hair salons was obtained • Researchers connected to local businesses through the assistance of the CEC

Figure 1. Community Identified Themes on Barriers to Infant Oral Health with Selected Quotations

1. *Limited access to healthy food:* Food deserts prevent a healthy diet, and families need education about how a healthy diet is related to a healthy mouth.
   - "Food desert prevents healthy eating choices"
   - "There needs to be more of a discussion regarding healthy diet, healthy body, healthy mouth and how all these are interconnected. It needs to be collaborative with medical and dental all on the same page making this a reality for all patients. If patients are seeing that it is coming from the medical and dental providers there's a likelihood of understanding the importance of diet and good health & teeth and good health. Also it's a message that needs to be repeated at every well-child visit and dental visit."
2. *Oral hygiene routines:* Families need assistance with the logistics of performing home oral hygiene activities, such as how to incorporate tooth brushing within morning and evening routines when there are different caregivers in the home at different times of day.
   - "Many parents/guardians don't get to see their children off to school. Many children are expected to get themselves ready for school due to parent/guardian schedule, caring for younger siblings, etc. Lack of knowledge related to how often to brush teeth"
3. *Limited education: Address* families' lack of understanding of the importance of early intervention regarding dental care.
   - "It would be helpful to be proactive and offer a talk about the above topics in an environment like Pitt's CEC in Homewood. Parents may not be aware of their options and the importance of early intervention regarding dental care."
   - "Lack of education is a barrier."
4. *Poor access to care:* Families lack resources to access early dental services.
   - "A listing of Pediatric dental providers which accept different types of insurance is needed. Also, if children are to attend a dentist as young babies, why is it so difficult to locate and get transportation to providers? Therefore accessibility to transportation is a barrier."
   - "Access to assistance to pay for dentist appointments."
   - "It may also be helpful to increase networking with pediatricians to encourage the dental visit before the teeth erupt - actually giving parents the phone contact for pediatric dentists and printed information."

Figure 2A. Initial recruitment flyer

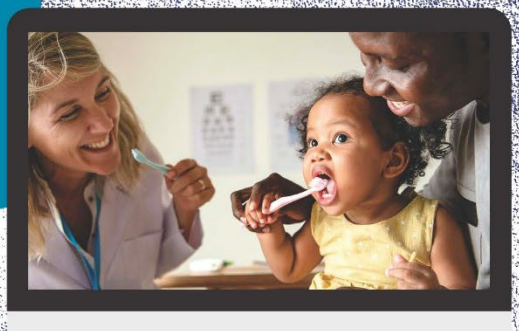
Family Infant Oral Health Televisit

This research study involves meeting one-on-one with mom and Pediatric Dentist, Dr. Jacqueline Burgette, D.M.D., Ph.D., for a Televist (via a video-conference platform) to receive:

- Information on Infant Oral Health
- A Brief Oral Health Consultation
- Support Coordinating Care for Dental Needs

Participants Must:

- Be Age 18 or Older
- Have a child under 3-years old
- Live In Homewood



For more information and to schedule an appointment email Dr. Jacqueline Burgette at jacqueline@pitt.edu

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Figure 2B. Revised recruitment flyer

Figure Caption

Figure 1. Responses to an open-ended question about community specific barriers related to infant oral health were analyzed for themes using the memo writing technique. Four themes emerged. The figure provides example quotes from the partner survey related to each theme.

Figure 2A. Original recruitment flyer. **2B.** Updated recruitment flyer incorporating feedback from the CRAB and developed in conjunction with the Clinical Translational Science Institute. Note the inclusion of the less formal project title "Healthy Teeth, Healthy Me" and decreased word count and jargon.