

Beyond Expectations: Characterizing and Expanding the Roles of Community
Health Workers in Environmental Health and the Built Environment

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Abstract

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Community health workers (CHWs) enhance the fields of public health and medicine. They are known to improve trust and connection between institutions and communities that experience barriers to care. Meanwhile, most public institutions struggle to sufficiently reach all the communities they seek to support. This research investigates how community health workers contribute to their current projects and considers if and how the community health worker model can be applied to non-medical settings or fields other than medicine and public health.

This research was completed in collaboration with Public Health – Seattle & King County’s Community Health Worker Asthma Program (CHW Asthma Program) and the Airport, Air

Quality, and Asthma Research Study (AAA Study), a research project under the University of Washington's Department of Environmental and Occupational Health Sciences. It investigated the roles of community health workers in the CHW Asthma Program and the AAA Study, where they are mediators, educators, and advocates of their clients.

This research evaluated the AAA Study Protocol and suggests that community health workers strengthened the AAA Study by enhancing participants' engagement and satisfaction and by providing insights as to how participants would interact with study materials. This research also conducted the CHW Roles Study, a qualitative analysis of the experiences of community health workers. It found that they are skilled professionals who make personal connections with their clients based on respect and autonomy. This analysis found that CHWs support clients with many resources and topics, including non-medical care, if they have access to training and resources. Additionally, CHWs can be better supported in their work with more stable funding, training and education, and access to mental health care.

This research supports the importance of community health workers in public health and research. It also suggests that expanding the role of CHWs beyond these fields can help other institutions engage more meaningfully with their residents and constituents. Hiring community health workers or other liaisons can increase community engagement and public participation, improve trust, and support a shift toward more collaborative decision-making between institutions and the communities they seek to support.

Acknowledgements

This work could not have been done without the amazing community health workers who support people's health and wellbeing every day. You all inspire me to get involved in local efforts and to create healthier spaces for my communities and neighbors.

I would also like to express my deepest appreciation for my committee co-chairs, Dr. Elena Austin and Dr. Rachel Berney, who guided and supported me throughout this whole process. Thank you for helping me untangle my thoughts, bridge two disciplines, and speak with a strong voice.

Many thanks also to the AAA Study Team and the King County Asthma Team – Jeff, Maria, Christine, and Jan – who have been a pleasure to work with over the last year and a half. I am so grateful for my experiences collaborating with and learning from each of you.

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Chapter I

Introduction

Background

Community Engagement and Environmental Public Health

While most public institutions value community engagement, many struggle to sufficiently reach all populations of interest, particularly those that have historically experienced and continue to experience racism and other social injustices. In the field of urban planning, frameworks such as Arnstein's ladder of public participation¹ and the IAP2 spectrum of public participation² describe the range of decision-making power a community can have. Communities have less power when governments only inform them of decisions that were made without their input. At the other end of the spectrum, governments can collaborate with their constituents, share power, or even relinquish power. Community engagement efforts in urban planning continue to fall short,³ resulting in the continuation of disinvestment and harm to marginalized communities.

Meanwhile, the field of public health has embraced the role of community health workers (CHWs) as liaisons between agencies and communities, particularly communities of marginalized populations. Community health workers come from and are knowledgeable about their own communities, have linguistic and cultural competency, and receive training about the relevant medical information. CHWs therefore provide a link between communities and the health system and facilitate the building of community trust.⁴

Given that community health workers are simultaneously trusted by communities and knowledgeable about the systems they work in, this research explores how the community health worker model can be applied to other public agencies. For example, can liaisons engage their communities about transportation safety, navigating public transit, and using bicycle paths? Can they uplift the voices of their community members who need housing or green spaces, or even guide communities to develop plans for the type of housing or green spaces they want to see in their neighborhoods? The work of any public agency affects public health. Department such as solid waste, parks and recreation, economic development, and land use planning all have an impact on what resources are available to people and what negative impacts are prevented from reaching communities.

Built environments are greatly affected by public agencies who have power to design the neighborhoods people live, work, and play in, and thereby have impacts on community and

individual health. Exploring the potential roles of community health workers as intermediaries between public agencies and communities can have vast implications for the field of environmental public health. One example of how a community's built environment affects its health is seen in the relationship between asthma and air pollution.

Asthma and Air Pollution

Asthma is a chronic lung disease recognizable by asthma exacerbations, or “asthma attacks,” during which airways narrow and cause symptoms such as wheezing, chest tightness, and difficulty breathing.⁵ In 2022, 8.2% of the US population had asthma, including 6.2% of children and 8.7% of adults.⁶ In the US, the age-adjusted rate of asthma mortality in 2001-2021 was 12.0 per million.⁷ In 2017-2019 in the US, there were almost 1.68 million annual emergency department visits which listed asthma as the primary diagnosis, with a rate of 99.5 per 10,000 children and 38.2 per 10,000 adults.⁸

Asthma has significant impacts on people's health-related quality of life. Those who have uncontrolled asthma report lower satisfaction with many aspects of their health, including mobility, sleeping, mental health, and mental function.⁹ Uncontrolled asthma also limits the ability of people to carry out their usual activities and live their day-to-day lives. Children who experience asthma exacerbations miss more school days than children without asthma, and their caregivers miss more workdays than their counterparts whose children do not have asthma.¹⁰ Children with uncontrolled asthma also participate in less physical activity and have worse mental health than their counterparts without asthma.¹¹

Exposure to air pollutants including nitrogen dioxide and fine particulate matter is associated with increased risk of asthma development.¹² Research suggests that exposure to traffic-related air pollution (TRAP) from roadways and transportation sources at an early age or prenatally is associated with developing asthma, though some findings are inconclusive.¹³⁻¹⁶ Additionally, exposure to air pollution is also known to increase asthma exacerbations.¹⁷ This includes pollutants such as fine particulate matter (PM_{2.5}), ozone, sulfur dioxide, nitrogen oxides, and black carbon. Air pollution contributes to asthma through mechanisms that include airway inflammation, DNA methylation, oxidative stress, and other pathways.^{18,19}

Among outdoor air pollutants, TRAP from roadways and transportation sources, including aviation, is of particular concern. Ultrafine particle (UFP) pollutants, which are associated with roadways and aircrafts, are smaller than 0.1 micrometers, can travel deeper into the lungs than larger particles, and are retained longer in the respiratory system.^{20,21} Evidence

is increasing that UFP pollutants are associated with increased rates of asthma and respiratory symptoms.^{20–22}

Indoor air quality is also important for respiratory health. Americans spend most of their time indoors, where pollutants may be in higher concentrations than outdoors and where there are unique sources and types of air pollutants.²³ Two major groups of indoor air pollutants are volatile organic compounds (VOCs) and PM_{2.5}.²⁴ Sources of VOCs include household products and cleaning agents, and PM_{2.5} is primarily produced by indoor combustion sources such as gas stoves and candles. Mold, pests, and allergens are also indoor air pollutants that are associated with asthma.²⁵ Furthermore, indoor air quality is affected by outdoor air quality as well as building construction, which impacts the air exchange rate with the outdoors.

The prevalence of asthma differs throughout the population, with disproportionate impacts borne by certain racial groups and by low-income communities. Based on the 2020-2022 National Health Interview Survey, 10.6% of Black Americans and 12.5% of American Indians and Alaska Natives have asthma, while 7.8% of White Americans have the disease.⁶ Among those who are below the poverty threshold, 11.1% have asthma; this prevalence is about 3% higher than the national average. The consequences of asthma are also greater for these disadvantaged communities. For example, the rate of asthma deaths per year for Black Americans is 29.8 per million, nearly triple the national average.⁷

Racial and ethnic minority populations and low-income communities are disproportionately exposed to outdoor air pollutants.²⁶ Communities of color and low-income communities are more likely to be adjacent to major roadways, which are a significant source of mobile air pollution.²⁷ People of color in the United States are also exposed to greater concentrations of “industry, light-duty gasoline vehicles, construction, and heavy-duty diesel vehicles” than White Americans.²⁶ Communities of lower socioeconomic status have higher indoor exposures to nitrogen dioxide (NO₂), PM_{2.5}, VOCs, and tobacco smoke due to higher exposures to outdoor air pollution, poorer quality housing, and higher occupant density.²⁸

Disparities in exposures to air pollution are present due to discrimination and racism.²⁹ Residential segregation by race was designed through redlining, racial restrictive covenants, deed restrictions, real estate steering, and other discriminatory practices which excluded Black Americans and other communities of color from white neighborhoods.³⁰ This history of segregation continues to result in health and income disparities.³¹ Communities of color and low-income communities face elevated levels of air pollution due to systems of power which have sited more highways, more industry,

fewer green spaces, fewer healthcare services, and less safe and complete pedestrian infrastructure in their neighborhoods. Each of these disparities relate to air pollution, asthma, and overall respiratory health.

Project Objectives

This project studies the role of community health workers in enhancing health at multiple scales, from the individual level to the policy level. It is an exploratory analysis focused on the experiences of CHWs who primarily work to help people manage their asthma. This project was completed in partnership with the Public Health – Seattle & King County Community Health Worker Asthma Program (CHW Asthma Program) and the University of Washington’s Airport, Air Quality, and Asthma Research Study (AAA Study). The aims of the project are to:

1. Describe the implementation of the AAA Study and the role of CHWs in participant engagement and retention.
2. Explore the roles of CHWs in building relationships with clients and addressing broader community health needs.
3. Evaluate how the CHW model can be adapted to other programs and service areas to address environmental public health challenges.

Chapter II will address the first aim by describing the AAA Study protocol in detail and evaluating its success, particularly focusing on the role of community health workers in its implementation. This chapter will include an analysis of data on the recruitment and retention of AAA Study participants.

Chapter III will address the second and third aims. This chapter is a qualitative research study in which community health workers were surveyed and interviewed about their experiences and their thoughts about CHW roles. Data gathered from CHWs will be analyzed along with contextual information about resources and support systems available to CHWs. This chapter will also include a discussion on whether and how the CHW model can be used outside of medical health.

Chapter II

Community Health Workers and the Airport, Air Quality, and Asthma Research Study

Abstract

Asthma is a chronic respiratory disease which is associated with indoor and outdoor air pollution. Communities of color and low-income communities are disproportionately impacted by asthma, partially due to their higher exposure to air pollutants from major roadways and other transportation sources. South King County, Washington is home to the Seattle-Tacoma International Airport and has a high concentration of freeways and highways. The region has a lower average income and a higher population of people of color compared to the rest of the county. The University of Washington and Public Health – Seattle & King County (PH-SKC) are collaborating to conduct the Airport, Air Quality, and Asthma Research Study (AAA Study), a randomized controlled trial investigating the effectiveness of portable air cleaners (PACs) with high-efficiency particulate air (HEPA) filters in improving the health of children with asthma who reside in areas with high exposures to traffic-related air pollutants including roadways and aircrafts. The AAA Study is nested into PH-SKC's Community Health Worker Asthma Program, which provides education, resources, and supplies to help clients manage their asthma. Community health workers (CHWs) are trusted individuals who are liaisons between institutions and community members. In the AAA Study, CHWs mediate all interactions between research staff and study participants and foster a trusting relationship which begins before study participation and continues afterwards. Successes of the AAA Study protocol include a high survey response rate, quick survey responsiveness, and high participant satisfaction with the research study. Limitations of the protocol include recruitment challenges, turnover among community health workers, and challenges with scheduling home visits. Future studies will consider the role of CHWs in engaging with participants, providing resources other than asthma control, and advocating for their clients.

