Community Health Worker (CHW) Integration Pilot in Federally Qualified Health Centers (FQHCs) in North Carolina
Final Evaluation Report

Partners In Health (PIH) - United States

August 2024

Amy Kryston, Monitoring Evaluation Research & Learning (MERL) Officer

Dr. Emma Jean Boley, Technical Lead MERL

Melinda Gomez, Impact Officer

Nicolle Miller, Senior Project Lead

Dr. Devin Worster, State Director, North Carolina (Principal Investigator)

Acknowledgments

Funding Agencies – US Centers for Disease Control and Prevention, North Carolina Department of Health and Human Services

This evaluation was supported by the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services (HHS) as part of a financial assistance award totaling $9 million, with 100 percent funded by CDC/HHS. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by CDC/HHS, or the U.S. Government. Partners In Health developed this product for the North Carolina Department of Health and Human Services as part of this CDC/HHS award. Its contents are solely the responsibility of Partners In Health and do not necessarily represent the official views of the North Carolina Department of Health and Human Services.

The PIH-US evaluation team expresses their deep gratitude for the opportunity to contribute to enhancing the North Carolina Community Health Worker Initiative. We extend our heartfelt thanks to the leadership and staff at the NCDHHS Office of Rural Health for their generous funding and unwavering support throughout this endeavor. Their commitment to advancing health equity and improving outcomes for underserved communities is commendable and we are grateful to them for entrusting us with this important work.

Participating Federally Qualified Health Centers

The PIH-US evaluation team would like to sincerely thank the North Carolina Community Health Center Association and participating Federally Qualified Health Centers including MedNorth Health Center, Piedmont Health Services, Charlotte Community Health Clinic, and Rural Health Group for their collaboration and assistance in integrating community health workers and facilitating data collection for this study. We recognize and appreciate their dedication to improving healthcare outcomes and advancing patient-centered care and thank them for their valuable contribution.

Evaluation Summary

Project Overview

This evaluation, funded by the North Carolina Department of Health and Human Services (NCDHHS) Office of Rural Health (ORH) through the Center for Disease Control and Prevention (CDC) CCR2109 grant, assesses the impact of Community Health Worker (CHW) integration in four Federally Qualified Health Centers (FQHCs) in North Carolina and makes recommendations for future CHW integration in clinical settings. Integrating CHWs into FQHC care teams holds promise for addressing social determinant of health (SDOH) needs, managing chronic conditions, and improving health and social outcomes. This report illustrates the multi-faceted impact of CHWs on patients served by FQHCs, summarizes promoters and inhibitors of successful integration, and provides recommendations for future programming and evaluation.

Evaluation Objectives

The evaluation aims to assess the impact, effectiveness, and integration of CHWs within FQHC care teams, with specific objectives to measure program impact on health and social care outcomes, understand factors influencing successful CHW integration, describe the perceived effects of CHWs, and evaluate the systemic economic benefits of CHW integration. In addition to CCR2109 grant performance metrics, this evaluation examines outcomes tied to the roles and responsibilities of CHWs integrated into three FQHCs through the CCR2109 grant through supplemental evaluation. The three FQHCs that participated in supplemental evaluation include MedNorth Health Center, Charlotte Community Health Clinic, and Piedmont Health Services. This supplemental evaluation implements the Triple Aim Framework by:

1. Collecting secondary data to compare health and social care outcomes of patients over time
2. Conducting key informant interviews to describe the perceived impact of CHWs in FQHCs and understand factors influencing successful integration of CHWs
3. Exploring the opportunity for future return-on-investment (ROI) analysis.

Methods

The study employs a mixed methods approach including secondary data analysis and key informant interviews to assess CHW integration and impact. Secondary data analysis quantifies changes in patient health outcomes or summarize patient connection to SDOH needs, while interviews with FQHC staff provide qualitative insights.

Evaluation Findings

We summarize key CCR2109 grant performance metrics, which illustrate the broad impact of CHWs across the four FQHCs, conducting outreach, education, and SDOH screening and referral. The proportion of resolved referrals at one FQHC was greater than 90%, indicating a high success rate in connecting clients with social supports. While largely exploratory, the supplemental evaluation revealed statistically significant improvement in chronic condition indicators (specifically A1c for Type 2 Diabetes and systolic blood pressure for hypertension) among some samples of patients who received services from CHWs. Key informant interviews yielded significant insight on factors that helped or hindered CHW integration into FQHCs; such factors include defining and communicating the CHW role, collaborating with the CHW around integration and management strategies, recognizing and supporting the CHW, and more. They also highlight the perceived impact of the integrated CHW on patients at the FQHC. Clinicians, CHW managers, and CHWs reported impact of CHW activities on health education and

behavior, access to care and social determinants of health needs, and chronic condition management. Given data and study duration constraints, we were unable to conduct a robust ROI analysis.

Recommendations

Based on these findings, we provide recommendations for CHW integration into FQHCs and other settings, and for data collection and methodology for future evaluation. Maintaining and expanding collaborative spaces for FQHCs to learn from each other and providing tailored training opportunities to CHWs and clinical teams can support CHW integration in FQHCs. Integration efforts may benefit from CHW involvement in program development and clear communication across FQHC staff can foster a shared understanding of CHW role and overall program strategy. Robust data collection and intentional evaluation design are essential for demonstrating program impact and supporting continuous quality improvement, sustained investment, and dissemination of program knowledge. Additional data collection to support ROI analyses and larger sample sizes to increase statistical power, specifically for chronic condition health outcomes, may further bolster evidence supporting CHW integration in FQHCs.

Contents

Introduction

Integrating Community Health Workers (CHWs) into Federally Qualified Health Centers (FQHCs) is increasingly recognized as an effective strategy for addressing health care disparities and improving health outcomes, particularly among underserved populations. CHWs are trusted members of their communities, possessing insights into the cultural, social, and economic factors influencing health behaviors and outcomes [1].

Marginalized communities often encounter barriers such as limited access to quality health care, insufficient health literacy, economic instability, and additional social determinant of health (SDOH) needs, all of which can exacerbate health disparities [2]. SDOH can include socioeconomic status, education, housing, and access to healthcare services [3]. CHWs are uniquely positioned to address these challenges by providing culturally and linguistically appropriate, community-centered support to individuals facing social and economic hardships [4]. As outlined by the C3 CHW Core Consensus Project [5], their responsibilities encompass a wide range of activities, including conducting outreach and facilitating access to healthcare services, assisting individuals in navigating complex healthcare systems, and offering guidance on preventive care measures. Responsibilities can also include health education, advocacy, care coordination, and social support [6]. Additionally, CHWs serve as liaisons between community members and healthcare providers, helping to bridge communication gaps and ensuring that healthcare services are tailored to the specific needs of the population they serve.

Click or tap here to enter text.

CHWs are also proven to be effective in addressing chronic conditions [7-9]. Type 2 Diabetes Mellitus (T2D) is a chronic disease characterized by insulin resistance and impaired insulin secretion, leading to elevated blood glucose levels and complications including cardiovascular disease, chronic kidney disease, and neuropathy [10]. Hypertension, or high blood pressure, is a common condition associated with an increased risk of cardiovascular disease, stroke, and other complications [11]. In North Carolina, these chronic conditions contribute significantly to the disease burden, imposing high healthcare costs and substantial morbidity and mortality [12].

Because FQHCs serve marginalized populations impacted by SDOH gaps and chronic disease, integrating CHWs into FQHC care teams can be an effective strategy for addressing SDOH needs and improving chronic condition outcomes. CHWs can complement the clinical expertise of healthcare providers by providing health education, support for lifestyle modifications, medication adherence assistance, and care coordination through outreach, follow-up, and appointment scheduling. CHWs can empower individuals to manage their health effectively and navigate complex healthcare systems [13, 14] and can play a vital role in addressing the underlying social and behavioral determinants of health, such as access to healthy food, safe housing, transportation, and social support networks [15].

In North Carolina, FQHCs are vital to delivering comprehensive primary care services to underserved populations, including low-income individuals, racial and ethnic minorities, and rural communities [16]. By integrating CHWs into their care teams, FQHCs can enhance the delivery of culturally informed, patient-centered care and improve health outcomes for their diverse patient populations [17]. Moreover, CHW integration aligns with the mission of FQHCs to address the root causes of health disparities and promote health equity [18].

CHWs were integrated into care teams in four FQHCs as part of a pilot program coordinated by North Carolina Community Health Center Association (NCCHCA). These pilots were funded by the North Carolina Department of Health and Human Services (NCDHHS) Office of Rural Health (ORH) through the Center for Disease Control and Prevention (CDC) CCR2109 grant. Each of the four FQHCs received funding to hire and sustain one CHW within their facility over the grant period. FQHCs included MedNorth Health Center (MedNorth), Piedmont Health Services (PHS), Rural Health Group (RHG), and Charlotte Community Health Clinic (CCHC). NC Area Health Education Center (AHEC) provided trainings and formed peer collaborative spaces to support CHW integration into the FQHCs.

Following a contracting process in 2022, each participating FQHC hired one CHW for the project by May 2023 and was connected to an AHEC practice support coach. The coach shared best practices and the CHW Integration & Optimization toolkit, a comprehensive, evidence-informed toolkit that includes a gap analysis, implementation resources, and a project management plan for integrating new or optimizing existing CHW programs in Advanced Medical Home settings. Two of the four FQHCs (MedNorth and PHS) completed the gap analysis. AHEC also hosted a health equity training, completed in July 2023, and a Peer Learning Collaborative for the CHWs and staff at participating FQHCs. All four CHWs participated in the Peer Learning Collaborative, a five-session series, between September and November of 2023.

All participating FQHCs were required to report on CDC CCR2109 grant performance metrics as part of the NCDHHS award. These metrics comprise a range of quantitative and qualitative measures designed to evaluate the impact and efficacy of CHW interventions. In addition to the required CCR2109 grant performance metrics, each FQHC could select supplemental evaluation methods tailored to its diverse served populations and CHW integration priorities. MedNorth, CCHC, and PHS decided to participate in a population health outcomes assessment with focus on chronic conditions, care team key informant interviews, and a potential return-on-investment (ROI) analysis. MedNorth and CCHC additionally chose to provide SDOH referral data. RHG abstained from supplemental evaluation.

This report provides a brief overview of the CCR2109 grant performance metrics and documents the findings from the supplemental evaluation.

Evaluation Design

The evaluation examines outcomes tied to the roles and responsibilities of CHWs integrated into three FQHCs through the CCR2109 grant awarded to NCDHHS and factors impacting CHW integration, while touching briefly on CCR2109 grant performance metrics reported from all four FQHCs. This evaluation employs the Triple Aim Framework to a) collect secondary data to compare outcomes of patients interacting with the integrated CHW; b) conduct key informant interviews to describe the perceived impact and understand factors influencing the successful integration of CHWs; and c) explore assessment of ROI of CHW integration. The results are intended to be used to augment evidence for sustainable CHW employment, improve CHW integration in these and other FQHCs, and present data to stakeholders that may invest in or set policy for CHW programs.

Supplemental evaluation strategies and data reporting systems were developed over multiple meetings with the CHW and CHW manager at each participating FQHC. These meetings allowed for participatory and collaborative design of the evaluation and were critical for understanding the data monitoring capacity of each FQHC. FQHC staff were welcome to attend office hours hosted by the evaluation team throughout the pilot period to ask questions and trouble-shoot any data-related challenges.

Specific Evaluation Aims

This evaluation aims are described below:

Objective 1

- Measure the effectiveness of the FQHC CHW program design and implementation and describe whole-person health outcomes for patients served.

Objective 2

- Understand factors influencing the successful integration of CHWs in FQHCs.

Objective 3

- Describe the perceived impact of CHWs in three North Carolina-based FQHCs.

Objective 4

- Measure the economic impact of employing CHWs to deliver services at FQHCs.

Hypothesis and Evaluation Questions

We hypothesized that CHWs would be valuable in improving health outcomes and care teams in North Carolina-based FQHCs and that successful integration of CHWs in FQHCs would enhance whole-person health outcomes and generate positive economic benefits.

Objective 1 (Quantitative)

- Initial Evaluation Question 1a: To what extent do CHWs increase access to and utilization of whole-person health services and outcomes for CHW-supported patients?
- Initial Evaluation Question 1b: How do patients supported by CHWs rate their care experience?
  The initial evaluation questions for Objective 1 were revised in lieu of data limitations. While we were unable to quantitatively assess overall health care access and utilization as a result of CHW integration, we were able to assess trends in chronic condition outcomes and summarize SDOH referrals made by CCR2109-funded CHWs. Additionally, though patient experience surveys were an initial component of the evaluation methodology for at least one FQHC, these surveys were not completed at a high enough rate to allow for analysis. As such, the revised Objective 1 (Quantitative) evaluation questions focus on chronic condition outcomes and SDOH referrals:

- Revised Evaluation Question 1a: Are there any changes in chronic condition indicators in patients served by CHWs?
- Revised Evaluation Question 1b: To what extent are CHWs able to address SDOH needs?

Objective 2 (Qualitative)

- Evaluation Question 2: What factors facilitate or impede the integration of CHWs in FQHCs?

Objective 3 (Qualitative)

- Evaluation Question 3: What do CHWs and FQHC staff perceive CHW impact to be in FQHCs?

Objective 4 (Quantitative)

- Evaluation Question 4: Do CHW services increase primary care provider visits and reduce overall costs?

