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Implementation evaluation of three community-clinical infection-related cancer prevention and control programs in New York City: Lessons learned from leveraging community health worker strategies to enhance reach and fit for Asian American communities

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Introduction

In the United States, Asian Americans (AA) and other minoritized groups experience a greater burden of infection from *Helicobacter pylori* (*H. pylori*), hepatitis B (HBV), human papillomavirus (HPV), and their associated cancers, stomach, liver, and cervical respectively.^{1–3} Foreign-born AAs are at particular risk for morbidity and mortality from these cancers due to the high prevalence of these infections in countries of origin.^{4–6}

In New York City (NYC), historically underreached AAs experience health disparities due to increased risk for infection-related cancers and the impacts of social determinants of

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Statements and Declarations

Declaration of Conflicting Interests: The authors, Lee, Kranick, Foster, Chebli, Yusuf, Trinh-Shevrin, and Kwon, declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Considerations

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Approval for this research was obtained from the NYU Langone IRB, i20–000134.

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health.^{7,8} To address this, programs employ community health workers (CHWs), lay health workers (LHWs), or patient navigators (PNs), which we simplify to “CHWs” throughout, to bridge gaps with health systems, build trust, support language concordance, and improve health outcomes.⁹ CHWs can perform unique functions to facilitate the implementation of evidence-based interventions (EBIs) for cancer prevention and control in underserved communities.¹⁰

Implementation science provides important scientific rigor to the understanding of the practical circumstances that may impact EBIs implementation. In order to identify the multilevel factors that influence the implementation of CHW-led programs, we utilized the Consolidated Framework for Implementation Research (CFIR).¹¹ While CFIR is predominantly used in healthcare settings, it’s important and relevant to see if key implementation science frameworks can also be used to guide work in community settings as well. In doing so, we hope to gain a better understanding of how implementation determinants, such as factors from CFIR, function in dynamic community settings and can contribute to tailoring of future implementation effects and strategies to optimize CHW-led community-clinical programs.

To contribute to growing evidence of CHW-delivered interventions to advance health equity, we describe the implementation evaluation of three community-engaged infection-related cancer programs implementing EBIs through CHW-led implementation strategies (for overview of programs, see Table 1) and focused on AAs in NYC: 1) a CHW-delivered *H. pylori* program which provides culturally and linguistically tailored education on medication adherence and stomach cancer prevention to Chinese and Korean American patients, who tested positive; 2) an LHW/CHW-delivered HPV program which provided education on cervical and breast cancer screening to Muslim women, primarily South Asian, who were randomized to receive patient navigation to Pap and mammography screenings by CHWs;¹² and 3) a PN/CHW-delivered HBV liver cancer prevention program, which provides patient navigation to AA and other priority communities with HBV, linking them to screening, vaccination, treatment, care, and support services to prevent liver cancer and other chronic liver diseases. In this manuscript, we describe lessons learned to inform related initiatives that leverage CHWs to implement EBIs focused on alleviating health disparities among Asian Americans.

Methods

Design

We conducted semi-structured key informant interviews with multi-level stakeholders (leadership, managers, and CHWs) to assess three programs that leveraged CHW-deliverer strategies to facilitate program reach and fit.

Interview Guide/Procedures

Using a framework-driven pragmatic qualitative approach,¹³ the interview guide and analysis were primarily guided by the Consolidated Framework for Implementation Research (CFIR),¹¹ which consists of constructs across five key domains (Innovation, Outer

Setting, Inner Setting, Individuals, Implementation Process; Table 2) and is widely used to design and conduct implementation evaluations. The interview guide was pilot tested with two eligible participants who provided very minor feedback, as such, those two pilot interviews were included in the final sample. The focus was to identify factors critical to the success of CHW delivered strategies to optimize community-clinical EBIs among AA communities.³

All interviews were conducted and recorded virtually between November 2020 – March 2023 by a female interviewer (JK; MPhil, MA, Project Manager), not affiliated with any of the programs and with no prior expectations to outcomes, with support from another researcher (ML) in preparation for interviews.

Recruitment and Data Collection

Potential participants were identified by program leadership and contacted by evaluation staff through e-mail, informing them about the evaluation and asking if they were interested in participating. Some interviewees were aware of this project and previously known to the interviewer, while others were not. Interviews were conducted via zoom and audio recordings were transcribed verbatim, de-identified, and uploaded to Dedoose without corrections from participants.¹⁴ No additional individuals were present at interviews. The interviewer kept jottings as the interviews were carried out.