Introduction

Asthma is a chronic lung disease recognizable by asthma exacerbations during which airways narrow and cause symptoms such as wheezing, chest tightness, and difficulty breathing.⁵ As of 2022, 8.2% of the US population had asthma⁶ and the age-adjusted rate of asthma mortality in 2001-2021 was 12.0 per million.⁷ Those with uncontrolled asthma

report lower satisfaction with many aspects of their health, including mobility, sleeping, depression, and mental function.⁹ Uncontrolled asthma also limits the ability of people to carry out their usual activities. For example, compared to their counterparts without asthma, children with asthma exacerbations miss more school days and their caregivers miss more work days,¹⁰ and children with asthma participate in less physical activity and have worse mental health.¹¹

Exposure to air pollutants such as nitrogen dioxide and fine particulate matter (PM_{2.5}) is associated with increased risk of asthma development.¹² Research also suggests that exposure to traffic-related air pollution (TRAP) from roadways and transportation sources at an early age or prenatally is associated with developing asthma, although some findings are inconclusive.^{13–16} Additionally, exposure to air pollutants including PM_{2.5}, ozone, sulfur dioxide, nitrogen oxides, and black carbon is associated with an increase in asthma exacerbations.¹⁷ Evidence is also increasing that ultrafine particle (UFP) pollutants are associated with increased rates of asthma and respiratory symptoms.^{20–22}

Indoor air quality also affects respiratory health. Americans spend most of their time indoors, where pollutants may be in higher concentrations than outdoors and where there are unique sources and types of air pollutants, such as volatile organic compounds.²³

The prevalence of asthma differs throughout the population, with disproportionate impacts borne by certain racial groups and low-income communities. Data from 2020–2022 shows that 10.6% of Black Americans and 12.5% of American Indians and Alaska Natives have asthma, while 7.8% of White Americans have the disease.⁶ Among those who are below the poverty threshold, 11.1% have asthma. The consequences of asthma are also greater for disadvantaged communities. For example, the rate of asthma deaths per year for Black Americans is 29.8 per million, nearly triple the national average.⁷

Racial and ethnic minorities and low-income communities are disproportionately exposed to outdoor air pollutants.²⁶ Communities of color and low-income communities are more likely to be adjacent to major roadways, among other sources of air pollution.^{26,27} Communities of lower socioeconomic status also have higher indoor exposures to nitrogen dioxide (NO₂), PM_{2.5}, VOCs, and tobacco smoke due to higher exposures to outdoor air pollution, poorer quality housing, and higher occupant density.²⁸

Disparities in exposures to air pollution are present due to discrimination and structural racism.²⁹ Residential segregation by race was designed through redlining, racial restrictive covenants, deed restrictions, real estate steering, and other discriminatory practices which excluded Black Americans and other communities of color from white neighborhoods.³⁰ This history of segregation continues to result in health and income

disparities.³¹ Communities of color and low-income communities face elevated levels of air pollution due to systems of power which have sited more highways, more industry, fewer green spaces, fewer healthcare services, and less safe and complete pedestrian infrastructure in their neighborhoods. Each of these disparities relate to air pollution, asthma, and overall respiratory health.

Background

Local Context: South King County

The Airport, Air Quality, and Asthma Research Study (AAA Study) takes place in South King County, Washington, a region with a lower median income and a higher percentage of people of color than the rest of the county.³² King County's airport communities, defined as those within 10 miles of the Seattle-Tacoma International Airport (Sea-Tac Airport), also experience a relatively high rate of asthma, stroke, heart disease, death, and premature birth.³³ The Environmental Health Disparities Map shows that this area also has high exposures to TRAP including PM2.5 and UFP because of its proximity to the airport and many highways and major roadways.³⁴ The King County Asthma Data Dashboard reports that South King County has a high rate of emergency department visits due to asthma and asthma diagnoses compared to the county overall.³⁵

The King County CHW Asthma Program

Public Health – Seattle & King County (PH-SKC)'s Community Health Worker Asthma Program (CHW Asthma Program) is a CHW-administered intervention program available to King County residents who have poorly controlled, moderate, or persistent asthma and are at least 5 years of age.³⁶ Through this program, community health workers conduct home assessments and deliver asthma education to clients. The program also helps clients create a plan and provides supplies to reduce asthma triggers.

Relevant Interventions

Portable air cleaners (PACs) with high-efficiency particle air (HEPA) filters improve indoor air quality by reducing concentrations of PM2.5, particulate matter (PM10), and biological pollutants such as viruses, bacteria, fungal spores, pest droppings, and animal dander.³⁷ Evidence is also mounting that PACs may improve the health of those with asthma, particularly among children, by reducing indoor air pollutants.^{38,39}

Community health workers (CHWs) are liaisons between agencies and communities, particularly communities of vulnerable and marginalized populations. They come from and are knowledgeable about their own communities, have linguistic and cultural competency, and receive training about the relevant medical information. CHWs therefore provide a link between communities and the health system and facilitate the building of community trust.⁴ Asthma interventions delivered by community health workers have been found to be effective at improving asthma control and quality of life.⁴⁰

The Airport, Air Quality, and Asthma Research Study

AAA Protocol

The Airport, Air Quality, and Asthma Research Study (AAA Study) is a partnership between the University of Washington (UW) and PH-SKC which aims to investigate if HEPA cleaners can improve asthma health outcomes among children who live near the Sea-Tac Airport. This intervention study is a randomized controlled trial in which intervention homes are provided with a fully functioning PAC with a HEPA filter and carbon filter, while control participants are given a PAC without the two filters. Below is a summary of the AAA Study protocol; the full protocol is detailed in The Airport, Air Quality and Asthma (AAA) Indoor Air Intervention Trial for Children with Asthma: Protocol for a Community Based Study in South King County, Washington.⁴¹

AAA Study Participants are recruited into the study through the CHW Asthma Program. CHWs conduct outreach to enroll clients into the CHW Asthma Program. PH-SKC staff assess the eligibility of the participant for the AAA Study by completing the Eligibility Survey with the caregiver. Eligibility criteria include: the participant is a child 6-12 years old with doctor-diagnosed asthma who lives in one of 31 zip codes within 10 miles of Sea-Tac Airport with at least one caregiver who is comfortable speaking and reading in English. If the child's asthma is determined to be severe, they are not eligible for the study and would immediately proceed with the CHW Asthma Program. Severe asthma is defined as having asthma symptoms every day for the last 14 days and/or having two or more in-patient hospitalizations due to asthma in the last 12 months. If the child meets all eligibility criteria, the caregiver consents, and the child assents, the participant is enrolled into the study. Upon enrollment, the caregiver completes two questionnaires: the Baseline Survey and the Asthma Control Test, a reliable and validated tool for measuring asthma control.⁴² Those who are eligible for the study and consent to participating first complete the AAA Study before beginning the CHW Asthma Program. Figure 1 is a flow chart which outlines how a participant moves through the CHW Asthma Program and the AAA Study.

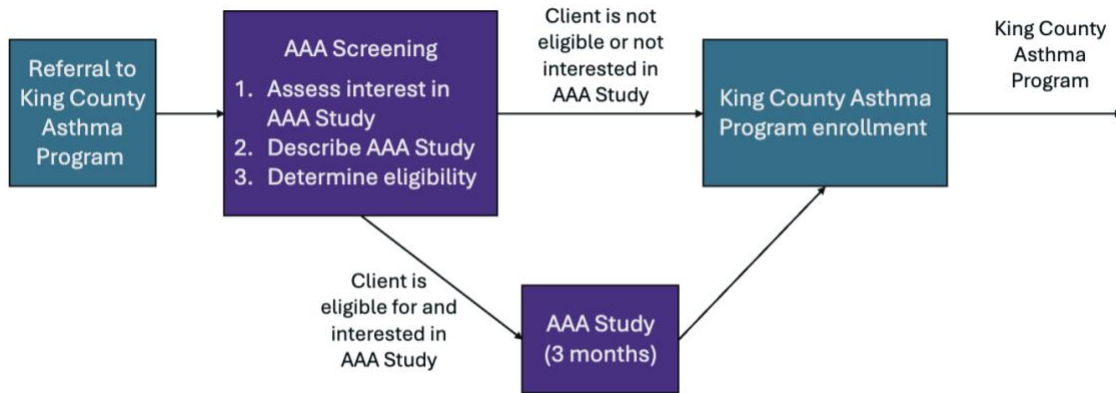


Figure 1: A flow chart of the CHW Asthma Program and the AAA Study

The study area of the AAA Study is shown in Figure 2. The map is centered in south King County and shows the eligible zip codes as well as major highways and other prominent sources of transportation emissions.