Evaluation Strategy

To address Objective 1, the three participating FQHCs provided quarterly de-identified patient-level data for health and social conditions. We addressed Objectives 2 and 3 through key informant interviews with CHWs, CHW managers, and clinicians at each of the three FQHCs participating in the supplemental evaluation. We were unable to address Objective 4, but included recommendations for future potential ROI evaluation.

CHW Program Structure & Patient Population

CCR2109-funded CHWs in FQHCs operated in different ways and served different populations, including individuals with Medicaid, Medicare, and those that are under- or uninsured.

MedNorth Community Health Center

The CHW at MedNorth primarily interacted with Medicare enrollees, but some patients were served by two or more insurance types, such as Medicare and Medicaid. They were connected to patients whose primary care provider at the center identified a need for social support or care coordination and reported on SDOH type for their patients. For patients connected to the CHW, chronic condition data for patients with hypertension and T2D were reported. However, it should be noted that a primary objective of the CHW was not chronic disease management through medication adherence or another activity directly tied to chronic disease control.

Piedmont Health Services

The CHW at PHS primarily conducted telephonic outreach to patients, providing outreach and appointment scheduling assistance, including reminders for health screenings. They also occasionally attended community events to connect to potential patients. Most patients were uninsured/self-pay, although some were insured through private or public programs. The included data are from patients connected to services and screening through the CCR2109-funded CHW. The only chronic condition data provided was A1c, as the CHW frequently provided services to those with uncontrolled T2D. The CHW did not often connect patients to SDOH during the evaluation period and did not report on these metrics. Like the CHW at MedNorth, the CHW at PHS did not directly engage in chronic care plan creation, but a primary focus of their work was increasing care for uncontrolled T2D.

Charlotte Community Health Clinic

The CHW interacted with patients with various insurance types including many with Medicare and Medicaid, though most were uninsured. They were typically referred to patients via clinicians. After

getting connected to patients, the CHW would determine any SDOH needs, conduct follow-up and outreach with patients including appointment scheduling, and meet one-on-one with patients to discuss their health plans and progress. This latter activity allowed the CHW to engage in some chronic disease management. For patients connected to the CHW, chronic condition data for patients with hypertension and T2D were reported; SDOH referrals and outcomes were also reported.

Ethical Considerations

The study adhered to ethical guidelines with data de-identification to ensure patient confidentiality. Institutional Review Board (IRB) approval exemption was obtained from Mass General Brigham as the IRB of record for Partners In Health, subsequently receiving approval from NCDHHS and CDC, and the study followed all relevant privacy regulations. A data sharing and use agreement was established between PIH and NCCHCA. During the key informant interviews, each participant was asked for their verbal consent to be recorded and for their information to be used in the evaluation. Data have been anonymized to protect participants.

Quantitative Analysis: Evaluation Objective 1

Methodology

The analyses detailed below aim to document CCR2109 grant performance metrics and the changes observed in chronic condition indicators and SDOH care coordination by the CCR2109-funded CHWs within the pilot integration.

CCR2109 grant performance metrics were reported monthly by each FQHC to NCCHCA, aggregated quarterly, and submitted to ORH. These quarterly metrics include data from June 2023 to May 2024. FQHCs that had already hired the CCR2109-funded CHW began reporting for earlier quarters, but we constrain analysis of these metrics to June 2023 and after to ensure all four FQHCs are represented consistently. The metrics included in this report summarize following variables: number of SDOH screenings, number of individuals reached through education/outreach, number of patients referred for SDOH needs, number of resolved SDOH referrals, and number of categorized SDOH referrals. We report the median and corresponding interquartile range (IQR) of the CCR2109 required metrics where applicable due to the relatively small amount of data and the non-normal distribution of values.

In accordance with a data usage agreement between NCCHCA and PIH, NCCHCA received supplemental quarterly data from participating FQHCs, removed any personally identifiable information, and shared with PIH. Patients treated for hypertension had corresponding blood pressure values (both systolic and diastolic, measured in mmHg), while patients treated for T2D had glycated hemoglobin (A1c, measured in %) values, reported. MedNorth and CCHC reported data on patients with hypertension and/or T2D along with information on SDOH support. PHS provided data on patients with T2D and chronic care management coordination.

CCHC was able to provide data on total referrals and total resolved referrals, allowing us to calculate the proportion of resolved referrals to total referrals (which was not possible using the CCR2109 grant metrics). We also summarize the number of outreach attempts to support chronic condition management made by the CHW at PHS. MedNorth provided data from June 2023 to May 2024; Piedmont provided data from July 2023 to May 2024; CCHC provided data from January 2023 to May 2024. These ranges are henceforth referred to as the evaluation period.

Chronic conditions data were analyzed by FQHC, and then aggregated. Analysis was conducted using Microsoft Excel and R [19]. Descriptive statistics including median, range, and sample size, are provided for A1c and systolic blood pressure values. Given the generally non-normal distribution data, median values were considered more representative of central tendency than mean and thus reported. These descriptive statistics are provided over four quarters of data: Quarter 1 (June - August 2023), Quarter 2 (September - November 2023), Quarter 3 (December 2023 – February 2024), and Quarter 4 (March – May 2024), aligning with the CCR2109 quarterly reporting cycle. We also report total number of patients represented in the data, by each FQHC and collectively. Only patients with at least one corresponding data point were included; that is, while the CHW at each FQHC may have interacted with more patients being treated for either or both chronic conditions, we include only patients who have a chronic condition monitored and reported.

We also conducted two-sided paired t-tests when paired data were available and normally distributed. Where data were not normally distributed, we first transformed them logarithmically to induce normality; if sufficiently normal, we conduct t-tests. If normality was not achieved, we conducted Mann-Whitney U tests where data were sufficiently symmetric. Paired data refers to at least two health outcome data points, taken at different times, for a single patient. Because A1c indicates average blood sugar over a two- to three-month period, we removed any pairs that were both taken and reported within this timeframe. PHS data were reported by month and A1c values at least two months apart were included in the analysis.

To operationalize principles of data equity, the evaluation team facilitated data reviews each quarter with each of the FQHCs participating in supplemental evaluation and provided customized infographics summarizing the received data and subsequent analysis. Review sessions provided an opportunity for the evaluation team to update the FQHCs on the analysis and for the FQHCs to ask questions and address any issues around data collection.

Results

Tables and figures with results have been provided in Appendix A.

CCR2109 Grant Performance Metrics

From June 2023 through May 2024, four CHWs across the FQHCs reached 6,553 individuals through messaging and education. The median number of individuals reached per quarter was 1,653 (IQR: 895, 2178). CHWs screened 2,596 patients for SDOH needs with a median number of patients per quarter of 583 (IQR: 758.5, 812.5). CHWs referred 671 patients to resources for SDOH needs. The median number of patients referred per quarter was 163.5 (IQR: 117, 218.5). During this time, 718 referrals were resolved, with a median of 175.5 (IQR: 122.5, 236.5) resolved referrals per quarter. Reported for only the last two quarters (December 2023 to May 2024), a total of 380 categorized SDOH referrals were made (Table A1).

Social Determinants of Health Referrals

Within CCHC, we found that 91.9% of referrals were resolved; 4.7% were unresolved and 3.4% were open or had no information. Almost all SDOH referrals included in CCHC supplemental data were for food (99%), whereas the most frequent referral type from MedNorth was general care coordination, followed by transportation (Table A2).

Chronic Conditions Management

At PHS, the CHW contacted 250 patients for chronic conditions management over the evaluation period. Results below summarize A1c and systolic blood pressure (SBP) value changes over time across FQHCs for patients with diabetes and hypertension, respectively. Data represent a total of 379 patients being treated for T2D and 180 patients being treated for hypertension. Note that there is some overlap between these numbers (i.e., some patients were treated for both T2D and hypertension). MedNorth data represent 33 T2D patients and 68 hypertension patients; CCHC 49 T2D and 112 hypertension; PHS 294 T2D.

Glycated Hemoglobin (A1c) Values

A1c values for patients with diabetes are presented by quarter and FQHC, as well as aggregated across FQHCs (Table A3). Distribution of A1c values aggregated across FQHCs are shown by quarter in Figure A1. Sample size varied across quarters; some quarters had no or only one patient value (for a single FQHC), representing high variability in patient chronic condition testing.

We sought to conduct paired two-sided t-tests on data from each FQHC (MedNorth, PHS, CCHC). The time between pairs ranged from approximately two to 10 months. MedNorth (n=21) and PHS (n=95) data were non-normally distributed, and normality could not be induced through logarithmic transformation to conduct testing. PHS data were sufficiently symmetric for a Mann Whitney U test, but results of this test were not statistically significant ($p = 0.19$). We were able to conduct a two-sided t-test on CCHC data (n=12), though the results were not statistically significant ($p=0.23$, Table A4a).

We then combined the paired data across all FQHCs (n=128) and conducted a logarithmic transform to induce sufficient normality. Because of the logarithmic transform, t-test results are reported in terms of confidence interval ratios of proportion to the sample median, rather than the mean difference (Table A4b). We found that the median of first reported A1c values are 1.002 to 1.079 times higher (95% confidence interval) than the median of the last reported A1c values ($p = 0.039$); conversely, this is associated with a 0.2 to 7.3% drop in A1c values.

Systolic Blood Pressure Values

Systolic blood pressure values for patients with hypertension are presented by quarters and individual FQHC, as well as aggregated across FQHCs (Table A5). Values aggregated across FQHCs are shown by quarter in Figure A2. Sample size varies across quarters; some quarters have only one patient value (for a single FQHC), representing high variability in patient chronic condition testing.

For paired data, the time between pairs ranges from approximately one to eight months. MedNorth data (n=30) were sufficiently normally distributed to conduct a t-test, though results were not statistically significant ($p=0.22$, Table A6a). A t-test was conducted on CCHC data (n=18) after removing one outlying data point. We found a statistically significant mean difference of 11.6 ($p=0.0065$, Table A6b). Given these results, we can be 95% confident that the mean of the last reported systolic blood pressure values are 3.7 to 19.5 points lower than that of the first reported values. We then conducted a t-test on combined MedNorth and CCHC paired data (n=48), and the results were not statistically significant ($p=0.52$, Table A6c).

Discussion

All CCR2109 grant metrics (i.e., outreach via health messaging and education, SDOH screenings, number of patients with referrals, and number of resolved referrals) increased over the reporting period. The high proportion of resolved SDOH referrals at CCHC (>90%) is noteworthy, and highlights both the proficiency of the CHW and potentially the high level of resource-availability in the Charlotte area. Additional study of this referral system may also be warranted and used to inform similar SDOH referral program and resource networks. Other CCR2109 evaluation components (e.g., COVID-19 CHW Program) indicate that patient satisfaction is, predictably, higher when proportion of resolved referrals are higher. The high resolution of referrals at CCHC may be associated with an increase in trust between the health system and patients.

The results of quantitative analysis for diabetes and hypertension outcomes are largely exploratory and should be interpreted as such. The samples represented in the quarterly chronic conditions data vary from quarter to quarter, and so we explore only the paired data results. We observed a statistically significant reduction in A1c across all FQHCs (though not within individual FQHCs) and in SBP at CCHC among patients with paired data. Data availability precludes us from making any causal inferences about these changes, but the presence of these changes within a CHW-served population may hold important implications for CHW programming around chronic condition management. However, we note the limited statistical power of these data. We were unable to complete power testing prior to evaluation because we did not have information on the data variance and could not forecast the effect size. Additionally, it likely would not have impacted data collection because data are representative of patients served or impacted by CHWs and would not be necessarily influenced by evaluation needs. This is further discussed in "Limitations."

The reduction in median A1C values may be clinically significant, dependent on the baseline median of A1c values. For a sample of patients with a relatively high baseline median A1c value, a 0.2-7.3% reduction (the 95% confidence intervals observed) in that median may be clinically meaningful in addressing T2D. For example, a starting A1c of 9% could expect a reduction of 0.18–0.63. Because these data are aggregated across multiple FQHCs, it is difficult to assess which CHW activities may have contributed to this reduction. The majority of the data (107 of 128, 84%), however, are from two FQHCs wherein one of the primary objectives of CHW programming is chronic care management. We posit that specific CHW activities may be associated with positive T2D management health outcomes. We recommend further data collection to build statistical power and further causal diagramming of CHW activities on health outcomes to allow for more robust evaluation strategies.

Changes in systolic blood pressure yielded similar conclusions. First, there is a potential association of the activities of the CCHC CHW and decreased mean systolic blood pressure in the paired patient samples. The CCHC CHW engages in one-on-one chronic condition management and care coordination for hypertensive patients. The reduction of mean blood pressure in paired samples of 11.6 points is clinically meaningful and may indicate improvement in hypertension control and management. Second, the lack of statistical significance in data from MedNorth may indicate that refinement of evaluation strategies is needed; the CHW at MedNorth does not engage with patients for the specific objective of chronic condition management, and thus this evaluation, regardless of its statistical significance, may not meaningfully capture impact or effectiveness of that specific CHW program. While there is evidence of CHW impact on chronic disease by addressing adjacent health-related social needs, chronic disease metrics are likely better served as secondary evaluation outcomes. We recommend further data collection where warranted (i.e., where CHW activities are aligned with chronic condition health outcome data) and causal diagramming to understand what health and social outcomes would be most meaningful and collectible across FQHCs and CHW programs.

We stress that any analysis that did not yield statistically significant results does not indicate a lack of efficacy in CHW programming, nor do positive results represent more than exploratory findings. We intend that these results be used to inform future data collection and evaluation, and that statistically and clinically meaningful results be used to inform continuous quality improvement and support new or

expanding CHW programming. Further CHW impact is discussed in the next section, “Qualitative Analysis.”