Analysis

Two experienced coders (ML & JK) not affiliated with the programs, independently coded all transcripts and met weekly to discuss and compare preliminary findings using the constant comparative method.¹⁵ Additional codes were added regarding infection-related cancers and COVID-19 impacts. Evaluation results were shared with each program to be validated through a member checking process and to help inform future related efforts.

Results

The final sample included 16 key informants, (6 from the Hep B program, 5 from the cervical cancer screening program, and 5 from the *H.pylori* program), with an average of five interviews per program and 2–3 CHWs interviewed per program. No individuals invited to participate refused. Average duration was 52 minutes (range: 24–91 minutes). The sample size reflects the small implementation teams that were carrying out these three projects. However, in line with published guidance, interviews were conducted until the point of data saturation—that is, interviews with leadership, managers, and CHWs for the three programs ceased once all three levels had been interviewed and subsequent interviews did not lead to identification of new insights into the implementation processes and outcomes or other eligible participants at that level did not exist (i.e., there were no other program leadership or managers that worked on that program).^{16,17} Findings were organized across CFIR domains (see Table 2), with four overarching thematic lessons learned that were derived from the data after all interviews had concluded.

Theme 1: Sustaining Engagement and Buy-In from Multiple Implementation Partners.

Aspects of the ‘individuals’ domain from CFIR, in the form of institutional and organizational buy-in, both initial and sustained, were important factors related to implementation success for each program.

Subtheme 1.1: Long-term engagement of site champions: For example, site champions (physicians at hospitals, small practices or clinics, faith leaders) were key to facilitating initial integration and implementation for the programs. Champions who understood the project and valued how it could improve patient health tended to provide strong support for the CHWs integration into routine processes and physical spaces. “It’s really the champion, the clinic and the manager at that work site, that makes a difference. It makes it so much easier knowing someone at the site is fully supporting you.” (H. pylori, CHW)

Because doctors were considered trusted figures, high-level cooperation with doctors and their teams improved implementation outcomes. Warm hand-offs from doctors who presented CHWs as part of the care team improved engagement. One program manager with the *H.pylori* program reflected:

“...in the Chinese community, doctors are a very highly trusted figure of authority, and if doctors even just say a few words to their patients around how this study would be good for you to participate in, someone would be calling you soon. Even just that little introduction, so they don’t even know the specifics of the study would, kind of, prime the patient, so that they may be more receptive to that first call from the CHW.” (H. *pylori*, Program Manager)

Moreover, continued support from champions, including reminding clinic, CBO, and FBO staff about the program, facilitated program acceptance and recruitment over time.

“Engaging and really making sure that we had buy-in from leadership at the mosque to facilitate our efforts and they were able to make announcements about the project... Making sure our CHWs were really attuned to, and leaders as well within FBOs or CBOs to really make sure that we were able to maximize the reach and impact of some of our efforts too.” (HPV, Program Manager)

Theme 2: Prioritizing Both Recipient- and Deliverer-Centeredness

Key informants highlighted several relevant factors regarding the ‘inner setting’, such as the importance of prioritizing both recipient- and deliverer-centeredness, and the importance of engaging CHWs in implementation decisions. Given that CHWs were from similar communities as program recipients, they filled a unique role to build and sustain trust. Each program also valued input from communities, prioritizing recipient-centeredness, as suggested by a program manager with the HBV program:

“Having that one person that speaks your language, that understands your culture, to be there, especially to just make sure that you understand what your doctor is saying to you, how important it is.” (HBV, Program Manager)

Subtheme 2.1: Recipient-Centeredness: Informants noted that CHWs had a deep knowledge of the communities they were working with and could tailor engagement to enhance trust and reach. Across programs, the CHWs provided key program components in recipients' primary languages and centered cultural relevance.

"A lot of our patients have a stigma about the disease so we had to kinda tailor in a way that they feel comfortable discussing about their chronic condition." (HBV, Program Manager)

Given the complexity of the NYC transportation infrastructure, CHW-deliverer familiarity with navigating neighborhoods and local transit further facilitated recipient engagement with the programs. One HPV program CHW reflected on the difficulty some participants had with transportation, stating "In terms of transportation, they didn't know how to come."