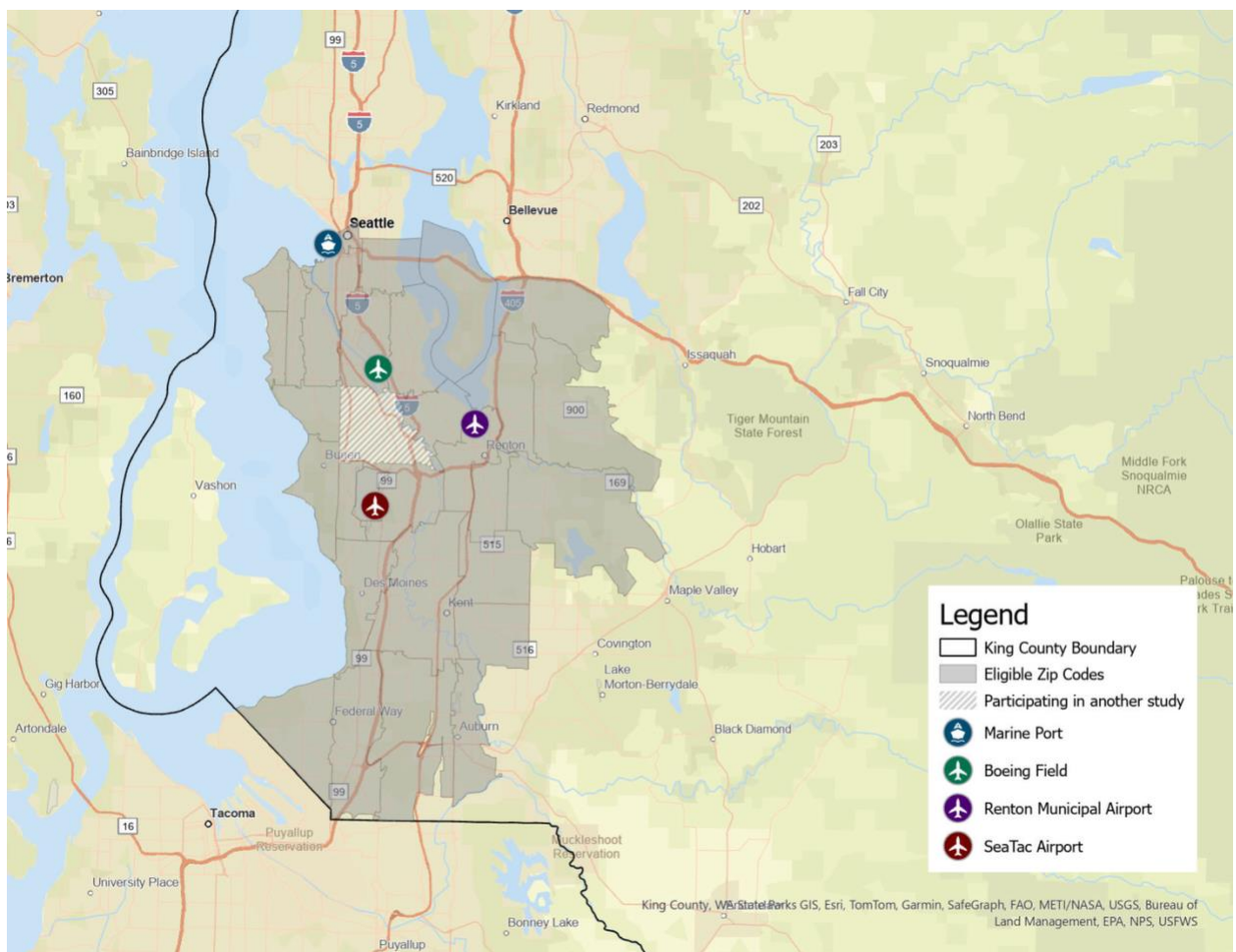


Figure 2: A map of the AAA Study area, including the eligible zip codes and Sea-Tac Airport

During the study, a Winix 9800 portable air cleaner is placed in the participant's bedroom for three months. Participants in the intervention group are given PACs with a HEPA filter and carbon filter, while participants in the control group are given PACs without these two filters. During the three-month observation, participants and caregivers are instructed to use the PAC how often and at which fan level they prefer. At the end of the three-month study, each participant is provided with a complete set of filters, as well as replacement filters which generally last for about two years.

After enrollment, the first home visit is conducted by members of the UW study team and a CHW hired or contracted by PH-SKC. During this visit, the PAC is installed in the child's bedroom with a HOBO® onset® plug load data logger (UX120-018), which will collect data on the energy use of the unit. A PurpleAir Zen air quality monitor is also installed in the bedroom to collect readings on PM2.5, temperature, and humidity. The caregiver completes a Weekly Caregiver Survey with the UW study team; this survey asks about the health of the child in the week prior, including questions about coughing, wheezing, and trouble sleeping. Over the course of the next three months, the caregiver is asked to fill out the same survey each week to report their child's health in the last 7 days. Figure 3 is a flow chart which details the stages of the AAA Study, particularly what occurs during the pre-intervention, observation period, and post-intervention phases of the study.

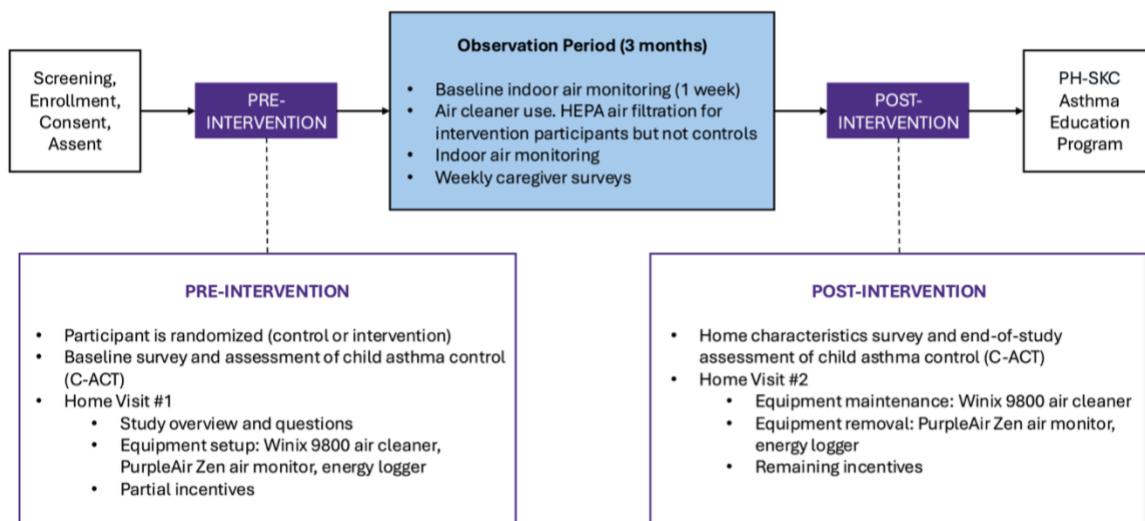


Figure 3: A flow chart of the stages of the AAA Study

At the end of the three months, the caregiver is asked to complete two more surveys: a Home Characteristics Survey and another Asthma Control Test. The UW study team and CHW conduct a second home visit with the family. For intervention homes, the PAC is cleaned and the carbon filter, which lasts for three months for this model, is replaced. The HEPA filter, which lasts for one year, is left inside the PAC. For control homes, the PAC is

cleaned, and a HEPA filter and carbon filter are placed in the unit. The CHW then enrolls the participant into the CHW Asthma Program.

Survey data were collected and managed using REDCap electronic data capture tools hosted at Yale University.^{43,44} In the Eligibility Survey completed by the CHW, the caregiver is asked their preferred method of communication: via email or SMS text messaging. Each subsequent survey is sent to the caregiver using their preferred communication.

Study participants receive monetary incentives for completing the study. After the first home visit, they are given a gift card through a link to an online platform. Caregivers are informed that they will receive an additional \$5 for each Weekly Caregiver Survey they complete. After the second home visit, they receive another gift card, the value of which depends on how many Weekly Caregiver Surveys they fill out throughout the study.

Role of Community Health Workers

Community Health Workers are vital to the success of the AAA Study. PH-SKC's CHW Asthma Program employs two community health workers and works with several community-based organizations (CBOs) to contract CHWs hired through the CBOs. These CBOs include Cultivate South Park, Lutheran Community Services Northwest, African Community Housing & Development, and Villa Comunitaria. Each of these organizations provides a wide range of services and is dedicated to serving their communities. CHWs contracted through these CBOs work either full time or part time with the CHW Asthma Program and AAA Study. As of mid-May 2025, there are five CHWs currently involved in the program, and six CHWs who are no longer involved. Each contract CHW who is involved with the CHW Asthma Program AAA Study has attended a three-day training about asthma, air pollution, the CHW Asthma Program protocol, and the AAA Study protocol.

Prior to the launch of the study, CHWs provided insightful feedback about the study's surveys, including the wording of questions and how caregivers would respond to them. CHWs are the point of contact for participants in the study; they communicate with caregivers to schedule visits, answer questions, and respond to concerns. During home visits, CHWs mediate the interactions between researchers and participants and engage with the caregiver and child while the UW study team sets up and takes down equipment. In some cases, CHWs interpret conversations between caregivers and the UW study team when caregivers are more comfortable speaking in a language other than English. CHWs also continue to work with their clients after their participation in the AAA Study. During the second home visit, the CHW begins the client's enrollment into the CHW Asthma Program through a home assessment which can take up to two hours. From the client's

perspective, the community health worker is the constant point of contact in their participation in the CHW Asthma Program.

Role of Research Assistant

As the research assistant for this study, I supported the design of the surveys and the REDCap instruments and helped to keep track of records on REDCap. I also help to conduct home visits by preparing equipment and study instruments, booking University vehicles, driving to homes, installing and removing equipment, and taking notes. I coordinate with CHWs, interact with CHWs, caregivers, and participants during home visits, and help caregivers fill out surveys. After participants complete the study, I download data from the equipment and update our records. I also supported writing the AAA Protocol Paper, particularly in the development of maps and graphs, and in writing about the role of community health workers in the study.

Study Evaluation

Challenges

One challenge of the AAA Study is the low number of participants recruited. The study initially aimed to have 100 participants complete the study over the course of one year. At least 80 participants were needed for sufficient power calculations. As of mid-May 2025, there is about a month and a half remaining in the funding period for the study. To date, 31 participants in 28 households have been enrolled in the AAA Study. Among the 28 households, three had two participants in the study. Twenty-three participants (21 households) have completed the study. Of these, one participant/household dropped out of the study early because the child's asthma was too severe to delay their participation in the CHW Asthma Program.

There was also a delayed start to the project; while the first training for community health workers was conducted in March of 2024, the first participant was not enrolled until June of the same year. The distribution of first home visits by month is shown in Figure 4. The figure shows highest enrollment during the months of July, August, and September 2024, along with another peak in March 2025.

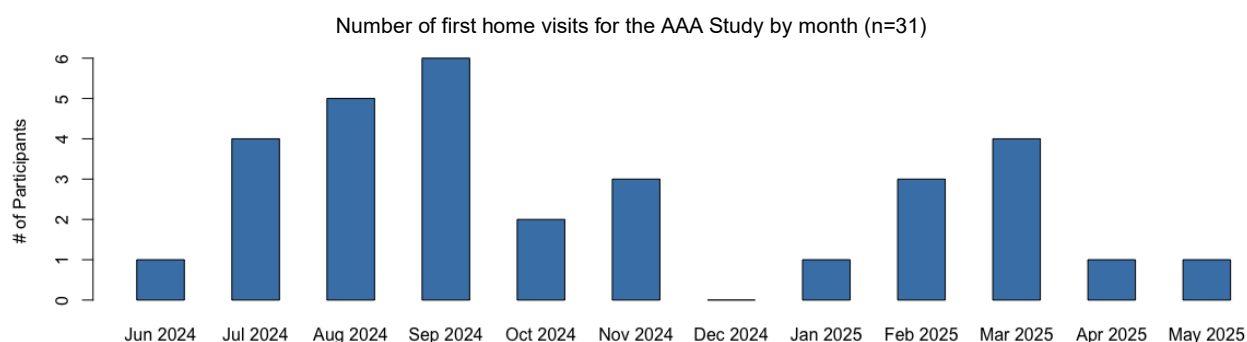


Figure 4: First home visits for the AAA Study by month (as of May 12, 2025)

Furthermore, there has been some turnover in the community health workers involved with the CHW Asthma Program and the AAA Study. Of the five contracted community health workers who attended the first training session, only one is still involved in the project. Additionally, among the four community-based organizations who have been partners in the project, one is no longer involved, and another joined about six months after recruiting the first participant.