Limitations

Our methodology and analysis include multiple limitations. Due to the varied roles of CHWs across FQHCs with different outcomes of interest, this quantitative analysis should be considered exploratory in nature.

Due to single FQHCs and small patient populations for some outcomes, sample size and statistical power may have been limited for some tests. Retrospective power testing can be problematic as probability does not apply to historical events. We might assume that some of our tests are underpowered given the relatively low sample sizes, but should not make assumptions of power for past events. Instead, we recommend caution when applying these evaluation results, while also noting their alignment with similar study results [8,9]. Additionally, we may use these data as pilot testing for future evaluation; that is, using the variance of the collected data, we can make better recommendations for sample sizes that may be associated with higher statistical power. We could also use the effect sizes found in this evaluation for future testing, but recommend using clinically meaningful thresholds instead. For example, clinically meaningful effect sizes may be a 0.5 A1c and 10 point systolic blood pressure drop for T2D and hypertension, respectively.

The time periods between paired samples are also variable. A potential concern with data collected over a shorter period is the risk of patients returning to baseline over time. Longer-term, continuous data collection may be more robust to this behavior and may illustrate sustained improvement.

An additional limitation is that of the causal framework between CHW activities and outcomes. A more robust understanding of specific CHW activities and how they might map onto various social and health outcomes, and potentially downstream health impacts, would have been helpful (see “Return on Investment” for more). While chronic conditions data are likely well-suited to investigate the impact of CCHC and PHS CHW activities, the causal link between MedNorth CHW activity and these chronic condition management outcomes is likely more tenuous. More information and specific next steps around evaluation design, including power testing, can be found in “Recommendations.”

Qualitative Analysis: Evaluation Objectives 2 & 3

A qualitative analysis was performed to synthesize the successes and challenges of CHW integration within participating FQHCs and the perceived impact of the CCR2109-funded CHWs within each health center, from the perspective of the CHWs, their direct managers, and clinicians who worked closely with them. This analysis provides valuable context and insight into CHW integration within FQHCs, highlights the important role of CHWs, and offers lessons learned for program quality improvement for other FQHCs interested in CHW integration.

Methodology

Prior to the interviews, the evaluation team conducted a site visit to MedNorth to review data findings, better understand and describe the CHW program structure, and discuss the key informant interviews. The visit informed the interview guides, provided valuable context for the evaluation, and ensured CHW voice was incorporated into this piece of evaluation. Interview guides were developed for each staff role; that is, a similar but unique interview guide was completed for CHWs, their managers, and clinicians who worked closely with them. This reflects the different perspectives of each role. Interview guides have been provided in Appendix B (Supporting Documents B1 – B3).

MedNorth, CHCC, and PHS participated in this supplemental qualitative evaluation. The CCR2109-funded CHW, their direct manager, and one clinician that works closely with the CHW from each of the FQHCs were invited to participate in a key informant interview. PHS did not have a clinician available, but all others invited participated, totaling eight interviews. The CHW manager at PHS had recently transitioned into a new role, and a new manager had been hired; both participated in the interview and are referred to collectively in any transcript excerpts as “manager.” Each interview took place over one hour via Zoom, in March 2024. Interviews were recorded and transcribed in Zoom, and transcript edits were made manually for clarity and accuracy. After transcription was complete, the recordings were destroyed.

After reviewing all transcripts, a codebook was developed with codes and their corresponding definitions (Table B1). Each code defines an important theme relevant to the two research questions (Objectives 2 & 3) or otherwise salient information. These codes were then applied using the mixed methods software Dedoose [20]. Each transcript was first coded by an individual member of the evaluation team. Codes were then reviewed collectively and reconciled to ensure consistent application of codes.

Following coding, thematic analysis was conducted. A summary of that analysis is provided in this report, along with relevant excerpts from the transcripts. Due to the small number of participants and the relatively close connection audiences may have to those involved, each excerpt will only be attributed to a role (i.e., CHW, Manager, Clinician), and not the FQHC at which they are employed.

Results

The following results are organized by the evaluation objective they address, though other significant findings not directly related to either objective are also provided. They are further organized by theme.

Objective 2: Integration Strategies

Participants were asked about the overall experience of CHW integration in their respective FQHC and the strategies or factors that hindered or promoted successful integration. To fully understand the responses, it is important to note that prior to the CCR2109-funded CHWs, one FQHC employed CHWs and promoted CHW programming for over four years, one hosted a small CHW program for about two years, and one had never previously employed a CHW. Participants from FQHCs with pre-existing CHW programming made frequent reference to lessons or systems they had in place before integration of the CCR2109-funded CHW.

While the themes below are sorted as "Promoters of Integration" or "Barriers to Integration," almost no theme fits entirely into either. They are presented by what was most commonly seen throughout the transcripts, and additional context and nuance is provided for each theme. Notably, what may work well for one FQHC or one role may have been experienced differently by another.

Promoters of Integration

Overall, CHWs felt integrated and supported in their FQHCs. While for most, integration took multiple months, by the time of the interviews (approximately one year after hiring) they felt they had been incorporated into the care systems.

Collaboration. The ability for FQHCs to collaborate with each other was universally positively received. Managers noted that they collaborated within the AHEC Peer Learning Collaborative and reached out to those in other organizations and states to learn about their CHW programs and share their strategies. While not the most frequently occurring theme, managers in particular felt supported by the CCR2109 programming, especially those coordinated by AHEC. Said one manager:

> "And it was really... the most beneficial just to see how, the things that other health centers [are doing], and how they were utilizing their CHWs, as well as challenges, cause, sometimes you think, like, gosh! Are we, like, the only ones having trouble with this or that? And it, that was very helpful and resourceful to have those meetings."

Trainings. Trainings provided to the CHWs through the CCR2109 programming (specifically those provided by AHEC) were generally viewed positively. CHWs expressed that they enjoyed the trainings and often found the information to be useful. They did, however, note that additional specific trainings around payer sources and specific health conditions would have been helpful. Across all FQHCs, CHWs seemed to be interested in more tailored trainings to ensure they were getting the information and resources they needed for their specific roles and for the populations with which they worked. Said one CHW, "I don't necessarily feel like all of the classes, or all of the meetings and trainings were necessary for this role."

Management Systems. Having clear and explicit management systems and protocols was generally seen as helpful to integration. Systems included an algorithm in one FQHC, established by the CHW and a clinician, in which the CHW would base their workflow on quantitative information provided to them about each patient. Other protocols included basic program management tools like morning huddles and standardized communication procedures (e.g., standards around chart usage, soliciting feedback in Microsoft Teams, etc.). Prior to grant funding, one FQHC had established a protocol for connecting a

CHW with a patient via warm handoffs during patient visits or discussing which patients needed follow-ups during the daily morning huddle, which was continued throughout the pilot.

CHWs at FQHCs with more robust management systems or clearly established protocols generally felt more integrated into the FQHC. Additionally, while clinicians and managers seemed more likely to view these management systems as integration strategies in themselves, two of the CHWs did not appear to view them as such. Management systems in general were mentioned more frequently by managers and clinicians than CHWs, potentially indicating the need for clearer communication over protocols and systems to the CHW, specifically around their use in part as integration strategies.

Prior Role of CHWs. The prior role that the CCR2109-funded CHWs had, either in their current FQHC or in another setting, was viewed as critical by managers, clinicians, and often by the CHWs themselves. Every CHW interviewed had at one point worked as a medical assistant (MA); two had previously been MAs at the FQHCs where they now work as CHWs. Only one CHW had previously worked as a CHW in another setting. Having a clinical background was highly valued by clinicians and managers:

“She comes with a lot of clinical experience... compared to some other community health workers, and I think that that has influenced her ability to participate too.” (Clinician)

“She's really, honestly sort of a jack of all trades, so she she's willing to jump in sort of wherever... I think for us, the benefit of having a CHW with medical assistant experience was really great.” (Manager)

The prior experience of CHWs and the specific populations they previously worked with were also seen as helpful in their current roles. For example, familiarity with a specific type of payer source (e.g., Medicaid, Medicare, etc.), proved useful in integrating the CHW because they already understood and were comfortable with the assets and limitations of that payer source. Said one CHW, “[I’m] someone that specializes in the [redacted] population. So I'm gonna know... a lot more resources than the others. [...] Yeah, yeah, it's really helpful having that expertise with this population." Similarly, the lived experience of the CHWs and prior knowledge of local resources were viewed as critical by at least two managers.

Manager/Clinician Prior Knowledge of CHWs. The prior roles and knowledge of the managers and clinicians, and especially any prior knowledge of or experience with CHWs, significantly influenced integration and perceptions of CHWs. Some managers and clinicians credited prior knowledge or experience for their interest and commitment to the CHW program; that is, being exposed to CHWs and CHW programming predisposed staff to championing CHWs in their FQHCs. One manager, who also serves in a clinical and corporate leadership role at their FQHC, said:

> “I think this role particularly was new when it was introduced, and [...] I had never heard of such thing in North Carolina, and I'm like, oh, this, you know, this would be great. So when the opportunity came to us, I'm like, definitely, like, I've had experience in working with a community health worker.”

Clinicians who received training around interdisciplinary care also seemed more inclined to understand the role and value of CHWs. One clinician shared, “That’s part of the reason I am motivated to incorporate... multiple disciplines. Because... I understand the limits of my training and my time. And my, the limits of... my lived experience as well.”

Two of the FQHCs had previously employed, and continue to employ, other CHWs in addition to the CCR2109-funded roles. Having existing CHW programming at the FQHC could be valuable, but only insofar as those other CHWs were doing work similar to the newly integrated CHW. One FQHC employed two other CHWs, but who had very different roles and responsibilities from the CCR2109-funded CHW. At this FQHC, the CHW, manager, and staff did not find having previous experience with those CHWs particularly helpful with this new role. However, at the FQHC where other CHWs had been employed and had similar roles and responsibilities, all participants found the community of CHWs and the resources and advice that they were able to share amongst each other to be useful.

Support, Value, and Recognition. At the time of the interviews, all CHWs felt generally supported by their managers and other staff at the FQHCs. Not only did they feel supported in their current roles, but they also felt that their managers would approve of and assist them if they were interested in pursuing additional activities or interests within the FQHC. They also saw their managers as a source of information and advice. Said one CHW, “I've never [run] into a situation where I couldn't reach out to my manager, and they would help me or reach out to another care manager, and they would help me.”

While the interview questions only included prompts about feeling supported and integrated, one CHW also noted the importance of feeling valued and recognized by her supervisors and colleagues. They mentioned that their manager advocated for them with FQHC leadership, and felt valued and supported by the clinical staff:

> “I'm respected for my role and appreciated. [...] I have buy-in from the providers in the organization. They recognize why my role is important, and in fact, recently I kind of had to negotiate my position and pay because I just didn't feel like it was fair, and my manager was able to prove to the leadership department the value that I have and why they should compensate me more. And they agreed. So I think that they recognize the importance of my role. And me specifically in this role. So yeah, I'd say, it's... pretty integrated at this point, part of our clinic.”

Managers and clinicians also mentioned the importance of communicating the value of CHWs to those in leadership or decision-making positions, like the Board of Directors. The CHW integration pilot seemed effective in providing narratives and data that may be used to advocate for further support of CHW programming at the FQHCs. One manager said:

> “We did have a patient that was... immobile, I want to say... the CHW went out to her home and provided her with a food box or something [...] to help her, and she was very grateful for that. And that was sort of a mission moment for us, and [at] our board meeting... we shared with our board. So they also are aware of the benefit and how we don't have anyone really that does that kind of thing outside of that role.”

Overall, the managers and clinicians expressed appreciation for the CHWs, and the CHWs felt supported and valued by other staff and often by the patients. However, at least one clinician and one manager noted that it was often difficult to communicate the value, or convince decision-makers of the value, of CHWs without having cost-effectiveness data.

Barriers to Integration

Capacity. Concerns about workloads and the capacity of CHWs were noted across all FQHCs and positions. Though mentioned at each of the three FQHCs, only one CHW felt that they could not adequately serve all clients in the FQHC network. This was due to the high volume (i.e., thousands) of patients that they could, in their scope of the practice, contact and assist in care coordination. They expressed that they were interested in doing more in-person outreach events and organizing programs for specific populations but felt limited by their existing workload. Indeed, all three CHWs indicated their desire to participate or lead more community outreach events, and saw that as a way to further gain trust and develop resources in the community, with one saying they would like to do, "...more outreaches, more community events, be a part of those... I've always enjoyed that. I did that a lot in my prior job. And again, that just gets us more embedded within the community and having those point of contacts with other agencies... to get the patient the best care."

Managers and clinicians seemed aware and understanding of CHW capacity, however. The CHW concerned about not serving all potential patients still felt supported by their manager, and their manager did not express any disappointment but acknowledged the high workload. This indicates an understanding of the capacity challenges and the clear need for CHW services.

Defining the CHW Role. The most frequent barrier to integration described challenges in defining the CHW role within each FQHC. It was mentioned 36 times across all transcripts. Note that each CHW held somewhat different (though often overlapping) roles and responsibilities within their FQHC. We here compare how successfully the role was defined across each FQHC: one with other CHWs in similar positions, one with CHWs in different positions, and one with no other CHWs. To protect the anonymity of the participants, excerpts from each FQHC in this section are not attributed to any role.