Deep understanding of community knowledge of each infection and cancer, and the ability to adapt content accordingly was another important facilitator. Limited community awareness about the relevance of the disease was a primary issue for HPV program engagement. "They don't even know what cervical cancer is, a lot of community members." (HPV, CHW) And for the *H. pylori* and HBV programs, participants' general concerns about cancer and lack of knowledge about infection treatment were important factors for deliverers to address:

"First, they worry about this disease.... It's, you know, telling them that this is a very common condition, like 60% of world population, get it. And just Chinese, Asians, have higher rates, but the treatment is very effective, so don't worry." (*H. pylori*, CHW)

Subtheme 2.2: Deliverer-Centeredness: All programs maintained regular team meetings where CHWs could reflect on issues that arose in the field, brainstorm solutions, and share resources. These meetings were highly valued by all CHWs and was emphasized as a source of encouragement, learning, and connection.

"For the CHW team management, it's really good to have weekly or biweekly, periodic, regrouping, and sharing, discussing the learning from each other and also assuring there's always support, and constantly fine-tuning the best practices." (*H. pylori*, CHW)

The importance of CHW-centeredness was noticed and described as highly effective by implementation leadership as well, referring to weekly calls as 'an important source of support for the CHWs to help troubleshoot issues that they were having with recruitment or delivering the education.'

Theme 3: Program Flexibility

Related to the 'innovation' domain, particularly the 'adaptability' construct, each program was flexibly designed to be tailored to accommodate a variety of implementation settings and to meet shifting community dynamics and priorities. For example, as described by one program manager "There's always a lot of flexibility, and it's written in a way for the

organizations to fit it into their organization, like, within their organization structure and how they do things.” (HBV, Program Manager)

Subtheme 3.1: Flexible Recruitment: Each setting presented unique challenges and opportunities for program recruitment. For the HBV program, one clinic-based site was focused on pregnant women and able to use the electronic health record (EHR) to find eligible participants, while non-EHR sites had to actively recruit participants from the community. Similarly, the HPV program recruited participants from both CBOs and FBOs, which required different engagement strategies for recruitment. For example, in FBO sites, recruitment was embedded within activities typically carried out at mosques (e.g., small group meetings and communal meals) and was facilitated by mosque leadership.

Finally, the *H. pylori* program initially designed an EHR component to facilitate recruitment, medication adherence, and follow-up; however, some sites did not have EHR access, so the program was adapted for physicians to identify and refer participants directly to the program, as noted by the Principal Investigator: “The way we learned about potential participants, was different for each of the sites that were not on our EHR.”

Subtheme 3.2: COVID-19: CHWs across all programs adapted outreach and case management to address participants’ emergent needs during the COVID-19 pandemic and were well-positioned to be responsive and ‘shift how they were addressing that and helping to also include other connections to other resources and needs that they had at the time (*H. pylori*, Project Coordinator).’ This helped to sustain longer-term participant engagement while fieldwork for the programs was paused, as well as when the programs started back up again.

Theme 4: Interoperability between the Program and Inner Setting

The administrative requirements of CHW-delivered programs did not always fit well with the needs of the organizations where the programs operated, or of partner sites, and were described as implementation “pain points.”

Subtheme 4.1 Interoperability Hurdles: Administrative barriers impacted program compatibility with organizational requirements and workflows. For example, programs housed in large institutions, tended to have administrative barriers to program implementation, including complex hiring and onboarding processes, training requirements, and payment methods as noted by the Principal Investigator of the HPV program:

“The major, major challenge was in recruiting and paying the CHWs. And that was a major issue structurally, because, you know, we, we had to pay them as what we call consultants and to onboard a consultant is a very complex process that necessitates a lot of digital literacy, which our CHWs did not have.”

The HPV and *H. pylori* programs noted barriers related to IRB oversight at large hospital systems, which primarily oversee clinical rather than community-based research. Simplifying consent forms to accommodate a ‘low health literacy patient population,’ proved challenging.

Subtheme 4.2: Balancing Program/Funder vs. Community Priorities: As another example, for interventions that were part of a research study, finding the balance between completing the research study as approved by the funder, while minimizing deliverer and recipient burden proved challenging. A Program Manager (HPV) noted the tensions between balancing rigorous data collection, the ‘breadth and depth in the information,’ for the study and the ‘burden’ for both the participants and the CHWs conducting surveys, was a ‘pain point.’