Another main challenge relates to the use of technical tools to manage data and scheduling. Home visits require the alignment of the schedules of at least two UW study team members, the assigned CHW, and the caregiver of the participant. A shared Microsoft Outlook calendar is being used to coordinate, but the many details of sharing, permissions, and notifications introduce opportunities for error. There have also been some challenges with the use of REDCap forms. For example, there have been instances in which participants miss required questions or do not fill out fields with the specified date formatting. In these cases, the form cannot be submitted or marked as complete.

The study is also concerned with comparing indoor and outdoor air quality. However, there is insufficient outdoor air quality information available in South King County. Figure 5 shows a map of outdoor publicly reporting PurpleAir air quality monitors present in King County. As seen on the map, the concentration of PurpleAir monitors is greatest in the northwest of the county, particularly in north Seattle. Figure 6 focuses on South King County, showing the approximate locations of homes enrolled in the AAA Study as well as the locations of outdoor publicly reporting PurpleAir monitors. Few of the homes in the study have a nearby outdoor air monitor which can be used to compare the data from the PurpleAir Zen monitor placed in the child's bedroom during the study.

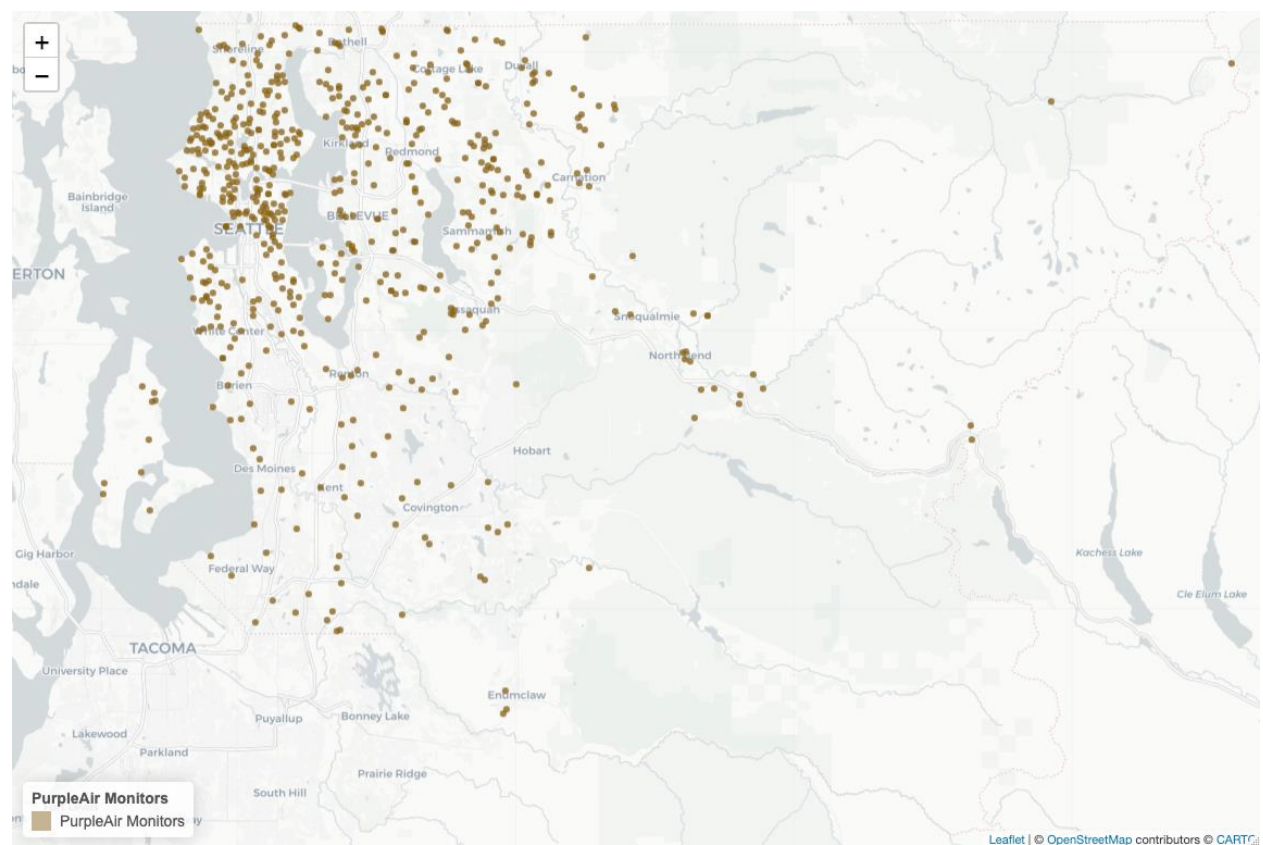


Figure 5: Locations of outdoor publicly reporting PurpleAir Monitors (as of October 2024)

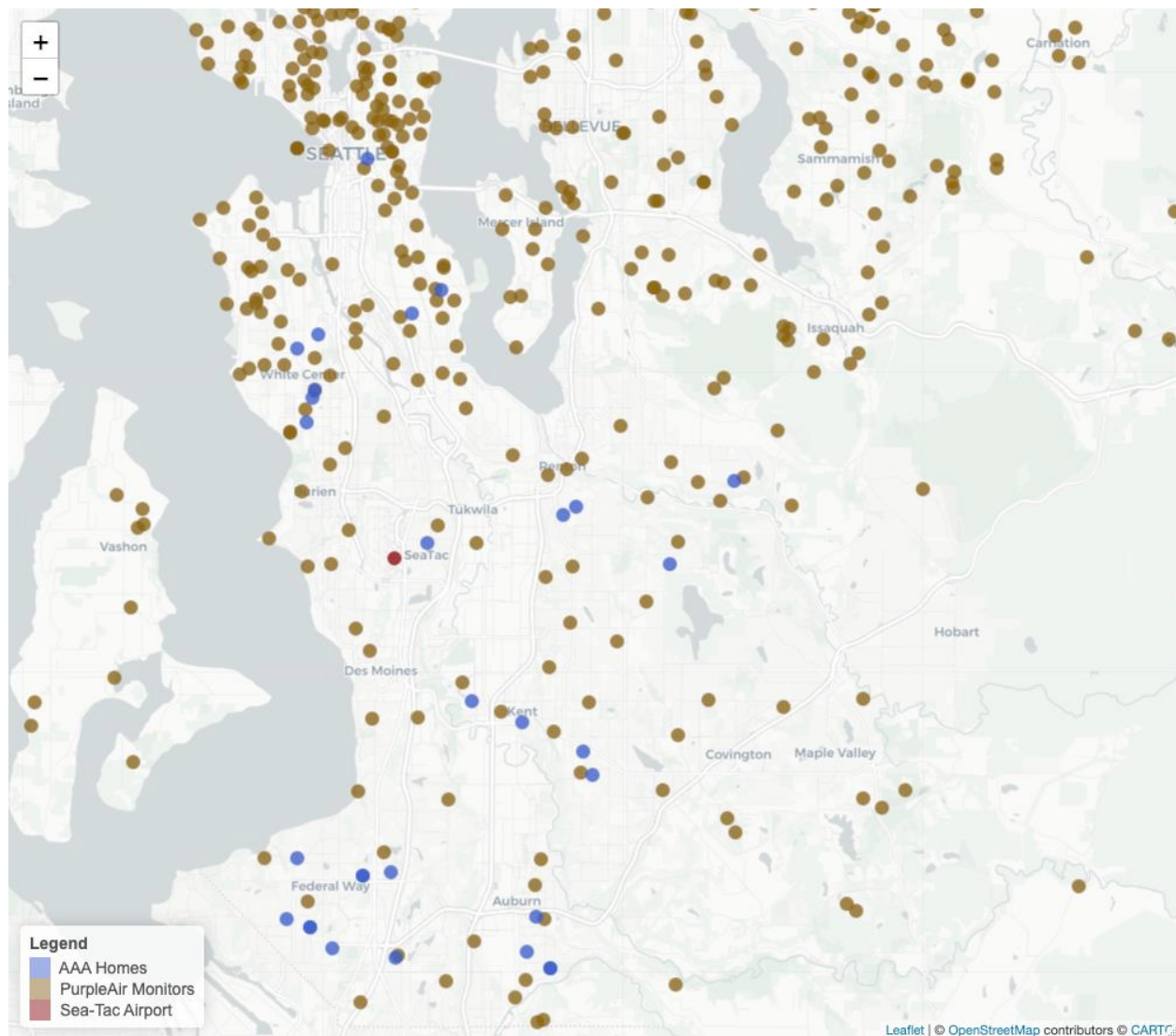


Figure 6: Approximate locations of enrolled AAA households (as of May 12, 2025) and outdoor publicly reporting PurpleAir monitors (as of October 2024)

Possible Reasons for Challenges

One potential cause for the challenges in the AAA Study is the limited resources of the region. For example, the limited number of outdoor PurpleAir monitors in South King County is related to the lower-than-average income of the area. These air quality monitors cost \$200-\$300, and many of the units from which the online data are sourced have been purchased by individuals to place in their neighborhoods. Fewer individuals and households in South King County have chosen or are able to make this purchase.

Furthermore, the study was limited to one year due to restrictions based on funding and the Washington State legislative timeline. Yet, it takes time to establish a protocol, train

CHWs, and learn to collaborate among the many involved parties. The CHWs were also contracted to work on the CHW Asthma Program while continuing to be employed with their community-based organizations. Some of the CHWs have a high workload, attending to tasks for their CBO as well as the CHW Asthma Program and AAA Study. In particular, the home visits were at times difficult to schedule because CHWs and UW study team had to account for travel time, which can take up to two hours total for one visit.

Successes

While the AAA Study faced challenges in the number of participants enrolled thus far, it was successful in fostering good interactions and building relationships with participants.

The study was able to recruit a diversity of participants in terms of geography and race/ethnicity. Table 1 summarizes the races and ethnicities of 31 participants who have enrolled in the study as of May 12, 2025. The following racial and ethnic identities are represented among the 31 participants: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, and White. One caregiver indicated that they would prefer not to answer this question. Figure 7 is a map of the approximate locations of participants in the AAA Study area. When compared to Figure 2, which shows all eligible zip codes, this map shows that participants are spread throughout the study area. Study participants also come from a range of racial and ethnic backgrounds.