Within the FQHC that already employed CHWs in a similar role to the CCR2109-funded CHW, defining the role of the CHW seemed to be less challenging than at other FQHCs. Despite the years of CHW programming at this FQHC, however, staff members still noted that additional training and education for clinicians was needed around the new CHW role. One participant said, "I don't think the providers necessarily know the position. They know that there is [a CHW]. Of course, they're learning it." Additionally, though this FQHC housed a relatively long-standing CHW program, they still benefitted from trainings and tools provided through the grant. One staff member specifically mentioned the AHEC Gap Analysis as being helpful for defining the new CHW role.

In the FQHC with other CHWs in different roles than those of the CCR2109-funded CHW, role-definition challenges centered on concerns around over-medicalizing the CHW. Because this CHW previously served as an MA, participants felt that they needed to refine the roles and responsibilities throughout the pilot period and communicate clearly to the other staff how this new position differed from that of

an MA. Despite early challenges, it does appear that the CHW role was clarified, with one participant sharing that, “I think that people have a pretty good understanding of what [they] do now. I can't say that for the beginning.”

The challenges were most prominent in the FQHC with no previous or other concurrent CHWs. All staff members felt that this pilot period was a “learning process,” but one that did benefit from open communication and time. It seems that there was not a universal firm understanding of the role within the CHW team at the beginning of the pilot period. However, much like at the FQHC with other CHWs in different roles, consistent workshopping, communication with other FQHC staff, and gradual refinement of the CHW goals resulted in a better delineation of CHW roles and responsibilities toward the end of the pilot period.

One challenge expressed by CHWs across FQHCs was the difficulty in communicating with clinicians. CHWs often felt disconnected from the clinicians, with some wanting to form more robust relationships with them to aid in getting connected to patients. This challenge was also noted to be, in part, a reason why some clinicians did not understand the CHW role or know when to contact them.

Strategy Limitations. While the interviews with clinicians and managers indicated that integration strategies were deployed, at least two CHWs did not feel that there was an explicit strategy. When asked if they were aware of any integration strategy, one CHW responded “none that I can think of off the top of my head.” Another CHW described themself as being “thrown in.” This is almost certainly linked to the barrier above, defining the CHW role. Said one CHW:

> “There was a lot of confusion in the beginning of this role. There was a lot of confusion about how [they] would use us. [...] So for us, it was a matter of trying to figure out how this role best fits our clinic. It's a position that we knew we needed, but we just didn't know how many ways we needed it and in what direction to move in.”

In general, it seems the CHWs were not adequately involved in planning or decision-making in terms of developing and implementing integration strategies, and that the integration strategies that were developed were often not communicated clearly to them. Lack of knowledge around strategy or a sense of confusion was prevalent across all FQHCs, though often this confusion abated as the program went on.

Objective 3: Impact of CHWs in FQHCs

The CCR2109-funded CHWs provided a breadth of services across the three FQHCs, and their impact is categorized below by social determinants of health referrals, care coordination, changes in health behavior, and support for chronic and other health conditions. The positive impact that the CHWs have had at their FQHCs is apparent, with clinicians and managers frequently praising CHW activities and output and noting specific examples of their impact on patients. Participants occasionally mentioned impact of CHWs on other staff at FQHCs (e.g., increasing capacity for clinicians). The following results, however, focus on CHW impact on patients.

Social Determinants of Health Referrals

SDOH referrals were mentioned 38 times across all transcripts. Connecting patients to SDOH resources (e.g., food, housing, transportation) was a primary responsibility for two of the CHWs. Managers and clinicians seemed to understand the high need for and importance of SDOH access for their patients, as well as the ways in which CHWs were able to fill any gaps. One manager shared, "I just think overall addressing those social drivers of health. It's been huge, somebody concentrating on that has been huge, and so concentrating on that, with how it overlaps and it impacts their overall health, I think is huge." CHWs were able to both address basic needs and go well beyond the scope of what may be considered orthodox SDOH: "I got him a secondary insurance. I got him a new recliner because his was falling apart like literally underneath him. I brought a lot of value to his life with, like other smaller things, putting money back in his pocket [...] now he has food stamps" (CHW). By forming relationships with patients and addressing their diverse needs, CHWs improved quality of life for their patients and leveraged existing resources.

One clinician noted that their patients:

> "need to be navigating all of the systems, not necessarily the clinic systems...like the legal system, housing, education...because they impact health a lot more than...the things that we do inside of the clinic walls. So I always talk about the fact that at least 90 to 95% of health is determined outside of the clinic walls."

This is an understanding that was acknowledged across the FQHCs. The ability of CHWs to connect patients to SDOH resources was critical to managers and clinicians, and they seemed most eager to expand this specific responsibility:

> "I hope it's something that's evolving and will be something that we can pretty much adopt and make it...a role that's just as important as nurses, providers. It's just an extra added layer of support for our patients, and I think in our settings we have very complex patient dynamics...our patients deal with a lot of different social determinants. So having [them], or the role in general, has been a really integral part of our team" (Manager)

CHW ability and willingness to connect to patients outside of the clinic setting was also seen as an asset. In the two FQHCs employing CHWs for SDOH, both CHWs frequently made home visits to assist patients or directly deliver food or another SDOH need. Said one CHW:

> "I also do house visits. So I'm able to, if the patient, you know, has transportation barriers, things like that, and we need to get like applications done, or we need that one-on-one time where they're not like rushed in the clinic, and have to go, or we have to get out of the room. So I'm able to do those, I'm able to, if the patient needs incontinence supplies, or food, or anything like that, I'm able to go to the local community resources and pick that up for them and bring it to them."

Managers and clinicians noted that, without the CHW, they would not be able to adequately connect patients to SDOH resources or provide the level of care, through activities like home visits, to their patients.

Care Coordination

Care coordination through patient outreach, appointment scheduling assistance, and follow-up was a primary CHW responsibility across all three FQHCs. It was mentioned 63 times across all transcripts, more than any other theme. Care coordination was also described as the primary way that CHWs interact with clinicians. Despite this, CHWs themselves mentioned care coordination far more often than did the managers or clinicians (over double on average by participant). This did not necessarily translate into lack of recognition from managers and clinicians in terms of CHW impact on care coordination. Across all FQHCs, managers and clinicians noted that CHWs were critical in maintaining a care pipeline for patients, ensuring follow-up and connecting them to their needs.

Responsibilities, and thus impact, varied across the FQHCs. Care coordination includes making phone calls or home visits, appointment follow-up and scheduling, tracking referrals, providing patient assistance on-site, and more. It can also overlap with SDOH; CHWs will often help patients navigate health insurance or provide support in obtaining prescriptions. One FQHC conducts follow-up with patients who have recently visited the emergency department to provide hospital discharge care coordination and post-emergency care. Regardless of their specific roles, each CHW saw themself as a trusted point of contact for patients.

At one FQHC, a manager (who is also a clinician) believed that CHW follow-up has contributed to improving patients' clinical indicators (see below, "Chronic & Other Health Conditions"). The CHW has been critical in supporting chronic disease management at the FQHC and assists in monitoring chronic condition indicators. Said the CHW:

> "A lot of our patients are uncontrolled, and they're hard to track and hard to manage, and our providers just don't have the time to do that. So with me, being able to do that, it's just helped them be more accountable and just been, you know, they have a point of contact. They can ask their questions, they know how to reach me and they'll, they know that I'll reach their provider but then, even aside from that, aside from the chronic disease patients."

Based on the participant perceptions, patients appreciated having a trusted member of the care team that they could easily contact with questions or concerns. According to clinicians, having one-on-one, consistent follow-up not only improved patient outcomes, but also improved communication with patients who might not otherwise have sought care. This was true across FQHCs. One CHW conducted outreach and follow-up with a non-English-speaking population, providing tailored and culturally appropriate care coordination. This CHW felt that their impact was most felt in care coordination, and in developing relationships with patients. To them, this contact and the fact that the patient was being reached out to, not having to reach out, was critical:

> "But to be honest, to me… the phone call [most touches] patients...just because I'm the one reaching out to them, and I do give them my personal number that [the FQHC] gave me. If they need anything, or if I see them in person, I'll be, I have little cards like, if you need anything, here's my card, you can call me. Uhm, to me it's the phone call, because I'm the one reaching out to them. They're not reaching out to me. So they know I know they're there."

This personal connection, and the consistent follow-up with patients, was noted to increase patient access to necessary preventative care and health screenings. One CHW described the process of connecting patients who were disinclined to seek continued care:

> "The ones that I've really been working with, some aren't even ready for the help. I mean the provider sends the referral over. They know they need it, I try to reach out, and they're not ready for it, and that's the other main thing of being a community health worker. You got to meet the patients where they are. If they're not ready for it, then you're not gonna get through, but also back end to that, is that I have more time that I can put towards them to not give up, I could check back in. Hey? You're not ready right now. Let me check back in a couple of weeks. How about I come out to your home, make a visit. Let's sit and talk a while and earn that trust and build up from there with things."

Clinicians, managers, and CHWs alike noted that this level of care coordination and follow-up would not be possible without CHWs.

Changes in Health Behavior. Health behavior was mentioned 16 times across all transcripts, a relatively low number of occurrences. However, nearly all (80%) clinicians and managers noticed positive changes in patient health behavior due to CHW care coordination. Said one clinician, "[Patients are] feeling more comfortable...that they would have support... just feeling more comfortable in the clinic." CHWs shared that they try to ease any patient anxiety, serve as an accountability partner, and "celebrate with [patients about] their progress" (CHW).

Managers seemed particularly enthusiastic about how health behavior changes could continue to be a focus for the CHWs. One FQHC is specifically interested in increasing their health screening metrics, while another has already seen a marked improvement in chronic disease management:

> "I'll always go back to our chronic disease management, of course, cause that requires education and follow up, and consistency and behavioral changes of course, on our patients' behalf and so, just again looking at those numbers, since she's been in her role and pretty heavily involved in it, I have seen those numbers change" (Manager).

As part of both care coordination and health education, one clinician was eager for CHWs to work with patients around simple lifestyle changes, like drinking water, improving diet, and moving more. This may include the CHW hosting walking groups, cooking classes, and more.

Chronic & Other Health Conditions. Chronic conditions were mentioned 48 times across all transcripts. Note that CHWs interfaced with chronic conditions differently across FQHCs; that is, while each FQHC was able to provide data on chronic conditions from patients who had interacted with the CHW, the degree to which the CHW was able to impact chronic conditions based on scope, and the corresponding condition indicators, varied. One CHW provided direct support and care coordination for patients with uncontrolled chronic conditions. Their manager reported that the number of patients with uncontrolled conditions decreased 3% and "that has been partially due to the CHW getting those reports, calling

those patients getting them in." That same manager also shared, "We've seen how beneficial her role has been in chronic disease, and chronic disease management, being able to outreach to those patients, being able to use the different tools that we've provided."

Both other CHWs provide care coordination which could ostensibly improve chronic condition indicators, but this was not discussed extensively in the transcripts. Similarly, one of these CHWs connects patients to SDOH resources, which could include access to prescriptions, healthy foods, transportation to appointments, and additional resources that could improve chronic conditions, but this was not the specific goal of the SDOH referrals made.

CHWs also expressed interest in impacting other health conditions, including cancer and mental illness. While the CHWs currently assist in all forms of care coordination, including making appointments for referrals and health screenings, one CHW had already supported thousands of health screenings for breast and colorectal cancer and had supported a mobile breast cancer screening program.

Other Impact

CHWs impacted patients and clinicians in additional ways. One CHW had been instrumental in connecting patients to Medicaid coverage, particularly after Medicaid expansion. As previously noted, CHWs were often able to conduct home visits which in themselves seemed to be impactful for patients, and particularly those with limited mobility or lack of transportation. CHWs also attended multiple community events to get connected to patients in ways that likely would not have been feasible without them. Additional impact was often patient-specific. One CHW shared about a patient:

> "He has a lot of anxiety. So he has paperwork everywhere. So anytime someone calls him, health care providers, something... he shuffles through a million papers to try to find what he thinks that they need, or, so, he's not hearing what they're saying, because he's focused on going through papers. I helped him get all of his papers organized. We put them in folders with big labels on it, so he can easily at least get to the folder to cut down on that anxiety. So I see the little things that I do, that makes me feel good, and I know it helps the patient out."

Other Findings: Resources

Resources were noted 20 times across all transcripts and indicated the importance of resources for addressing social and health gaps. One CHW noted the difficulty in finding resources for low income and uninsured patients in their area. Another expressed that resources were limited for patients not covered by Medicaid. Clinicians, managers, and CHWs at two of the FQHCs – the ones that were more focused on connecting patients to SDOH – seemed to share a concern for limited resources. Indeed, one CHW said that the largest barrier to serving patients was a lack of resources: "If the resources aren't there, then you're stuck. You're just another person telling them I can't help you, so that sucks. So I would say that would be like the biggest challenge." To address this, FQHCs were interested in developing a "detailed community survey of resources" (Clinician) and participating at more community events and meeting more local organizations to better connect patients to the necessary resources. Though not necessarily in the context of the CCR2109-funded CHW, one manager mentioned that they found NCCARE360 to be a useful tool for SDOH referrals.

Discussion

CHW Integration

Community of Practice

Participants valued access to collaborative spaces and the ability to share successes, challenges, and advice from others in like positions and working in similar programs. This seemed to be especially true for new CHWs and new CHW managers. The AHEC Peer Learning Collaborative served as a valuable space for FQHCs participating in CHW integration to learn and workshop solutions to problems and receive or provide support. As one manager described reaching out to resources and contacts in other states also engaged in CHW integration activities, it may be helpful to expand the Collaborative, or provide a directory of organizations throughout the country willing to engage with other CHW programs. While the FQHCs in their program benefitted from learning from each other and shared multiple similarities, their programming, infrastructure, population, and capacity varied. The ability to find and reach out to other FQHCs implementing similar programming, serving similar populations, etc. may prove helpful to newer and growing CHW programs in FQHCs.