Discussion

Our implementation evaluation of three CHW-delivered cancer programs generated lessons learned to enhance implementation of community-clinical linkage programs for AAs in NYC. These findings can inform other efforts to implement culturally-tailored CHW-delivered interventions for AA and other underserved communities, to advance health equity. Key takeaways and lessons learned include the following:

- Initial implementation can be improved by capturing the perspectives of key partners early and maintaining engagement and buy-in through the program, particularly from site champions.
- The unique nature of deliverer- and recipient-centered CHW-delivered programs allows deep engagement with underserved communities. Deliverers with in-depth knowledge of the community and its assets, can successfully facilitate navigation to care and other services. This is best achieved when CHWs have adequate support (regular meetings).
- Designing flexible programs allows for accommodating real-time changes to meet community dynamics.
- Understanding and preparing for interoperability between the program and the inner setting is essential. Planning for known ‘pain points’ should be considered to avoid delays and complications.

These results are similar to those found in several recent studies that evaluated evidence-based cancer interventions implemented with CHWs.^{18–20} One study, which examined a breast, cervical, and colon cancer screening intervention among Latino communities, found that CHW navigation improved screening, and that personal knowledge of, and connections within, the community as well as integration within medical teams improved recruitment and success.¹⁸ Another study, focused on colorectal cancer screening among predominantly uninsured Hispanic populations along the US-Mexico border similarly found that CHWs improved reach and completion of screening, while noting the benefit of culturally tailoring materials and multiple institutional barriers, such as establishing contracts.¹⁹ Finally, another study focused on colorectal cancer screening among Filipino Americans in Southern California leveraging community health advisors, found that their personal connections facilitated recruitment of participants and that engagement with leadership was crucial to program success.

Utilizing the CFIR framework for this analysis strengthened the foundation upon which we carried out this evaluation. The CFIR framework provided robust domains and conceptualizations that worked well within the context of community settings and community-clinical linkages and should be considered in future community-based evaluations. Recent work has applied CFIR to evaluate implementation efforts in schools,²¹ community-based diabetes programs,²² and college campuses.²³ This study contributes to the growing body of literature on applications of CFIR outside of clinical settings.

A limitation to this work is that this evaluation was not planned prior to the implementation of each program, therefore many key elements were not collected during active implementation that may have further informed this analysis. Additionally, some of the Program Directors/Principal Investigators from the programs are included as co-authors, which could introduce some bias, however none were directly involved in data collection, analysis, or interpretation and thus did not influence these results but did validate them based on their experiences. Furthermore, at the time of our evaluation, each project was at a different phase of implementation, making cross-program comparisons challenging. Despite the small sample size of our evaluation, one strength is that we were able to interview almost all individuals directly involved with implementing these programs. The evaluation was further strengthened by the utilization of CFIR domains to guide this implementation evaluation. This work highlights opportunities to advance the growing body of work that applies CFIR not just to healthcare settings, but also to diverse community settings.

Conclusion

Infection-related cancer disparities are strongly patterned by social determinants of health for minoritized racialized, ethnicized, and immigrant communities. Optimizing CHWs to enhance the reach and fit of cancer control CHW interventions and other programs focused on community-clinical linkages within these communities is critical for advancing health equity. This implementation evaluation identifies and provides key considerations for future CHW-delivered cancer programs.

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Data Availability Statement:

De-identified datasets generated and analyzed by the present study may be made available upon reasonable request to the corresponding author. Depending on the nature of the request, additional data-sharing agreements may be required. Additional information related to the study and relevant meta-data is currently being uploaded to the Cancer Prevention and

Control Research Network (CPCRN) Dataverse, located <https://dataverse.unc.edu/dataverse/cpcrn>

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Table 1:

Overview of Programs

Study/Program	H. pylori testing and treatment; stomach cancer prevention	Cervical cancer Screening (Pap smear test); cervical cancer prevention	Hepatitis B patient navigation program; liver cancer prevention
Key Deliverers	CHW	CHW/LHW	Patient Navigator
Evidence-Based Intervention	H. pylori testing and adherence to treatment	Pap smear test	HBV screening and linkage to care and treatment
Implementation Strategy	CHW-delivered culturally- + linguistically- adapted patient education to facilitate H. pylori testing and treatment adherence	Community navigation with linkages to health providers	Community outreach and linkage to health providers
Population(s) of Focus	Chinese Americans with confirmed H. pylori diagnosis	South Asian populations, Muslim women	Chinese and Korean Americans positive for HBV
Inner Setting	Hospitals, clinics, small provider practices	Community-based organizations, Mosques, homes of participants, parks	Hospitals, Community-based organizations, Community Health Centers
Outer Setting	The communities being served and engaged by the CHWs/LHWs/Patient Navigators.		
Reach	July 2017 – June 2024 314 screened for eligibility 275 eligible 135 enrolled in the study 17 dropped out	March 2017 to September 2018. 477 screened for eligibility; 428 eligible 7 lost to follow-up or later ineligible	From 2015 to 2021, the program served 2,295 people currently living with hepatitis B at 10 health organizations. Three of the organizations primarily served Asian Americans. This program is ongoing

Table 2.
Overview of CFIR Domains, with Construct Example, and Example Application

CFIR Domain + Definition	Example Construct(s) + Definition	Example Application
Innovation (The “thing” being implemented, e.g., a new clinical treatment, educational program, or city service.) ^a	Adaptability (The innovation can be modified, tailored, or refined to fit local context or needs.) ^a	“We have a program, but we want them to adapt it to the organization's needs...So that's kind of been like, like the successes of the program has been based on those two things, buy-in and like, how they utilized the program to their own needs.” (HBV, Program Manager)
Outer Setting (The setting in which the Inner Setting exists, e.g., hospital system, school district, state.) ^a	Partnerships & Connections (The Inner Setting is networked with external entities, including referral networks, academic affiliations, and professional organization networks.) ^a	“We were able to leverage some of those communications products...to offer an entry point to community outlets we've used for recruitment, so mostly FBOs, but also tapping into the networks of our CHWs, informal networks through their peers, but also their prayer groups, who they were seeing with their kids. You know, just like, kind of, using those networks to recruit. But those [communication] campaign resources, I think, were really helpful to foster that conversation.” (HPV, Principal Investigator)
Inner Setting (The setting in which the innovation is being implemented, e.g., hospital, school, city.) ^a	Deliverer-centeredness (There are shared values, beliefs, and norms around caring, supporting, and addressing the needs and welfare of deliverers.) ^a Structural Characteristics (Infrastructure components support functional performance of the Inner Setting. Note: Use this construct to capture themes related to Structural Characteristics that are not included in the subconstructs below.) ^a	“The CHW piece was hard, right, 'cause we wanted to make sure that we were, again, representing the diversity of the population within New York City, which meant that we had to identify and recruit CHWs from all over New York City, including Staten Island. We actually had a Staten Island person on this project. But again, you know from like different ethnicities, different races and stuff. So it was hard to bring them all together, which we needed to do for the training, but to make sure that we were also, like, all on the same page at the same time in terms of where the study was. So that was a big hurdle, I think, to overcome.” (HPV, Program Manager)
Individuals (The roles and characteristics of individuals) ^a	High-Level Leaders (Individuals with a high level of authority, including key decision-makers, executive leaders, or directors.) ^a	“You have to kind of lay the groundwork...you have to kind of get the buy-in from the site, the medical director, and the site director. We think that's probably the best way you can get significant involvement from the site. It is definitely important, for acceptance. It's a little easier with the smaller providers, you just have to talk directly to their own practice.” (H.pylori, Program Manager)
Implementation Process (The activities and strategies used to implement the innovation) ^a	Reflecting & Evaluating (Collect and discuss quantitative and qualitative information about the success of implementation.) ^a	“We had great recruitment and retention from the South Asian populations that we're looking at, the Southeast Asian populations that we're looking at, to some extent the Middle Eastern. But I think we're trying to hit some targets within the African American and African immigrant populations that were little harder to reach and I think it was just because of our lack of track record, honestly, in those communities too. I think we obviously have trusted relationships and networks within some of those other groups, but the groups that we didn't have as much of a relationship with it was a little harder, which we tried to kind of work towards.” (HPV, Program Manager)

^aCFIR domains, constructs, and definitions verbatim from Consolidated Framework for Implementation Research. CFIR. 2024. Accessed 6/10/2024. <https://cfirguide.org/constructs/>