Table 1: Race and ethnicity of AAA Study participants (as of May 12, 2025)

Race or Ethnicity	Number of participants
American Indian or Alaska Native	4
Asian	5
Black or African American	19
Hispanic or Latino	6
Middle Eastern or North African	0
Native Hawaiian or other Pacific Islander	0
White	6
Other	0
Prefer not to answer	1

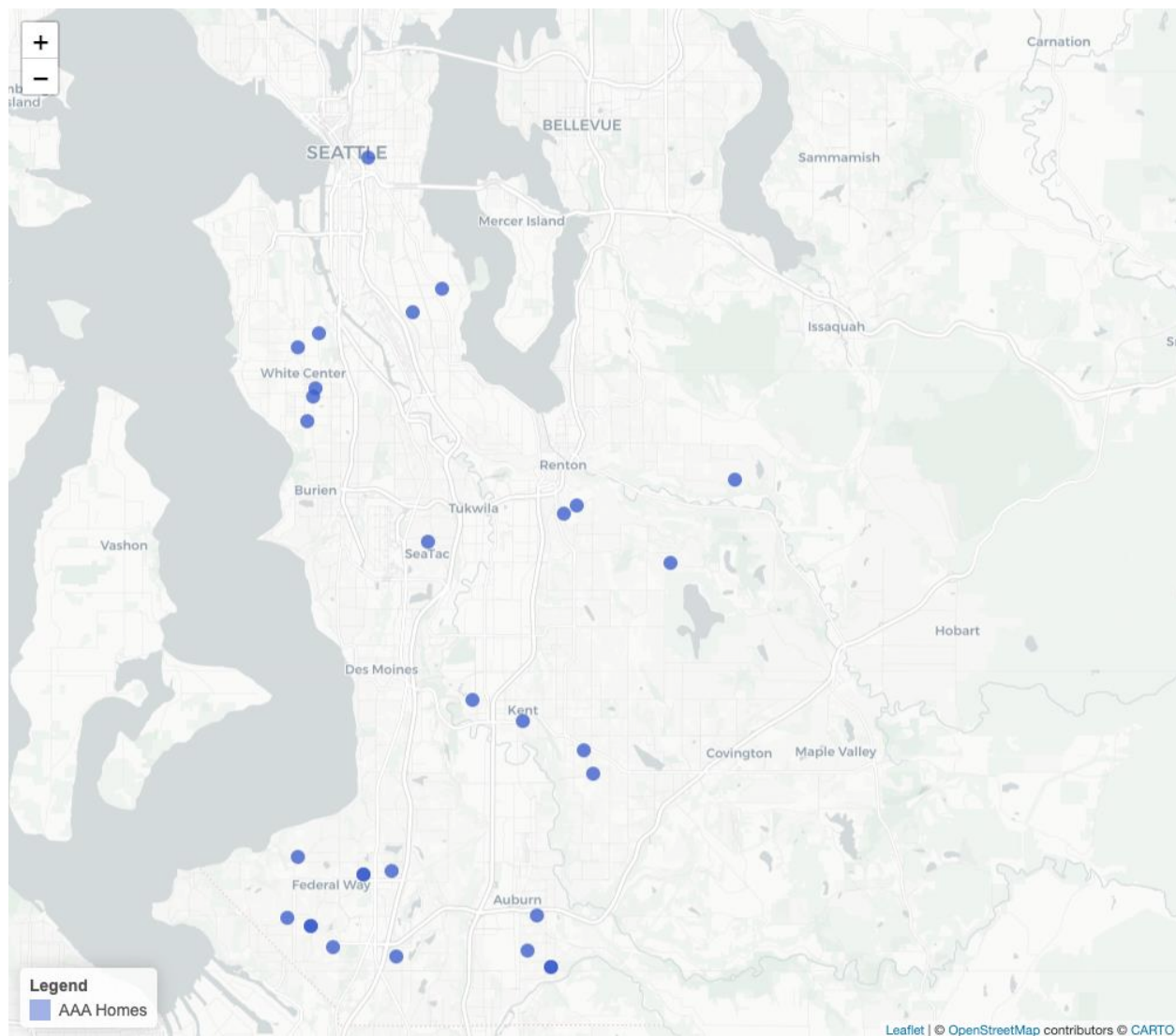


Figure 7: A map of approximate locations of the homes of participants enrolled in the AAA Study (as of May 12, 2025)

The AAA Study has been successful in terms of participant responsiveness. Caregivers are asked to fill out 12 Weekly Caregiver Surveys on their own. A large majority of caregivers have completed each survey. Among the 22 participants (20 households) who completed the full study to date, 16 participants (72%) and 15 households (75%) did not miss any surveys. In total, 244 out of 262 (92%) of Weekly Caregiver Surveys were completed by caregivers on their own. Table 2 details Weekly Caregiver Survey completion rates among the participants and households.

Table 2: Number of Weekly Caregiver Surveys missed by AAA Study participants and households (as of May 12, 2025)

Number of Weekly Caregiver Surveys missed (out of 12)	Number of participants (n=22)	Number of households (n=20)
none	16	15
1	2	2
4	3	2
6	1	1

Participants are quick to complete the Weekly Caregiver Survey. Each week, the caregiver is notified via email or SMS text messaging to fill out the survey. If they do not complete it, they receive a reminder the next day at 8am. If the caregiver still has not completed the survey by the third day, they receive one final reminder. Figure 8 details how quickly caregivers completed Weekly Caregiver Surveys. Excluding the Weekly Caregiver Surveys completed during first home visits, 287 Weekly Caregiver Surveys have been completed by caregivers as of May 12, 2025. Among these 287 surveys, 206 (72%) were completed on the first day the caregiver received the notification, and another 58 (20%) were completed on the second day. Furthermore, among the 23 participants (21 households) who completed the study, only one participant/household did not complete the end-of-study questionnaires (the Home Characteristics Survey and Asthma Control Test).

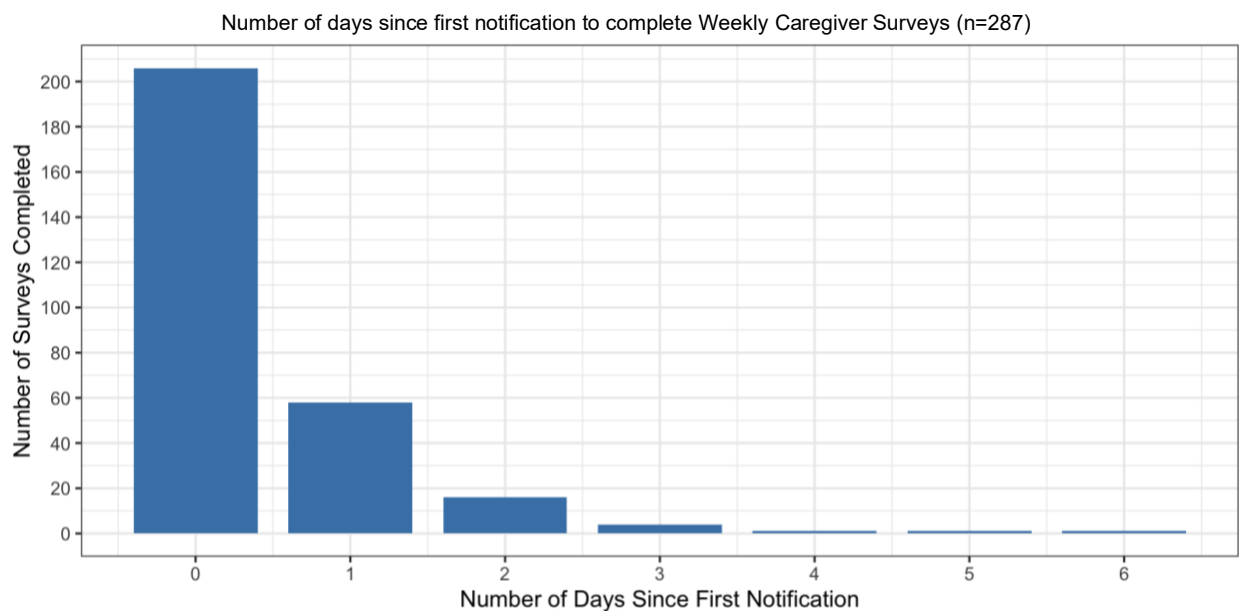


Figure 8: Number of days since first notification to complete each Weekly Caregiver Survey (as of May 12, 2025)

Participants also report a high level of satisfaction with the AAA Study. When filling out the Home Characteristics Survey at the end of the study, caregivers are asked “How likely would you be to recommend the AAA research study to friends or family?” Table 3 details caregivers’ responses to the question of how likely they are to recommend the study to friends and family. Among the 22 participants (20 households) who completed this survey, 19 participants (86%) and 17 households (85%) indicated that they are “very likely” to recommend the study to friends and family and 2 participants/households responded that they are “likely” to recommend the study. In an open-ended survey field associated with this question, caregivers noted that participation has been easy, people have been helpful, and that they have appreciated learning from the study. One participant/household answered that they are “not likely” to recommend the study, citing the long duration of the study, the size of the PAC, and the burden of the weekly surveys. However, this caregiver verbally retracted their comments during the second home visit, saying that the effort was ultimately worth it.

Table 3: Responses of caregivers to the survey question “How likely would you be to recommend the AAA research study to friends or family?”

Response	Number of participants (n=22)	Number of households (n=20)
Very likely	19	17
Likely	2	2
Not likely	1	1
Very unlikely	0	0

Possible Reasons for Successes

There are several potential reasons for these successes of the AAA Study. The CHW Asthma Program works closely with CHWs to conduct outreach through various avenues, including their community-based organizations and through tabling at fairs and festivals. This is one potential reason that the study was able to enroll participants from throughout the study area and include people from a diversity of racial and ethnic identities.

The CHW model also fostered trust among the caregivers, the CHW, and the UW study team. During first home visits, caregivers quickly became comfortable with CHWs, who usually spoke their language, offered services and resources, and engaged with the caregiver and child. CHWs and the UW study team also made themselves available to the

caregivers over phone and email, asked for permission and consent at each step, and encouraged caregivers to ask questions and raise concerns.

As of mid-May 2025, the survey completion rate for Weekly Caregiver Surveys completed by caregivers on their own was 244 out of 246, or 92%. The completion rate for the end-of study surveys was 22 out of 23 participants, or 96%. These high survey completion rates may partially be due to the AAA Study's communication options. Rather than conducting the entirety of the study via email, caregivers were given the option to receive email or SMS text messages. Among the 28 households enrolled in the study, 14 (50%) chose to receive emails and 14 (50%) chose text messages. The high rate of survey completion suggests that incorporating the option of SMS text messages can increase responsiveness among survey participants.

In "Techniques for Improving Electronic Survey Response Rate," Radack et al. recommend that surveys are shortened, personalized, and easy to understand to increase response rates.⁴⁵ They suggest, for example, that emails are signed by a patient's surgeon to make it more personal to them. In the AAA Study protocol, each caregiver completes the first Weekly Caregiver Survey with the CHW and the UW study team. They are also informed that the survey will be exactly the same in each of the following weeks. These actions may have contributed to the personalization of the survey while increasing the caregiver's comfort and familiarity with the questions.

In comparison, the Behavioral Risk Factor Surveillance System Asthma Call-Back Survey had a median response rate of 49.4% among US states in 2019.⁴⁶ This was a follow-up telephone survey for participants who indicated they ever had asthma. In the PeRson EmPowered Asthma RELief (PREPARE) study, which investigated the efficacy of a rescue therapy for asthma among Black and Latinx adults, participants were asked to complete 13-15 monthly surveys either online, by phone, or on paper.⁴⁷ The PREPARE study achieved a high survey response rate of greater than 90%. These two examples emphasize how increasing survey personalization and providing multiple survey mode options can improve response rates. They suggest that having two survey options contributed to the high response rate in the AAA Study.