Trainings and activities like the AHEC Gap Analysis were well-received overall. Trainings provided through AHEC and other organizations were also found to be useful, though all CHWs noted that more tailored trainings could be valuable. Soliciting feedback from CHWs on what topics (e.g., health conditions, payer sources, etc.) may help ensure that CHWs have access to necessary information and that training content is relevant to their roles. Trainings could also be customized or adapted, given required bandwidth, to reflect the background and experience of participating CHWs.

Management & Communication

Management systems and robust documentation are integral to CHW programs, where support provided to clients or patients can include long-term follow up, care coordination and system navigation, and health condition monitoring. Each FQHC had a different management system that, while seemingly effective for the programming itself, had varying levels of success in terms of CHW integration. The CHW with the most positive experience with a management system (note that this is not related to personnel management) had collaborated with a clinician to develop the management system. The other two CHWs who felt “thrown in” or that there was no specific strategy were not involved in the creation of or decision-making for management systems. The reasons for this are understandable and reflect challenges around nascent program implementation or existing program expansion. However, clear communication with CHWs around management systems may aid in integration. Close connections between CHWs and clinicians may additionally facilitate integration and bolster programming. Our findings suggest that working with CHWs to develop the management systems, including those for data reporting, improve CHW perceptions of integration. Care should be taken to, at a minimum, incorporate CHW feedback into such systems.

Preparing for Integration

The knowledge and experience prior to the CCR2109-funded integration of CHWs, managers, and clinicians influenced multiple stages of the integration process. Most of the managers and clinicians who advocated for CHW integration in their FQHC had previous knowledge of CHWs and their unique contribution in clinical settings. They also communicated their appreciation for the complex SDOH and

care navigation needs of many of their patients and recognized the need for additional, non-medical support. The participating clinician at the FQHC with an existing robust CHW program has championed CHW integration for years and was instrumental in developing their program. They had deep knowledge of CHW programs, diverse in both scope and population, and understood the critical role of shared lived experience that CHWs bring to the communities they serve. Collectively, this indicates that increased awareness about CHWs may increase the likelihood of their integration in FQHCs and other settings. It also indicates that having a champion – whether CHW, manager, or clinician – is critical to the development and implementation of CHW integration, and that being a champion often results from witnessing the impact of CHWs. This illustrates the importance of storytelling and communicating impact about CHWs (further discussed in "Data & Recognition").

The prior experience of CHWs also dramatically influenced their experience in integration, and that of the managers and clinicians. As all three CHWs had previously worked as MAs, we are limited in our ability to compare how other previous clinical and non-clinical backgrounds may have influenced their current work. However, all participants felt that this experience was an asset due to increased CHW knowledge of health conditions, experience in FQHCs, and, in at least one case, ability to monitor chronic conditions. We may glean from this that clinically-oriented trainings, including on-the-job training, for CHWs without MA background may aid in their integration into FQHCs or other clinical settings, to ensure that they have the necessary skills and knowledge for such settings. We do note, however, the potential for over-medicalization of CHWs that may detract from their core roles (further discussed in "Defining the CHW Role").

Defining the CHW Role

While CHW roles may be broad as defined by the CHW Core Consensus Project, they may also be narrowed and specified by each employer to fit the scope and needs of the program. CHW role definition appeared to be key to successful integration. Understanding and communicating the role of CHWs was a common challenge identified throughout the interviews.

Defining the role seemed to be particularly challenging, understandably, at the FQHC that had not previously employed CHWs. The CHW had no prior experience as a CHW and their manager had not previously managed CHWs; it is unclear whether the FQHC clinicians had previously worked with CHWs or were familiar with the position. This FQHC used the integration pilot period to learn and grow, perhaps iteratively defining and refining the CHW roles and responsibilities. They facilitated introduction meetings with the clinicians and other staff to introduce the CHW and their new roles, which they reflected on positively. This indicates that regular and intentional communication between the CHW and other FQHC staff may promote a universal understanding of the CHW and how and why they should be connected to patients.

Communicating the role of the CHW to clinicians also appeared as a challenge across FQHCs. Even at FQHCs that had previously employed CHWs, there was a perceived incomplete understanding of CHWs. Interestingly, participants shared mixed feedback on how this issue might be resolved, with some (mostly managers and CHWs) advocating for increased education around the CHW role, and others (mostly clinicians) believing that additional training would not help. There are no obvious solutions to this, and any solutions would likely be dependent on the specific setting. Physician, or additional health

professions, champions for CHWs at other FQHCs or in other clinical settings may support program adoption and CHW integration. Further exploration of this issue may be warranted to better understand the perspectives of clinicians who do not have strong prior knowledge of or experience with CHWs, as their voices are not represented in this evaluation.

We identified another potential concern, even among the those directly working with CHWs, around the risk for over-medicalizing CHWs. Because all CHWs in this evaluation had previously worked as MAs, participants noted the skills and knowledge that transferred with them into their roles as CHWs. While this previous experience as an MA was viewed positively by all participants, it could lead to a CHW being tasked with more clinically-oriented activities. Knowledge of clinical systems as well as basic disease mechanisms and management are valuable and can be shared with CHWs in FQHC settings so that clinics do not become reliant on a clinical background from CHWs. One clinician indicated that a community health nurse may be preferable to a CHW in their setting, raising further concern about a misunderstanding of CHW scope of work, and indeed the unique value of CHWs. Defining the scope of the CHW is critical to prevent medicalization of the position and ensure the fidelity of the role, leveraging the greatest assets of CHWs in accompanying patients.

Lived experience is a defining characteristic of the CHW role and may have implications for CHWs integrated in FQHCs. Lived experience refers to the knowledge and understanding gained from one's own direct experiences, choices, and perspectives and is central to the ability of CHWs to understand their clients, build trust, and address their needs. The defined role and scope of the CHW program may offer guidance into what lived experience may be valuable in recruiting and hiring the CHW. While a prior clinical background was common among CHWs in this pilot, it is not clear that specific lived experience relevant to their patients was a factor in CHW recruitment. Additional exploration of how lived experience impacts CHW integration and impact may be helpful.

Limits of CHW Bandwidth and Singular Responsibility

While CHW impact was lauded across FQHC teams, the gap filled by CHWs was so large that workload and capacity constraints were universally noted. In the face of great need, CHWs may feel they cannot adequately serve all clients who might benefit from their support. This challenge is natural in a pilot program that has not yet been scaled to meet its full potential. Still, careful attention to the scope of the CHW role to manage workload, set expectations, and avoid burnout is crucial to the longevity of CHWs in these positions.

While not discussed at length, one potential pitfall of CHW integration is the reliance on a single individual for program success. At one FQHC, the CHW was on leave for an extended period, and there was a transition in managers during the pilot period. This did not impact the overall success of their integration, but does call attention to the challenges of small CHW programs at FQHCs and in other settings. Further collaboration with other FQHCs or health services organizations to develop networks that can support each other during such events or exogenous shocks may make CHW programming more resilient. This can also be true in larger CHW programs, where, for example, each CHW serves a particular population and thus acquires knowledge, resources, and connections related to that population. Robust knowledge management structures should be in place to adjust for staff transition, leave, or other disruptions. There are also the limits of the champion model, discussed above. While a

critical component to the development and implementation of CHW programming, having an individual champion for CHW integration can make programming vulnerable. Long-term planning, robust infrastructure, and buy-in from staff and leadership are necessary for sustained programming, especially if the champion should leave the FQHC.

Data & Recognition

To sustain and grow a robust workforce – and one that feels valued – CHWs must be recognized and supported by their managers and other FQHC staff. CHWs reported feeling supported by their managers and valued by their patients. In one FQHC, the manager and clinician were able to share impactful stories with the Board of Directors and communicate the value of the CHW role to executive leadership. By sharing such information, they successfully advocated for an increased CHW salary. Communicating the value of CHWs to leadership and key decision makers is a critical component of integration, as it helps to ensure the sustainability of the CHW position at the FQHC. We understand from previous conversations with FQHCs that CHWs advocates may find it difficult, however, to show impact to executive leadership without data. Some might find it challenging to sway decision-makers without cost-effectiveness data, specifically (Return-on-investment data are discussed more fully in "Return-on-Investment Analysis"). High-quality studies in similar settings disseminated broadly and leveraged by CHW champions may preclude the need to continuously repeat cost-effectiveness evaluation studies. Still, robust data collection and analysis strategies that encompass the immediate and downstream impact of CHW programming are necessary for the promotion of CHWs and communicating their value to those in decision-making roles.

CHW Impact

The results illustrate the significant impact of integrated CHWs on patients in FQHCs. That CHWs are effective in supporting a multitude of health and social conditions within clinical settings is well-documented [7,22]. The three CHWs participating in this evaluation share some responsibilities, but there are distinct differences in their roles, allowing us to contrast and explore the breadth and depth of their impact.

All CHWs conducted care coordination, but one almost exclusively completed engaged in care coordination. The manager and CHW both reported that this follow-up resulted in increased chronic condition monitoring and health screenings. Care coordination at this FQHC begins with the CHW contacting patients to remind them to schedule appointments and screenings and follow-up on chronic condition monitoring. The CHW relayed that many patients were grateful that someone was actively reaching out to them and tracking their progress. Success may have additionally been facilitated by the CHW speaking the same (non-English) language as the predominant population served. By providing linguistically appropriate care coordination and ensuring timely follow-up, the CHW has built trust with this community, and trust is associated with increased health-seeking behavior [21]. We argue that it is not simply the act of outreach that drives an increase in such health-seeking behavior, but the fact that the outreach is done by a CHW, someone with shared lived experience, who can build trust and develop and strengthen relationships in their communities.

Another CHW provided a range of services, including care coordination, chronic condition monitoring and accountability, and SDOH referrals. The CHW, manager, and clinician all observed changes in patient

chronic condition outcomes due to the CHW activities, including education around various conditions and appointment follow-up. This aligns with the rich evidence of CHW impact on chronic conditions [7-9,21], and highlights how CHW programming can complement clinical interventions.

The final CHW focused primarily on SDOH needs and system navigation and demonstrated how the role can and should provide holistic, humanistic care to patients. This model focuses on understanding what matters most to patients and working to address those needs. The CHW assisted one patient in getting new furniture and spent time helping another organize their medical files. Neither of these examples neatly align with SDOH categories but are critical nonetheless to patient well-being. Though it may often not be possible to see the impact of such activities in health condition data or cost-benefit analysis, these examples challenge us to consider the value of things like comfort, eased anxiety, and improved quality of life in defining program impact.

Collectively and individually, the CHWs integrated into the three FQHCs demonstrated significant impact, both on their patients and the other staff with which they worked. The ways CHWs impacted patients through their differing roles highlighted how CHW roles can be defined to best suit the interests of FQHCs and patients' needs.

Limitations

There are multiple limitations to our qualitative analysis, and we urge caution in applying lessons universally to other CHW integration in FQHC programs. Due to the integration pilot's size, there were few participants in each staff position (i.e., CHW, manager, clinician). Additionally, to maintain anonymity of the participants, we were limited in our ability to use excerpts and provide case studies of a specific position in a specific FQHC. Though one of the evaluation questions regarded the CHW impact on patients, we were unable to include patient interviews in our analysis and must rely on the perception of the FQHC employees to identify themes. Finally, all qualitative data and evaluation are susceptible to bias on the part of the evaluation team.

Return-on-Investment Analysis: Evaluation Objective 4

Though cost-effectiveness is a key component of the Triple Aim Framework and return-on-investment analysis was an intended component of the evaluation, the pilot time frame and data constraints made this infeasible. The three FQHCs that participated in other supplemental evaluation strategies were also interested in providing data for a ROI analysis. We thoroughly investigated ROI methodologies and met with a health economist to better understand potential analyses. Unfortunately, we concluded that a ROI analysis would not be advisable now. Instead, we lay out the conditions and data necessary to successfully carry out a ROI analysis for potential future implementation.

A typical program ROI analysis requires information about total costs expended through a program over a certain time period and total savings as a direct result of program activities over a certain, though not necessarily same, time period. For CHW integration into an FQHC, total costs could include those incurred through the hiring and on-boarding of the CHW, CHW salary and benefits, any other expenses accrued through their work like gas reimbursement, and similar costs for the CHW manager. If SDOH referrals were a primary CHW job component, data would also need to be gathered on total costs of SDOH resources. These costs are all ostensibly collectible. However, identifying the savings through the program activities would be more challenging, especially over the relatively short time frame of one year.

Firstly, the FQHCs would need to identify from which activities they expected to see cost savings. This is a difficult exercise because the downstream impact of CHWs can be challenging to capture and appropriately attribute. To circumvent the question of attribution and limit the effect of confounding variables, one could conduct a comparison analysis. To do so, we would need robust cohort data (as a randomized-controlled trial is unlikely in this context). This was not achievable for the following reasons:

1. Limited time period: While a single year of data may be sufficient to see statistically significant changes in health outcomes like A1c and SBP for chronic conditions (T2D and hypertension, respectively), downstream cost savings may be more difficult to observe. For example, program launch costs and increased preventative care associated with care coordination might actually drive up initial costs. It may take additional months or years to see financial downstream impact through reduced emergency department visits or long-term care.
2. Limited comparison data: A cohort evaluation is not possible at this time given the lack of comparison data. One potential way to measure the impact of CHWs on chronic conditions would be to contrast outcomes and downstream impacts in the CHW-connected population, and the general population. However, publicly-available data on the general population is subject to a multi-year time lag and could not be used for this evaluation. We have requested 5-digit zip code data for each patient so that such analysis may be completed when general population data become available.
3. Limited causal connection: Finally, and perhaps most critically, the causal association between both the CHW activities and the outcome data and the outcome data and potential downstream impacts from which we can hope to see cost savings must be further defined. Programs will need to identify which downstream impacts (some examples provided below), are most relevant and plausible for the activities of their CHW programming, and then select the evaluation from there.