The caregivers may also be encouraged to complete all surveys and remain engaged in the study by the AAA Study's incentives, which include monetary incentives in the form of gift cards and the PAC which they keep at the end of the study. Caregivers may have been specifically encouraged to take all Weekly Caregiver Surveys because they were informed that with each survey they submit, they receive an additional \$5 for a maximum of \$65.

All caregivers enrolled in the study completed the pre-enrollment surveys (the Baseline Survey and an Asthma Control Test) before or during the first home visit. These surveys were required for study participation. The AAA protocol was successful in outlining a procedure for both surveys to be completed. Two days before the home visit, the CHW contacts caregivers to remind them of the visit and to ask them to fill out the Baseline Survey and Asthma Control Test if they have not done so.

Next Steps

In the next stage of this project, I will interview community health workers about their roles in the CHW Asthma Program and AAA Study as well as in their work at their respective community-based organizations. During these interviews, I will also discuss broader environmental health topics, advocacy, and other ways they support their local community. My remaining study aims are to: (1) Explore the roles of CHWs in building relationships with their clients and addressing broader community health needs, and (2) Evaluate how the CHW model can be adapted to other programs and service areas to address public health challenges.

Conclusion

The Airport, Air Quality, and Asthma Research Study is being implemented through the collaboration of the University of Washington and Public Health – Seattle & King County's Community Health Worker Asthma Program. The study prioritizes the quality of interactions with participants by designing the protocol with community health workers at the center of study interactions. The protocol is thorough and considers the perspective of participants and caregivers throughout, including using SMS text messaging, incorporating reminders and communications with CHWs, and providing appropriate incentives for participation. While the study has not enrolled the target number of participants, it has been very successful at building good relationships with participants and caregivers, achieving high rates of survey completion, and integrating well with the CHW Asthma Program. Further research will continue to investigate the role CHWs play in supporting the health of their clients.

Chapter III

Characterizing and Expanding the Roles of Community Health Workers to Environmental Health and the Built Environment

Abstract

The field of public health has embraced the role of community health workers (CHWs) as a liaison between agencies and communities and has especially employed CHWs to connect with communities of vulnerable and marginalized populations. Meanwhile, most public institutions struggle to sufficiently engage all communities in their constituency, particularly those that have experienced and continue to experience racism and other social injustices. The following is a qualitative research study in which individuals were surveyed and interviewed about their experiences working as CHWs in King County, WA. The study seeks to (1) explore the roles of CHWs in building relationships with clients and addressing broader community health needs, and (2) evaluate how the CHW model can be adapted to other programs and service areas to address environmental public health challenges. Based on data from eight participants, this study found that CHWs are skilled professionals who make personal connections with their clients based on respect and autonomy. CHWs already support their clients in many ways even when their job protocol is specific to one topic area, and they can expand to more topics if they have access to training and resources. CHWs can be better supported in their work with more stable funding, training and education, and access to mental health care.

Acknowledging the value of CHWs and supporting their work can have great impacts on the communities they serve. The role of CHWs has the potential to expand beyond the fields of medicine and public health. Any institution which seeks to engage more meaningfully with their residents and constituents can use a similar model. Hiring CHWs, navigators, liaisons, *promotores*, and advocates can contribute to increasing community engagement and public participation and can support a shift toward more collaborative decision-making between institutions and the communities they seek to support.

Introduction

The field of public health has embraced the role of community health workers (CHWs) as a liaison between agencies and communities. Public health institutions have employed

CHWs to connect with communities of vulnerable and marginalized populations. Meanwhile, most public institutions struggle to sufficiently reach all communities in their constituency, particularly those that have experienced and continue to experience racism and other social injustices. This research seeks to understand how and why CHWs are successful in connecting with communities and improving their health. It also explores whether the CHW model can be applied to non-medical settings and in areas outside traditional public health.

The Settlement Health Map is a conceptual model which intersects public health and urban planning.⁴⁹ It considers the effects of physical and social environments on human health and a person's wellbeing. The Settlement Health Map (Figure 1) is comprised of nested spheres, with People at the center, surrounded by the Lifestyle sphere, then Community, Local Economy, Activities, Built Environment, and Natural Environment in increasingly large spheres. Each of these spheres impact each other, and is also affected by outside factors such as politics, economies, and other regions. The Global Ecosystem sphere surrounds all other components of the model. The Settlement Health Map is used in this research study as a framework for understanding which spheres CHWs and their community-based organizations (CBOs) work in, and which spheres they affect. It is also used to imagine which other spheres CHWs can expand into and provide benefit.

Figure 1.15
The Settlement Health Map
SOURCE: Barton and Grant 2006.
developed from the model by Dahlgren
and Whitehead, 1991.

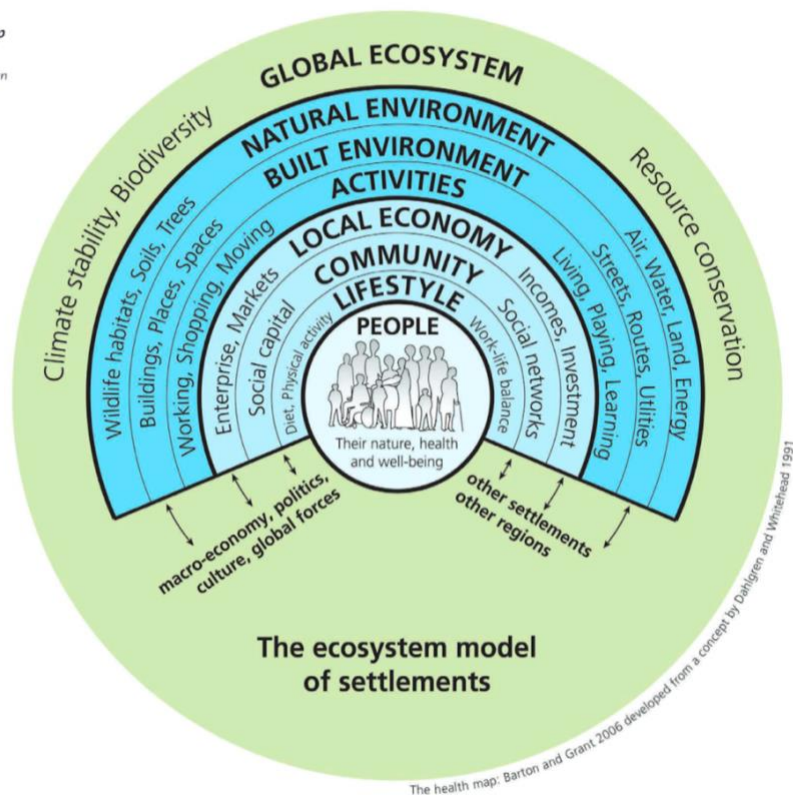


Figure 1: The Settlement Health Map⁴⁹

The National Council on CHW Core Consensus Standards (National C3 Council) has developed CHW Core Roles which outline 10 roles and 32 sub-roles of CHWs.⁴⁸ These roles include their work in cultural mediation, providing direct services, system navigation, and much more. This study uses these roles and sub-roles to understand which roles study participants do or do not fulfill in their current work. The National C3 Council's CHW Core Roles and Sub-Roles are listed in Appendix A.

This is the CHW Roles Study, a qualitative research study in which individuals were surveyed and interviewed about their roles and experiences working as CHWs in King County, Washington. Its aims are as follows:

1. Explore the roles of CHWs in building relationships with clients and addressing broader community health needs.
2. Evaluate how the CHW model can be adapted to other programs and service areas to address environmental public health challenges.

Methods

Study Setting

Public Health – Seattle & King County (PH-SKC)'s Community Health Worker Asthma Program (CHW Asthma Program) is a CHW-administered intervention program available to King County residents who have poorly controlled, moderate, or persistent asthma and are at least 5 years of age.³⁶ Through this program, CHWs conduct home assessments and deliver asthma education to clients. The program also helps clients create a plan and provides supplies to reduce asthma triggers.

The Airport, Air Quality, and Asthma Research Study (AAA Study) is a partnership between the University of Washington (UW) and PH-SKC which aims to investigate if high-efficiency particulate air (HEPA) cleaners can improve asthma health outcomes among children who live near the Seattle-Tacoma International Airport (Sea-Tac Airport). This intervention study is a randomized controlled trial in which intervention homes are provided with a fully functioning portable air cleaner (PAC) with a HEPA filter and carbon filter, while control participants are given a PAC without the two filters (at the end of the study, all participants keep their PAC and are provided with a full set of filters). The AAA Study is closely tied to the CHW Asthma Program. AAA Study participants are recruited through the CHW Asthma Program and those who are eligible for the study and consent to participating first complete the AAA Study before beginning the CHW Asthma Program. CHWs both administer the CHW Asthma Program are liaisons for the AAA Study.

The study setting of the AAA Study is 31 zip codes within ten miles of the Sea-Tac Airport. Though the CHW Asthma Program is available to any resident of King County who meets the eligibility criteria, it has been intentionally recruiting children in south King County to support the AAA Study since Spring 2024. Therefore, the work of CHWs in the CHW Asthma Program and AAA Study has largely focused on this region of the county for the last year.

South King County is a region with a lower median income and a higher percentage of people of color than the rest of the county.³² King County's airport communities, defined as those within 10 miles of the Sea-Tac Airport, also experience a relatively high rate of asthma, stroke, heart disease, death, and premature birth.³³ The Environmental Health Disparities Map shows that this area also has high exposures to traffic-related air pollution including fine particulate matter and ultrafine particle pollutants because of its proximity to the airport and many highways and major roadways.³⁴ The King County Asthma Data Dashboard also reports that South King County has high rates of emergency department visits due to asthma and high rates of asthma diagnoses compared to the county overall.³⁵

Participant Selection

The CHW Roles Study collaborated with the CHW Asthma Program and the AAA Study. The initial participants recruited were individuals who are or were involved in the CHW Asthma Program and AAA Study. Participants were also recruited into the study through snowball sampling. After each interview, the interviewer asked the participant to recommend any colleagues who they thought may be appropriate for the study. Individuals were eligible for the CHW Roles Study if they self-identified as a current or recent community health worker, are an adult, and consent to participate.

Potential participants received an email which briefly described the study's goals and procedures, then asked them to click on a link if they were interested in participating. The link led to a form which outlined all details of the study, including the risks and benefits and what participating in the study would involve. If the CHW indicates through the form that they (a) understand the risks and benefits to participation and (b) agree to participate in a survey and interview, they are enrolled into the study.

Data Collection

Development of Materials

The goals of the survey were to gather contact information from participants and to provide context for the semi-structured interviews. The survey asked about the organization they work for, the topics they address in their work, how many families they have visited, and

how important they think CHWs are to the programs they are involved in. Development of the survey was supported by the AAA Study Team and the thesis committee. Feedback and suggestions were used to clarify language and make survey questions easier to understand. The online form including the survey can be found in Appendix B.