A ROI analysis could potentially be completed if SDOH and chronic condition data, or other data connected to the work of FQHC CHWs, continued to be collected, and data around relevant downstream indicators were also collected. These downstream indicators should capture potential cost savings that could be attributed to CHW work. One such common indicator is urgent care and emergency department visits, though this will not necessarily be a quality indicator for all CHW programs. Given more time and a robust data collection system, FQHCs should be able to conduct ROI analyses of the CHW Program. North Carolina publishes patient discharge data (including diagnostic and treatment codes), typically at a four-year lag, that can be requested for evaluation purposes. One potential way to investigate cost savings is to compare discharge data, and its associated costs, by zip code and between the "comparison group," or patients who benefit from a CHW, and the "control group," or the others in their zip code who were not connected to a CHW. Many ROI analyses also implement quality adjusted life years (QALYs) in their evaluations, another potential way to quantify CHW impact.

To supplement this evaluation question, we have provided below a non-exhaustive list of ROI studies completed for CHW programs focusing on chronic condition management and care coordination in the United States.

Title & Link	**Population**	**Outcome Indicator**	**Cost-Savings Indicator**
Cost-Effectiveness Analysis of a Community Health Worker Intervention for Low-Income Hispanic Adults with Diabetes	Low-income Hispanic adults with T2D	A1c	QALY
Cost-effectiveness of Nurse Practitioner/Community Health Worker Care to Reduce Cardiovascular Health Disparities	Patients of Nurse Practitioner/ CHW program	A1c, blood pressure, cholesterol	Aggregated savings estimates
Higher Quality at Lower Cost: Community Health Worker Interventions in the Health Care Innovation Awards	Medicaid & Medicare patients	Participation in CHW program	Health care utilization
Cost-effectiveness of Community Health Workers in controlling diabetes epidemic on the U.S.–Mexico border	Mexican-Americans with T2D	A1c, cholesterol	QALY
The Effectiveness of a Community Health Worker Outreach Program on Healthcare Utilization of West Baltimore City Medicaid Patients with Diabetes, with or Without Hypertension	African-American Medicaid patients with T2D	Participation in CHW program	Health care utilization
The Community Diabetes Education (CoDE) Program: Cost-Effectiveness and Health Outcomes	Simulated, low-income, ethic-minority populations	A1c, foot ulcers, foot amputations	QALY

Synthesis: Overall Impact of CHWs Integrated into FQHCs

Health Education & Social Determinants of Health

Across four FQHCs, CHWs reached 6,146 people through outreach and health messaging over four quarters. 2,596 patients were screened for SDOH needs, with 671 being referred. Available data from CCHC on proportion of resolved referrals indicates overall success in linking patients to necessary social support. Further data collection around SDOH referrals and their outcomes across the FQHCs may be useful in highlighting the impact of CHWs and assessing resource availability for specific SDOH needs. Qualitative results further illustrate the impact of connecting patients to SDOH needs and assisting patients in system navigation. As one clinician said, "at least 90 to 95% of health is determined outside of the clinic walls," and the integrated CHWs have been adept at providing multi-faceted care coordination, working with patients to improve their health and social conditions inside and outside the clinic walls. While this impact is seen, in part, in numbers – of patients screened, resolved referrals, and more – the individual experiences of patients being supported in organizing their health records, having food personally delivered, or receiving a comfortable chair is immeasurable. Such experiences build trust in the health care system, increase access to existing resources, and improve quality of life.

Chronic Condition Management

Both quantitative and qualitative evidence indicate potential improvement in the management of chronic conditions. While the quantitative analysis was exploratory, two comparison tests yielded statistically significant differences in median (A1c) and mean (SBP) clinical indicators of DM2 and hypertension, respectively. These results align with existing literature on the impact of CHW care coordination and chronic condition management that show CHW programming to be effective in improving patient outcomes across chronic and other health conditions [8,9]. CHWs, managers, and clinicians also observed improvement in management. The manager (who is also a clinician) at one FQHC, for instance, noted a 3% drop in the number of patients with uncontrolled conditions and attributed some of this change to CHW involvement. This change, though anecdotal, is indicative of the role that personal follow-up and customized, routine support has in helping patients adhere to treatment plans and manage their health. Additional data collection, and specifically of paired patient data, will aid in illustrating the impact of CHWs on chronic condition management.

Recommendations

Community of Practice

Collaboration is an important component of CHW integration. FQHC staff, particularly those with newer CHW programs, were eager to learn from and with similar organizations. We recommend maintaining and expanding the collaborate spaces for FQHCs and other organizations working to integrate CHWs into clinical settings. This will allow participants to share resources and strategies to improve CHW programming and integration, and the enhanced collective power may also allow for additional advocacy and funding opportunities for organizations. We also recommend that formal training opportunities be provided in such spaces, with the caveat that feedback be solicited from CHWs and other staff to guide which topics are included.

Strategy Development & Communication

Results from the qualitative evaluation indicate that integration strategies are most effective and understood when CHWs are somehow involved in their development. However, we recognize that this is challenging and perhaps impossible where the CHW is not already employed by the FQHC in some non-CHW capacity and then transitions into the role of a CHW. While certain structures and role and responsibility definition may need to occur without the CHW being integrated, soliciting CHW feedback from other sources may be valuable; this could include, for example, collaboration with CHWs who have been integrated at other FQHCs or discussion with the state CHW Association (e.g., North Carolina CHW Association). Communication regarding any integration strategy is also critical. Any strategy, including management programs and protocols, should be explicitly conveyed to CHWs and, whenever possible, adjusted to incorporate feedback by CHWs throughout the program. The overall integration should also be continuously communicated to other FQHC staff, particularly clinicians, so that they understand the roles and responsibilities of the integrated CHW. Cultivating CHW champions within the clinical staff may further support CHW program adoption and integration.

Data Collection & Further Evaluation

Robust data collection and intentional strategy design are essential for meaningful evaluation, which is itself critical for continuous quality improvement, sustained investment, and the dissemination of program knowledge. Standardized data collection among FQHCs with CHW programming may be useful for sharing and aggregating data, and collectively reporting on CHW impact. Such data collection may be fostered through sustained collaboration (see above).

Multiple FQHCs indicated challenges in data collection. Questions and difficulties centered around understanding which data elements were necessary to demonstrate impact and capacity to gather said necessary data. Interestingly, at least one FQHC shared that collaborative evaluation strategy development was burdensome. Multiple FQHCs expressed confusion over the required versus supplemental evaluation, and some had difficulty reporting the supplemental data. Clear communication of evaluation strategies and data needs is necessary and visual representation of such strategies may be beneficial. Having data templates available (i.e., spreadsheets), though not requiring their use, may also be helpful.

As discussed in detail in “Return-on-Investment," understanding and mapping the theoretical connections between CHW activities, direct health outcomes, and downstream impact (including cost saving impact) is recommended for analysis that relies on causal inference, such as cost-effectiveness analyses. For such evaluation, we recommend the use of a directional acyclic graph (DAG) to map out activities and impact, as well as any contributing and confounding variables.

Finally, the exploratory results of this evaluation can inform future data collection and evaluation. Though we were unable to conduct power testing prior to this evaluation, such testing may be useful for additional evaluation strategy development, specifically for informing recommended sample size. This evaluation yielded valuable information on both variance of data and effect size, though we recommend that power tests for future evaluation use effect sizes that are clinically meaningful. For change in A1c in paired samples, we recommend an effect size of 0.5; for systolic blood pressure, we recommend an

effect size of 10. Using these values and the variance information from the aggregated FQHC data, we make the following sample size recommendations:

1. To detect a change of 0.5 in A1c, assuming a standard deviation of 2.04 and alpha error (p) of 0.05, we would need 177 paired samples for 90% power. Eighty percent power would require 133 paired samples.
2. To detect a change of 10 points in systolic blood pressure, assuming a standard deviation of 18.8 and alpha error (p) of 0.05, we would need 39 paired samples for 90% power. Eighty percent power would require 30 paired samples.

Conclusion

The CCR2109 grant allowed for the successful integration of four CHWs into four FQHCs and supported the development of a robust network of partner organizations that aided integration efforts. CHWs integrated through this pilot demonstrated significant impact by enhancing ability to connect patients to support needs, increasing outreach and education capacity, improving patient health behaviors, and supporting care coordination activities at FQHCs. Exploratory quantitative analysis demonstrated an association between some CHW activities and chronic condition management. This evaluation demonstrates the breadth and depth of CHW impact in FQHCs and builds upon the strong existing evidence supporting CHW integration into clinical settings. Further investigation of CHW integration in these FQHCs and in other settings will support program improvement, inform policy, and demonstrate CHW impact for advocacy efforts in support of the workforce.

References

1. K. Kim et al., “Effects of Community-Based Health Worker Interventions to Improve Chronic Disease Management and Care Among Vulnerable Populations: A Systematic Review,” Am J Public Health, vol. 106, no. 4, pp. e3–e28, Apr. 2016, doi: 10.2105/AJPH.2015.302987.
2. S. Stringhini et al., “Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1·7 million men and women,” The Lancet, vol. 389, no. 10075, pp. 1229–1237, Mar. 2017, doi: 10.1016/S0140-6736(16)32380-7.
3. M. Marmot, S. Friel, R. Bell, T. A. Houweling, and S. Taylor, “Closing the gap in a generation: health equity through action on the social determinants of health,” The Lancet, vol. 372, no. 9650, pp. 1661–1669, Nov. 2008, doi: 10.1016/S0140-6736(08)61690-6.
4. M. Ingram et al., “A Community Health Worker Intervention to Address the Social Determinants of Health Through Policy Change,” J Prim Prev, vol. 35, no. 2, pp. 119–123, Apr. 2014, doi: 10.1007/s10935-013-0335-y.
5. E. L. Rosenthal et al., “The Community Health Worker Core Consensus (C3) Project Story: Confirming the Core Roles and Skills of Community Health Workers,” in Promoting the Health of the Community, Cham: Springer International Publishing, 2021, pp. 11–35. doi: 10.1007/978-3-030-56375-2_2.
6. H. Balcazar, E. L. Rosenthal, J. N. Brownstein, C. H. Rush, S. Matos, and L. Hernandez, “Community health workers can be a public health force for change in the United States: three actions for a new paradigm.,” Am J Public Health, vol. 101, no. 12, pp. 2199–203, Dec. 2011, doi: 10.2105/AJPH.2011.300386.
7. M. Knowles, A. P. Crowley, A. Vasan, and S. Kangovi, “Community Health Worker Integration with and Effectiveness in Health Care and Public Health in the United States,” Annu Rev Public Health, vol. 44, no. 1, pp. 363–381, Apr. 2023, doi: 10.1146/annurev-publhealth-071521-031648.
8. S.L. Norris, F.M. Chowdhury, K. Van Le, T. Horsley, J.N. Brownstein, X. Zhang, L. Jack, and D.W. Satterfield, “Effectiveness of community health workers in the care of persons with diabetes,” Diabetic Medicine, 23: 544-556, 2006, https://doi.org/10.1111/j.1464-5491.2006.01845.x
9. J. N. Brownstein, F. M. Chowdhury, S. L. Norris, T. Horsley, L. Jack, X. Zhang, D. Satterfield, “Effectiveness of Community Health Workers in the Care of People with Hypertension,” American Journal of Preventive Medicine, vol. 32, no. 5, pp. 435-447, 2007, https://doi.org/10.1016/j.amepre.2007.01.011.
10. “Diagnosis and Classification of Diabetes Mellitus,” Diabetes Care, vol. 37, no. Supplement_1, pp. S81–S90, Jan. 2014, doi: 10.2337/dc14-S081.
11. P. K. Whelton et al., “2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults,” J Am Coll Cardiol, vol. 71, no. 19, pp. e127–e248, May 2018, doi: 10.1016/j.jacc.2017.11.006.
12. North Carolina Institute of Medicine, “Chronic Disease and North Carolina’s Public Health,” 2019, Accessed: Feb. 13, 2024. [Online]. Available: https://nciom.org/nc-health-data/chronic-disease/

13. E. L. Rosenthal, N. Wiggins, M. Ingram, S. Mayfield-Johnson, and J. G. De Zapien, “Community Health Workers Then and Now,” Journal of Ambulatory Care Management, vol. 34, no. 3, pp. 247–259, Jul. 2011, doi: 10.1097/JAC.0b013e31821c64d7.
14. S. Kangovi et al., “Patient-Centered Community Health Worker Intervention to Improve Posthospital Outcomes,” JAMA Intern Med, vol. 174, no. 4, p. 535, Apr. 2014, doi: 10.1001/jamainternmed.2013.14327.
15. N. S. Islam et al., “A Randomized-Controlled, Pilot Intervention on Diabetes Prevention and Healthy Lifestyles in the New York City Korean Community,” J Community Health, vol. 38, no. 6, pp. 1030–1041, Dec. 2013, doi: 10.1007/s10900-013-9711-z.
16. North Carolina Community Health Center Association, “About Community Health Centers,” 2020. Accessed: Feb. 13, 2024. [Online]. Available: https://www.ncchca.org/about-chcs/about-community-health-centers/
17. National Association of Community Health Centers, “Federally Qualified Health Centers,” 2021. Accessed: Feb. 13, 2024. [Online]. Available: https://www.nachc.org/about/about-our-health-centers/what-is-a-health-center/
18. D. Johnson et al., “Community Health Workers and Medicaid Managed Care in New Mexico,” J Community Health, vol. 37, no. 3, pp. 563–571, Jun. 2012, doi: 10.1007/s10900-011-9484-1.
19. R Core Team, “R: A Language and Environment for Statistical Computing.” R Foundation for Statistical Computing, Vienna, Austria, 2022. Accessed: Oct. 13, 2023. [Online]. Available: https://www.R-project.org/
20. Dedoose Version 9.2.007, web application for managing, analyzing, and presenting qualitative and mixed method research data (2019). Los Angeles, CA: SocioCultural Research Consultants, LLC www.dedoose.com.
21. M.E. Darden, M. Macis, “TRUST AND HEALTH CARE-SEEKING BEHAVIOR,” National Bureau of Economic Research, Cambridge, MA, May 2024, w32028.pdf (nber.org)
22. H. B. Perry, R. Zulliger, and M. M. Rogers, “Community Health Workers in Low-, Middle-, and High-Income Countries: An Overview of Their History, Recent Evolution, and Current Effectiveness,” Annu Rev Public Health, vol. 35, no. 1, pp. 399–421, Mar. 2014, doi: 10.1146/annurev-publhealth-032013-182354.