The Settlement Health Map and the National C3 Council's CHW Core Roles were used to guide the development of interview questions. First, each of the Sub-roles within the CHW Core Roles were mapped to one or more spheres on the Settlement Health Map. This mapping exercise found that most of the CHW Sub-roles were focused on the three innermost spheres: People, Lifestyle, and Community. Therefore, the semi-structured interview guide was designed to first discuss the three smallest spheres, then to naturally expand the discussion into the outermost spheres: Local Economy, Activities, Built Environment, Natural Environment, and Global Ecosystem.

The interview guide was comprised of three sets of questions. The first set of questions was designed to capture information about the participant's organization, the communities they serve, and their role in it. The second and third sets of questions reflect the inner and outer groups of spheres in the Settlement Health Map. In particular, the second set of questions elicited information about the participant's experiences as a CHW and the people they served. The third set of questions prompted the participant to explore broader ways they think CHWs can support community health.

The interview guide was reviewed by the AAA Study Team, the thesis committee, and the manager of the CHW Asthma Program. It was also tested on two students. Feedback and suggestions were used to limit the interview to one hour, prioritize questions based on the study aims, and to clarify language and wording of questions. The semi-structured interview guide can be found in Appendix C.

Survey and Semi-structured Interview

When participants consented to the study through the form, they were directly taken to the survey, which took up to ten minutes to complete. After completing the survey, they were asked to schedule an interview through an online scheduling program. If they did not schedule an interview within one week, they received an email reminder. Interviews were conducted via video call in March 2025. The benefits and risks of the study were stated at the beginning of each video call. Participants were asked for consent to moving forward with the interview, and interviews proceeded with verbal consent. Participants were also asked for consent to record the call and generate a transcript. Each of the 8 semi-structured interviews were recorded with the consent of the participant. The video call

platform generated transcripts for the interviews. The transcripts were then de-identified and cleaned to match the audio recordings.

Informational Interview

Five informational interviews were conducted with professionals who work, manage, and/or support CHWs. Four of these professionals were contacted through connections with Public Health – Seattle & King County, and one was reached via cold email. These informational interviews provided context for the resources and systems that are in place for community health workers in the study area. The five interviewees were employed at the Washington State Department of Health, Public Health – Seattle & King County, and the City of Seattle Department of Neighborhoods.

Data Analysis

Sample size

Eight community health workers were surveyed and interviewed for the CHW Roles Study. Six of the eight are past or current community health workers who delivered the CHW Asthma Program and liaised with participants for the AAA Study. One CHW (Participant 4) received training for the CHW Asthma Program and AAA Study, but did not work with clients for these projects. One CHW (Participant 6) was not involved with either the CHW Asthma Program or the AAA Study but is part of another CHW-administered asthma intervention study in South King County.

Thematic Analysis

Familiarization of the data was done while the transcripts were cleaned. Cleaning was done in three stages. First, the transcripts were de-identified, and formatting was simplified. In the second stage, punctuation was edited, words were corrected, and unclear words were highlighted. In the third and final stage, the transcript was edited while listening to the audio recording. In the process of cleaning, the transcripts were read at least three times, and the audio recordings were listened to at least once.

Thirty-six deductive codes were developed prior to coding the transcripts. Deductive codes were developed based on conceptual models and expected participant responses. Of the deductive codes, *communication_inperson* and *communication_virtual*, were merged into one: *virtual_inperson*. The *built_environment* code was merged into *envhealth_issues*. Ultimately, there were 34 total deductive codes. Of these 34 deductive codes, 10 were parent codes with a depth of 0 and 24 were child codes with a depth of 1. Forty-seven

inductive codes were added during coding. Inductive codes were added based on emergent patterns among participant responses. Of these inductive codes, 8 were parent codes with a depth of 0 and 39 were child codes with a depth of 1. In total, there were 81 codes used for qualitative analysis. The codebook can be found in Appendix D.

Qualitative coding was done using the Dedoose program. The first round of coding began with the 36 deductive codes. The 47 inductive codes were added throughout the first round of coding. The second round of coding ensured that the inductive codes were applied thoroughly to each of the transcripts, including the ones which were coded first. The third round of coding double-checked all code applications. Retroactive upcoding was applied in Dedoose in order to ensure that parent codes were assigned to excerpts where only child codes had initially been applied, facilitating higher-level thematic synthesis. Theme identification was completed with the support of the Dedoose software. Code presence showed which codes were used in which of the eight transcripts. Code frequency showed how often each of the codes were used. Code co-occurrence showed how often each code was present in the same excerpt as another code.

To develop themes, a list of topics was first generated based on the aims of the study and familiarization of the data. These topics include how the participant's experiences relate to the Settlement Health Map and the C3's CHW Core Roles, challenges and resources of CHWs, mental health, and examples of CHW interactions with clients. Next, code presence, code frequency, and code co-occurrence were used to analyze the groups of codes related to each of these topics. For example, it was noted that the code *mentalhealth_chw* was used 6 times in 2 interviews and the code *mentalhealth_client* was used 15 times in 7 interviews. Additionally, these two codes co-occurred in two excerpts from two different interviews. This suggests that the mental health of clients is important to the participants overall, but the mental health of community health workers may be particularly important to only two of the participants, both of whom made connections between clients' mental health and their own. Finally, the excerpts associated with these codes were read to understand what participants shared in the context of conceptual models or what other participants shared.

Four main topics emerged from the themes: the community health workers' experiences, the clients' experiences, the systems that CHWs work in, and the needs of CHWs in their current roles and potentially expanded roles.

Results

Participant Characteristics

Eight participants were enrolled into the CHW Roles Study. Two CHWs were invited to participate in the study and declined. These two individuals were contract CHWs with the CHW Asthma Program and the AAA Study, but their organization's contract with PH-SKC ended and they are no longer involved in these two projects.

Five of the 8 participants are currently community health workers involved in the CHW Asthma Program and the AAA Study. One participant (P7) used to be a CHW in this capacity until late 2024. One participant (P4) received training for the CHW Asthma Program and AAA Study, but did not work with clients for these projects. One participant (P6) was never directly involved with either the CHW Asthma Program or the AAA Study but is part of another CHW-administered asthma intervention study in South King County.

Two of the eight participants are staff at Public Health – Seattle & King County. Five are or were contract CHWs from three different CBOs who were hired to administer the CHW Asthma Program and AAA Study.

Among the 7 participants who are or were involved in the CHW Asthma Program, one has visited fewer than 5 families either at home or virtually, two have visited between 5 and 10 families, two have visited between 11 and 20 families, one has visited between 21 and 50 families, and one has visited more than 50 families. Among the 7 participants who are or were involved in the AAA Study, three have visited fewer than 2 families, three have visited between 3 and 5 families, and one has visited between 6 and 10 families.

Full participant characteristics can be found in Table 1.

Table 1: CHW Roles Study Participant Characteristics (n=8)

	Number of Participants	Percent of Participants
Currently a CHW	7	87.5
Currently a CHW in the CHW Asthma Program and AAA Study	5	62.5
Was a CHW in the CHW Asthma Program and AAA Study	1	12.5
Staff at PH-SKC	2	25
Contracted by PH-SKC	5	62.5
Neither staff nor contracted by PH-SKC	1	12.5

	Number of Participants	Percent of Participants
Staff at a CBO	6	75
African Community Housing & Development	2	25
Duwamish River Community Coalition	1	12.5
Lutheran Community Services Northwest	2	25
Villa Comunitaria	1	12.5
<i>Has been a CHW for __</i>		
Less than 1 year	4	50
1 to 3 years	3	37.5
4 to 6 years	0	-
7 to 10 years	0	-
More than 10 years	1	12.5
<i>Has visited __ families in the CHW Asthma Program</i>		
N/A	1	12.5
Fewer than 5 families	1	12.5
5 to 10 families	2	25
11 to 20 families	2	25
21 to 50 families	1	12.5
More than 50 families	1	12.5
<i>Has visited __ families in the AAA Study</i>		
N/A	1	12.5
Fewer than 2 families	3	37.5
3 to 5 families	3	37.5
6 to 10 families	1	12.5

Survey Results

In the survey, participants were asked, “In your role as a CHW, which of the following topics do you address?” They were provided with 22 options and asked to select all that apply. Asthma was the most common answer and was selected by seven participants. Air pollution was the next most frequent answer, with four respondents. Climate change, environmental or ecological health, housing, immigration and refugee resettlement,

mental health, navigating the healthcare system, and transportation access were each selected twice. Access to utilities, education, employment, food security, nutrition, and youth were each selected once. None of the participants selected arts and cultural activities, domestic violence, economic development, job skills training, or land use.

When asked how important CHWs are to the CHW Asthma Program, seven of the eight respondents chose “extremely important,” the highest importance on a Likert scale. One respondent said, “very important,” and none of the other selections were chosen. Seven of eight participants also said that they felt CHWs are “extremely important” to the AAA Study, one said that it was “important,” and none selected the other options. The full survey results are in Table 2.

Table 2: CHW Roles Study Survey Responses (n=8)

	Number of Participants	Percent of Participants
<i>In your role as a CHW, which of the following topics do you address? Select all that apply.</i>		
Access to utilities (e.g., water, electricity, gas)	1	12.5
Air pollution	4	50
Arts and cultural activities	0	-
Asthma	7	87.5
Climate change	2	25
Domestic violence	0	-
Economic development	0	-
Education	1	12.5
Elders and aging	0	-
Employment	1	12.5
Environmental or ecological health	2	25
Food security	1	12.5
Housing	2	25
Immigration and refugee resettlement	2	25
Job skills training	0	-
Land use	0	-
Mental health	2	25

	Number of Participants	Percent of Participants
Navigating the healthcare system	2	25
Nutrition	1	12.5
Physical activity and exercise	1	12.5
Transportation access	2	25
Youth	1	12.5
<i>How important do you feel CHWs are to the success of the PH-SKC Asthma Education Program?</i>		
Not important	0	-
Somewhat important	0	-
Important	0	-
Very important	1	12.5
Extremely important	7	87.5
<i>How important do you feel CHWs are to the success of the AAA Research Study?</i>		
Not important	0	-
Somewhat important	0	-
Important	1	12.5
Very important	0	-
Extremely important	7	87.5

Themes

Fifteen themes emerged from the data collected. They are categorized into four groups:

- A. The experiences of the CHWs' clients
- B. The experiences of community health workers
- C. The systems that CHWs work in
- D. The needs of CHWs in their current roles and potentially expanded roles

Figure 2 is a thematic map which illustrates the 15 themes and how they relate to each other. Themes are color-coded based on their group. Each theme is numbered, and its related codes are shown below it. The themes are clustered into four sets: CHW Resources, CHW Needs, CHW Roles, and Client Challenges. The Client Challenges set is nested into the CHW Roles set because CHWs address their clients' challenges in their

work. The CHW Resources and CHW Needs sets point to the CHW Roles set because they affect what CHWs can do and how.

A table of themes, heir groups, and related codes is found in Table 3.