Appendix A: Quantitative Analysis

Figures

Figure A1: Distribution of A1c value across all reporting FQHCs (MedNorth, CCHC, PHS) by quarter (Q1: June – August 2023; Q2: September – November 2023; Q3: December 2023 – February 2024; Q4: March – May 2024). Parametric (normal) testing refers to the mean and non-parametric to the median (both with 95% confidence intervals). Plot width represents frequency of observations.

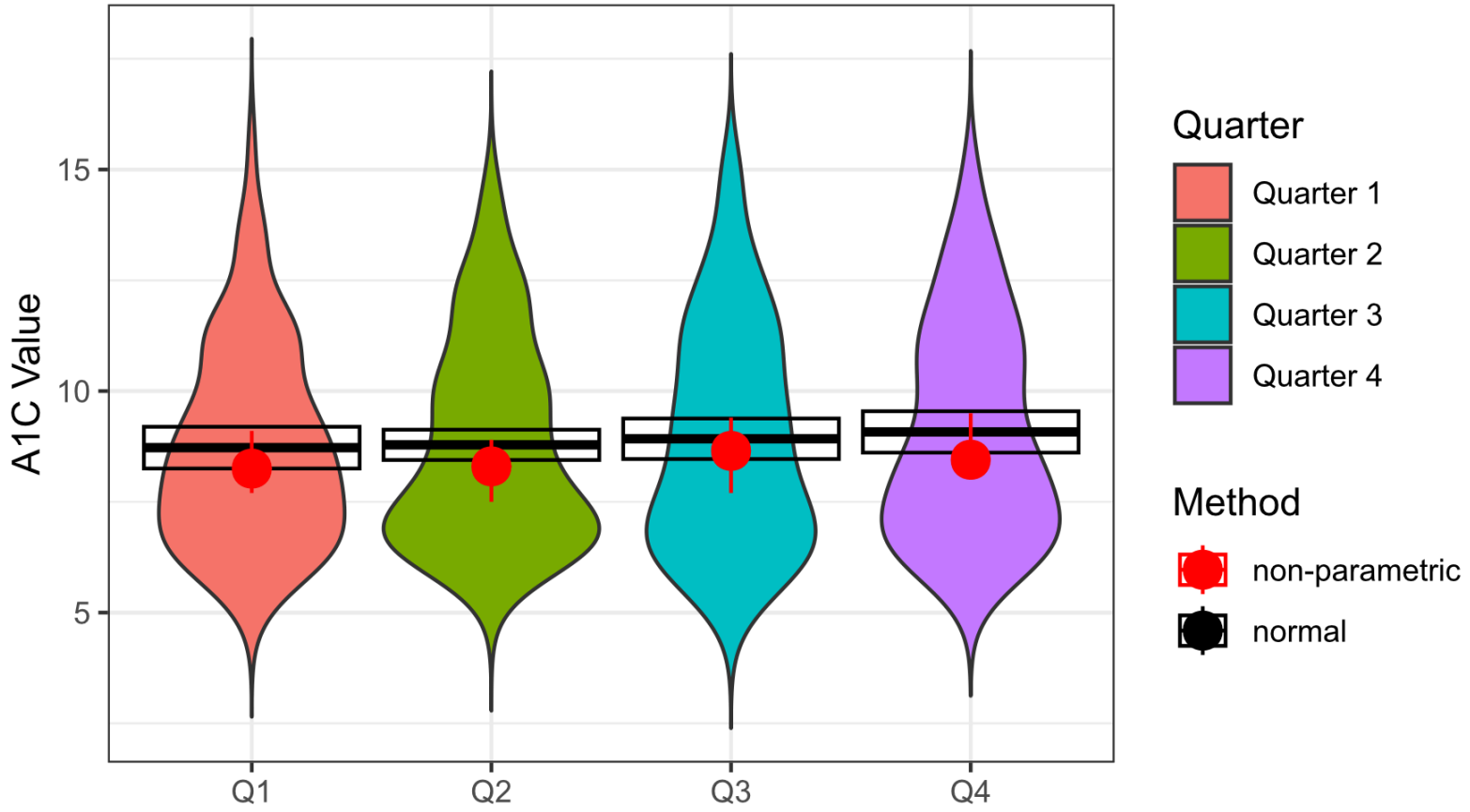
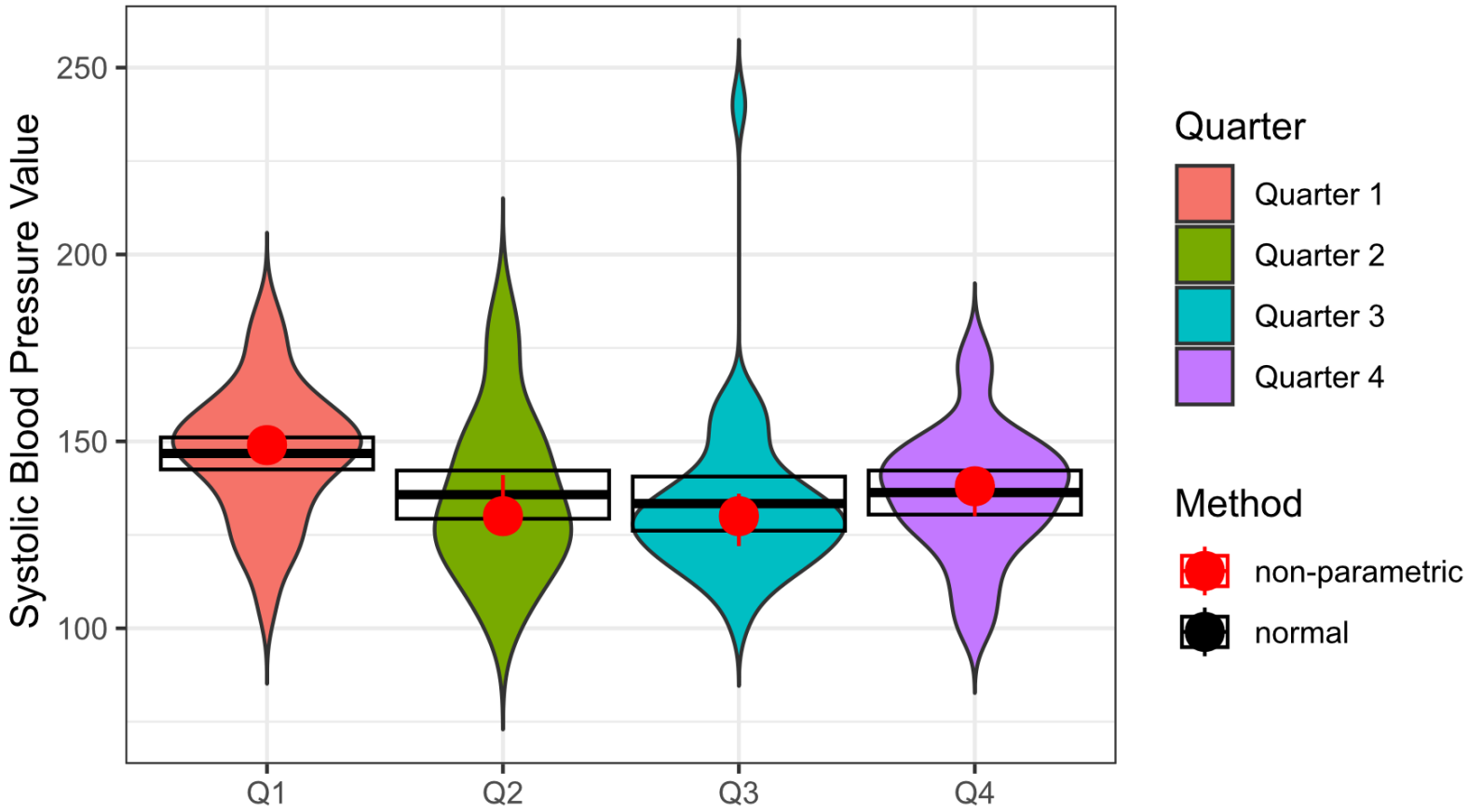


Figure A2: Distribution of systolic blood pressure value across all reporting FQHCs (MedNorth, CCHC) by quarter (Q1: June – August 2023; Q2: September – November 2023; Q3: December 2023 – February 2024; Q4: March – May 2024). Parametric (normal) testing refers to the mean and non-parametric to the median (both with 95% confidence intervals). Plot width represents frequency of observations.



Tables

Table A1: CCR2109 Grant Performance Metrics Results

Results of CCR2109 Grant Performance Metrics required for reporting by the four participating North Carolina-based FQHCs (Med North, Rural Health Group, Charlotte Community Health Clinic, Piedmont Health Services). While data reporting began in December 2022, data presented below ranges from June 2022 through May 2024 to ensure all four FQHCs are represented consistently. Data extracted from FQHC Electronic Health Records (EHR) and internal Excel Tracking tools by participating FQHCs. NR indicates that a value was not reported. NA is not applicable. SD = standard deviation; IQR = inter-quartile range.

Variable	**6/23 - 8/23**	**9/23 - 11/23**	**12/23 - 2/24**	**3/24 - 5/24**	**Total**	**Median & IQR**
# of individuals in the community or health center who *received messaging or education*	220	1,736	2,620	1,570	6,146	1653 (895, 2178)
# of health center patients who were *screened for SDOH* by CHW	264	707	810	815	2,596	758.5 (485.5, 812.5)
# of health center patients *referred for resources to address SDOH* by CHW	118	116	209	228	671	163.5 (117, 218.5)
# of *categorized referrals* completed by CHW for health center patients with SDOH needs	NR	NR	197	183	380	N/A
# of *resolved referrals* for health center patients who were referred for SDOH resources by CHW	121	124	246	227	718	175.5 (122.5, 236.5)

Table A2: Social Determinant of Health Referrals

SDOH referrals by number and percent of type are summarized. Note that dates are not provided for these data. There may be duplication with the CCR2109 metrics (Table A1) and specifically with categorized referrals. As such, data presented below should be assumed to overlap with previously reported data.

Table A2a: MedNorth Health Center

SDOH Type	**n**	**%**
Food	12	7.74
Housing	15	9.68
In-home Care	6	3.87
Care Coordination	59	38.06
Transportation	24	15.48
Additional health care	8	5.16
Health Literacy	4	2.58
Personal Care Services	5	3.23
Insurance & Billing Assistance	11	7.10
Financial Support	5	3.23
Other	6	3.87
TOTAL	155	

Table A2b: Charlotte Community Health Clinic

SDOH Type	**n**	**%**
Food	401	98.76
Transportation	1	0.25
Depression/Mental Health	3	0.74
Domestic Violence	1	0.25
TOTAL	406	

Table A3: Diabetes Data (A1c) Across Quarters

A1c values (%) for patients with Type 2 Diabetes Mellitus served by CCR2109-funded CHWs across reporting periods (Q1: June – August 2023; Q2: September – November 2023; Q3: December 2023 – February 2024; Q4: March – May 2024). Median A1c levels and their corresponding ranges are provided, alongside sample sizes (n).

Table A3a: Piedmont Health Services (Note: Q1 only includes July and August for PHS)

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	8.5	8.0	8.95	8.35
Range	5.8 – 15.5	5.4 - 15.0	5.4 - 15.0	5.7 - 15.1
Sample Size (n)	54	151	102	96

Table A3b: MedNorth Health Center

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	6.6	7.6	6.8	9.3
Range	5.1 - 13.3	5.0 - 10.5	5.0 - 10.9	9.3
Sample Size (n)	19	13	16	1

Table A3c: Charlotte Community Health Center

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	9.2	9.35	NA	10.8
Range	6.5 - 11.5	7.3 - 13.6	NA	6.4 - 14.3
Sample Size (n)	15	14	0	9

Table A3d: Combined FQHC (MedNorth, CCHC, PHS)

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	8.25	8.3	8.65	8.45
Range	5.1 - 15.5	5.0 - 15.0	5.0 - 15.0	5.7 - 15.1
Sample Size (n)	88	178	118	106

Table A4: Paired t-test Results for A1c Values

Two-sided t-test results for paired A1c values for patients with diabetes served by CCR2109-funded CHWs June 2023 – May 2024. Df is degrees of freedom (n-1) and 95% CI represents the 95% confidence interval.

Table A4a: Charlotte Community Health Center

t value	**Df**	**p value**	**95% CI**	**Mean Difference**
1.2716	11	0.2297	-0.335,1.25	0.458

Table A4b: Combined FQHC (MedNorth, CCHC, PHS). Results are provided in logarithmic terms below (only affecting the 95% confidence interval and the mean difference). To interpret the results of this t-test using logarithmically transformed data, we examined the ratio of the confidence intervals, exponentially transformed, on the median of the pre-transformed data.

t value	Df	p value	95% CI	Median % Difference
2.5498	127	0.03932	0.002, 0.076	0.039

Table A5: Hypertension Data (Systolic blood pressure) Across Quarters
Systolic blood pressure values (mmHg) for patients with hypertension served by CCR2109-funded CHWs across reporting periods (Q1: June – August 2023; Q2: September – November 2023; Q3: December 2023 – February 2024; Q4: March – May 2024). Median systolic blood pressure levels and their corresponding ranges are provided, alongside sample sizes (n).

Table A5a: MedNorth Health Center

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	129	124	130	137
Range	120 – 154	100 – 188	102 – 240	100 – 165
Sample Size (n)	14	25	38	16

Table A5b: Charlotte Community Health Center

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	150	143.5	157	141
Range	104 – 187	120 – 180	157	118 – 175
Sample Size (n)	54	20	1	19

Table A5c: Combined FQHC (MedNorth, CCHC)

Reporting Period	**Q1**	**Q2**	**Q3**	**Q4**
Median	149	130	130	138
Range	104 – 187	100 - 188	102 - 240	100 - 175
Sample Size (n)	68	45	39	35

Table A6: Paired t-test Results for Systolic Blood Pressure Values

Two-sided t-test results for paired systolic blood pressure values for patients with hypertension served by CCR2109-funded CHWs June 2023 – May 2024. Df is degrees of freedom (n-1) and 95% CI represents the 95% confidence interval.

Table A6a: MedNorth Health Center

t value	Df	p value	95% CI	Mean Difference
-1.2469	29	0.2224	-10.91, 2.65	-4.13

Table A6b: Charlotte Community Health Center

t value	Df	p value	95% CI	Mean Difference
3.0988	17	0.0065	3.71, 19.52	11.61

Table A6c: Combined FQHC (MedNorth, CCHC)

t value	Df	p value	95% CI	Mean Difference
0.65195	47	0.5176	-3.69, 7.23	1.77

Appendix B: Qualitative Analysis

Table B1: **Thematic Code Definitions**
Code definitions created for the thematic coding of the FQHC key informant interviews. Coding was completed in Dedoose.

Code	Sub-code	Description
Integration Strategies		Discussing the strategies or systems used to help integrate the CHW into the clinic, prepare them for their role, or prepare others for working with them.
	Prior role	Importance of prior role or experience for either CHW or those working with them. For CHWs, this could include work as a CHW, MA, or other. Includes the impact of their previous experience and how it affects their current work.
	Lack of strategy	Used if a participant indicates a lack of strategy or plan when the CHW started, or lack of awareness of strategy.
	Other CHWs	Mentions the role of CHW program or other CHWs at the clinic; does not necessarily need to be positive or important to integration.
	Support	Broadly includes support (to the CHW) from managers, other CHWs, clinicians, leadership, or others.
	Trainings	Mentions the use of trainings or formal education, can be either positive or negative, provided to the CHW.
	Knowledge	Different than trainings, this is relating to any education or information provided to non-CHWs about what a CHW is, or their understanding of who/what a CHW is.
	Collaboration	Specific to collaboration with other groups or organizations, like the peer trainings from AHEC, or other support around CHW integration.
	Management	Relates to specific protocols or program management tactics like using an algorithm or daily huddles to create a work flow with the CHW.
	Capacity	Mentions any concerns about capacity or workload for CHW.
	Other	Other strategy not included above.
	Positive	Positive integration experience.
	Negative	Negative integration experience.
CHW Impact		Discussing the impact of CHWs on their patients and the clinic.
	Set clinical	Clinical outcomes, specifically diabetes (A1c) and hypertension (BP) are mentioned, including the monitoring or improvement of such outcomes.
	SDOH	Mentions the social determinants of health, and how CHW takes part in connecting people to resources.

	Care coordination	Includes any activity where CHW is involved in outreach, coordination, and follow-up outside of SDOH coordination.
	Specific health	Other health priorities are mentioned, not including diabetes or hypertension.
	Health behavior	Relates to health behavior of the patient, and how it might have been impacted by CHW activities, including seeking health care.
	Personal	Mentions an improved or changed personal relationship with the patient, such as increased trust in the clinic or health care.
	Population	Indicates a specific population that the CHW works with, such as Medicare patients, Hispanic patients, patients with uncontrolled disease, etc.
	Limited	Mentions a situation where impact of CHW may have been limited, or where impact was hoped for and not achieved.
	Education	Relates to when CHW provides the patient with education.
	Other	Other CHW Impact not included above.
Other		
	Recognition	Participant indicates importance of recognition, appreciation, and/or respect for CHW; participant indicates action of CHW being recognized.
	Defining role	Mentions any role confusion or having to explain who/what a CHW is and should be doing; can include defining specific responsibilities and focus areas.
	Value	Broadly includes having to advocate or measure and communicate the value of CHW to leadership or others.
	Resources	Indicates the importance of resources, and any resource problems, like those specific to Medicare, Medicaid, or lack of local resources.
Great Quotes		Impactful or otherwise important quotes; quotes that exemplify a specific point.

Supporting Document B1: CHW Interview Guide

[*Intro questions*]

1. Can you tell me how long you've been with [FQHC name]?
2. Can you tell me about the population that you primarily work with?
    a. *If there's no specific population:* Are there any commonalities in terms of income, health insurance coverage, or demographic?
    b. *Probing*: Have you worked with this population before your current role?
        i. Yes: Do you feel prepared in your current role to work with them now in your current role?
        ii. No: Do you feel like you were provided adequate resources and training in your current role?
    c. *If they haven't worked with this population before (and if the population is somewhat specific, like Medicare, immigrant communities, etc.)*: Do you feel like you were provided adequate training or resources to work with this population?
3. Are there other CHWs at [FQHC name] that you work with?

[*Central questions*]

4. Can you walk me through a typical workday?
    a. *Probing:* Can you tell me about any major responsibilities you might have that we haven't covered yet?
    b. *Probing, if they don't discuss a patient interaction:* Can you describe a typical interaction with a patient?
5. In your current role, do you focus on any specific health priority areas such as chronic disease management, primary care, and behavioral health?
    a. *If yes*: Do you feel like you have adequate support to focus on this/these area(s)?
    b. *If no*: Would you have interest in focusing on any specific health priority areas?
        i. *If there is interest*: "Do you feel like clinicians/your manager would support you in that?"
6. Can you walk me through some of the ways in which you've been integrated into [FQHC name]?
    a. *If they need more information*: How do you feel you've been embedded into the patient-facing work of the clinic?
    b. *Probing*: Do you feel like you've been well-supported in your role? OR Do you feel valued by other members of the patient team? Please describe or provide an example of how you felt supported or valued.
    c. *If they talk about successes*: Can you tell me about any challenges you've faced in feeling like part of the patient-facing team?
    d. *If they talk about successes*: Can you tell me about any challenges you've faced working with patients?
    e. *If they talk about challenges*: Can you tell me about a success you've had in interacting with other members of the patient-facing team?
7. Do you feel like you have the resources necessary to perform your roles consistently?
    a. *Probing*: Can you tell me what resources or support might be helpful?
8. Can you tell me about the impact you feel you've had in this role on the patients?

a. *Probing*: Can you share an example of a success?
b. *Probing*: What do you think [FQHC name] is doing now that couldn't do before you/this program started?
c. *Probing*: Do you hear feedback from patients? (If so, what kind of feedback, examples)

9. Can you walk me through how you feel your work has influenced the care teams?
    a. *Probing*: Have you heard any feedback about the program from clinicians?
    b. *Probing*: How do you think your work influences how clinicians interact with patients?

[*Concluding questions*]

10. If you could anonymously share any feedback you wanted to your non-CHW co-workers, what would you like them to know?
    a. *Probing*: Do you feel like they would be receptive to that feedback?
11. In general, which aspects of your work do you believe are the most valuable for improving the health of your patients?
    a. *Probing:* what other activities would you like to devote more time to that are important to your patients or the communities you serve?
    b. *Probing*: Do you feel like you have adequate time to devote to this type of work?

Supporting Document B2: CHW Manager Interview Guide

[*Intro questions*]

1. Can you tell me how long you've been with [FQHC name]?
2. What are your primary responsibilities as they relate to the CHW integration?

[*Central questions*]

3. Can you tell me about any previous experience you have in managing or working with CHWs?
    a. *If they do have previous experience*: How do you feel your previous experience has aided you in managing the integrated CHW?
    b. *If they do not have previous experience*: Can you walk me through how you prepared to manage the CHW?
    c. *Probing*: Do you feel like you were given the necessary resources and support to manage and aid the CHW?
    d. *Probing*: What are some resources that would have been helpful before or during integration?
4. Can you explain the structure of the Community Health Worker Integration funded program as it relates to the rest of [FQHC name]?
    a. *If they need more information about structure*: Where does the CHW sit within your clinic and services?
    b. *Probing*: Are there other CHWs at [FQHC name]?
    c. *Probing*: Can you tell me about how CHWs are connected to patients? (What is the process for getting a patient in touch with the CHW?)
5. What is the primary role of the CHW under your management?
    a. *Probing:* What other ways do you believe CHWs could assist patients?
6. Can you walk me through some of the strategies you've used to help integrate the CHW into [FQHC name]?
    a. *If they need more information*: In what ways have you embedded them into the patient-facing work of the clinic?
    b. *Probing*: Do you believe these strategies were successful? If yes, how so? If no, why weren't they successful/what challenges did you face? (similar to 6e and 6f)
    c. *Probing*: Can you tell me about any resources you received about integration through the grant funding?
    d. *Probing, if they received resources*: Do you feel those resources were helpful? OR What other resources may have been helpful for integration and planning?
    e. *If they talk about successes*: Can you tell me about any challenges you've faced in integrating the CHW into your services?
    f. *If they talk about challenges*: Can you tell me about a success you've had in integrating the CHW into your services?
7. How have clinicians generally responded to working with a CHW?
    a. *Probing*: Do you feel like clinicians were given adequate resources to understand the roles and responsibilities of the CHW? If yes, what resources were provided? If no, what resources do you need?

b. *Probing*: Do clinicians typically know when to connect a patient to the CHW? If yes, describe how you do so.
c. *Probing*: Are there specific health priority areas like chronic conditions that you think clinicians would like to work with CHWs to address?

8. Have the patients provided you with any feedback on their interactions with the CHW?
    a. *Probing*: Have you observed any behavioral changes in patients with whom CHWs have helped?
    b. *Probing*: Are there any examples or testimonials that you've heard about the CHW from patients (or clinicians)?
9. Can you describe further the overall impact you've felt that the CHW has had within [FQHC name]?

[*Concluding questions*]

10. What part of the CHW integration do you feel has been most valuable for improving the health of your patients?
    a. *Probing:* Do you feel like the CHW has been well-supported in providing those types of services/interactions/resources?

Supporting Document B3: Clinician Interview Guide

[*Intro questions*]

1. Can you tell me how long you've been with [FQHC name]?
2. Are you aware of other CHWs who worked at [FQHC name] prior to the Community Health Worker Integration program?
    a. *If yes*: Can you tell me about how you interacted with those or other CHWs?
    b. *If no*: Can you tell me about any previous experience you have in working with CHWs?
    c. *Probing*: Do you feel like the integrated CHW has a similar role to those CHWs?

[*Central questions*]

3. Can you walk me through a typical interaction with the CHW?
    a. *Probing*: Do you feel like you know when to connect a patient to the CHW?
    b. *Probing*: Can you provide an example of a good experience you've had with the CHW?
4. What do you feel like are the main roles of the CHW(s) that you work with?
    a. *Probing*: Do you feel like you were given adequate resources to understand the roles and responsibilities of the CHW?
    b. *Probing*: Are there specific health priority areas like chronic conditions that you would like to work with CHWs to address?
5. Are you aware of any strategies used to help integrate the CHW into [FQHC name]?
    a. *If they need more information*: In what ways were CHWs embedded into the patient-facing work of the clinic?
    b. *Probing*: Do you believe these strategies were successful?
    c. *If they talk about successes*: Can you tell me about any challenges you've faced in integrating the CHW into your services?
    d. *If they talk about challenges*: Can you tell me about a success you've had in integrating the CHW into your services?
6. Have the patients provided you with any feedback on their interactions with the CHW?
    a. *Probing*: Have you observed any behavioral changes in patients with whom CHWs have helped? (This can include health-seeking behaviors, like showing up for appointments.)
    b. *Probing*: Are there any examples or testimonials that you've heard about the CHW from patients?
7. Can you tell me about the overall impact you've felt the CHW has had in [FQHC name]?
    a. *Probing*: Do you feel like the CHW has strengthened [FQHC name]'s relationship to patients?

[*Concluding questions*]

8. What part of the CHW integration do you feel has been most valuable for improving the health of your patients?
    a. *Probing:* Do you feel like the CHW has been well-supported in providing those types of services/interactions/resources?