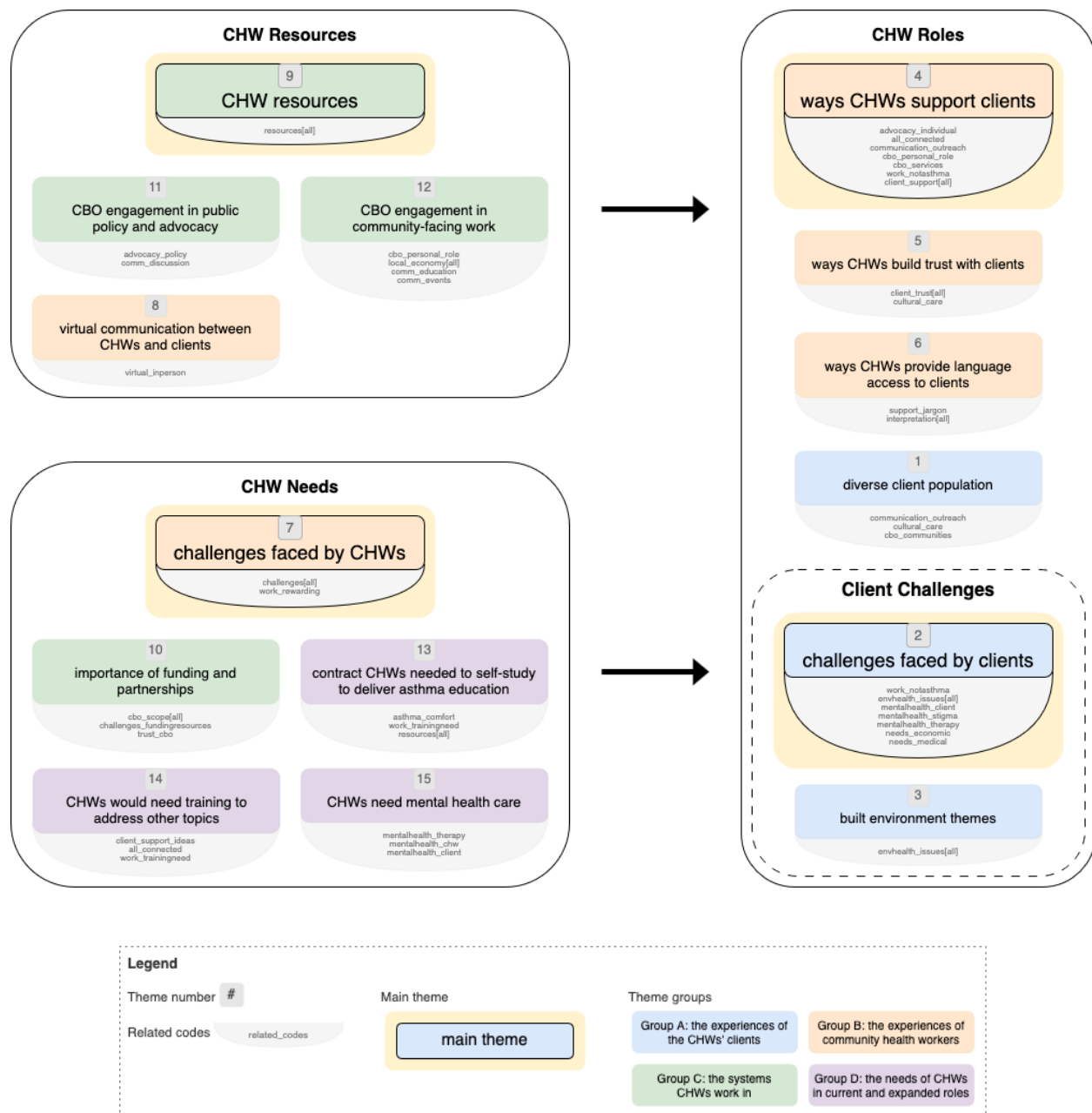


Figure 2: Thematic Map for CHW Roles Study Findings

Table 3: CHW Roles Study Themes

Group	Theme #	Theme	Related Codes
A	1	Community health workers support a diverse client population and do not always serve clients with whom they share a cultural background.	communications_outreach cultural_care cbo_communities
A	2	Community health workers' clients face economic, medical, mental health, and environmental health challenges.	work_notasthma envhealth_issues[all] mentalhealth_client mentalhealth_stigma mentalhealth_therapy needs_economic needs_medical
A	3	Many of the environmental health challenges of clients are related to issues with the built environment.	envhealth_issues[all]
B	4	Community health workers support their clients with a variety of resources, including those directly related to asthma and those that are not.	advocacy_individual all_connected communications_outreach cbo_personal_role cbo_services work_notasthma client_support[all]
B	5	Community health workers build trust with their clients in many ways.	client_trust[all] cultural_care
B	6	Community health workers provide language access to their clients.	support_jargon interpretation[all]
B	7	Community health workers face challenges related to capacity, logistics, and sufficient resources.	challenges[all] work_rewarding
B	8	Community health workers appreciate virtual communication because it is more convenient.	virtual_inperson
C	9	Community health workers draw from a variety of resources to support their clients.	resources[all]
C	10	Community-based organizations use partnerships and grants to provide resources to clients, but they have limited resources.	cbo_scope[all] challenges_ fundingresources trust_cbo

Group	Theme #	Theme	Related Codes
C	11	Community health workers don't do a lot of public policy advocacy in their roles, but community-based organizations do.	advocacy_policy comm_discussion
C	12	In addition to serving individual clients, community health workers also provide resources to the community through their community-based organizations.	cbo_personal_role local_economy[all] comm_education comm_events
D	13	While the training they received on asthma was helpful, contract community health workers needed self-study to feel comfortable delivering asthma education.	client_support_ideas all_connected work_trainingneed
D	14	Community health workers report that they could provide other services but will need training.	asthma_comfort work_trainingneed resources[all]
D	15	Community health workers need mental health support.	mentalhealth_therapy mentalhealth_chw mentalhealth_client

The experiences of the CHWs' clients

There are three themes about the experiences of community health workers' clients.

1. Community health workers support a diverse client population and do not always serve clients with whom they share a cultural background.

This is a sub-theme in the CHW Roles set. It supports the main theme (#4) by describing how part of CHWs' roles is to serve a diversity of clients. Many of the participants' clients are immigrants or refugees, do not speak English as a first language, and/or are people of color. Each of the community-based organizations (CBOs) represented by the CHWs has a specific population focus. Lutheran Community Services Northwest provides resources for immigrants and refugees, and CHWs from this organization shared that many of their clients are from countries such as Afghanistan, Iran, and Ukraine. Meanwhile, African Community Housing & Development primarily serves the African diaspora community and Villa Comunitaria primarily serves the Latino community in their neighborhoods. Even though these organizations specialize in providing services for specific populations, each of them welcomes any person in need of their resources. As a result, CHWs sometimes share a common cultural background with their clients and sometimes do not.

2. Community health workers' clients face economic, medical, mental health, and environmental health challenges.

This is the main theme in the Client Challenges set. Economic challenges of clients included concerns about affording sufficient housing, finding work, purchasing insurance, and paying bills. Clients also share with CHWs that they have other medical problems in addition to asthma, and they may struggle with finding medical care or accessing medication. Clients who are immigrants and/or refugees also face challenges related to the immigration system, work authorization, and resettlement.

Seven of the eight participants talked about the stress that their clients experience due to cumulative burdens and their need for mental health care and access to counseling. For example, one participant described what concerns they hear from their clients, saying:

Mostly, I hear about housing ... and the landlord is not doing anything about it. And despite of all the ... incident reports and the work orders they submit, it's not being addressed, and all the issues are just expanding, and one thing is causing another, and it's just keep on going (P2, 2025).

All eight participants shared that their clients face environmental health challenges related to housing, including poor housing quality and difficulty accessing affordable, sufficient housing. Many clients also had issues with accessing affordable food, public green spaces to spend time outside or exercise, and reliable and frequent public transit. Two CHWs shared that their communities have issues with soil and water quality and are vulnerable to effects of climate change such as flooding. These two participants, along with two others, spoke about asthma and these environmental health challenges as all connected issues.

3. Many of the environmental health challenges of clients are related to issues with the built environment.

This is a sub-theme in the Client Challenges set. It supports the main theme (#2) by emphasizing how clients' challenges are often related to their built environments. Among all participants, housing was the most frequently cited environmental health challenge. Clients face economic challenges to accessing their desired housing. They also experience housing quality issues such as mold, humidity, the presence of smokers, and issues with landlords who do not make repairs promptly. Clients also encounter problems with public transit. Those who do not have access to a personal vehicle or whose households share vehicles rely on public transit to get to work or medical appointments. However, clients share with CHWs that transit is not frequent or reliable enough, especially in suburban areas. A CHW described a common experience of their clients who take buses to clinics:

Sometimes [the bus] goes to certain areas where they're trying to go or not ... and that's a pretty big constraint for them, just because it's so far away. And every time they go, counting commute time, clinic time, and then commute back, they would probably take around like 3, 4 hours (P7, 2025)

Participants also talked about how their clients sometimes have inadequate access to green spaces where they can exercise or spend time outside for their mental health.

The experiences of community health workers

There arose five main themes about the experiences of community health workers.

4. Community health workers support their clients with a variety of resources, including those directly related to asthma and those that are not.

This theme is central to the thematic map and is the main theme in the CHW Roles set. The roles of CHWs are affected by the resources and needs they have, and the challenges their clients are experiencing. Each of the other themes in the CHW Roles set further describes what types of work CHWs do.

Four of the participants held another title at their CBO aside from being a CHW for the CHW Asthma Program. As part of the CHW Asthma Program, they deliver asthma education, provide supplies such as mattress covers and vacuum cleaners, and complete a home assessment to help clients manage their triggers. CHWs also help clients navigate the health system by helping them make doctor appointments and understand insurance. They also encourage clients to advocate for themselves in medical settings.

CHWs also learn about many other concerns their clients have and do what they can to help clients address these other concerns. For example, CHWs can direct their clients to food banks or places where they can get free clothing or hygiene items. CHWs also refer their clients to a variety of resources within and outside of their community organizations, including mental health counseling, energy assistance, discounted transit fare, legal services, and social security programs. One participant described how their work is not only constrained to asthma, saying:

This is mainly for asthma, but we also realize as community health workers, we also kind of act as social workers ... [or] community liaisons. So other things come up from time to time like housing and mental health (P8, 2025).

5. Community health workers build trust with their clients in many ways.

This is a sub-theme in the CHW Roles set. It supports the main theme (#4) by describing the different ways CHWs build trust with their clients. Participants shared that they spend time with their clients to get to know them and learn about their situations. They compared clients' interactions with CHWs to their interactions at medical appointments where doctors have limited amounts of time to spend with each patient. As CHW described, "[providers] don't have as much time to sit with their clients ... I don't hurry them. I listen, I talk to them, and I feel that's why they ... share" (P1, 2025).

All participants talked about ways they respect the wants, needs, and autonomy of their clients. They described how important it is to use situational awareness and emotional intelligence to understand how to support their clients. They obtain consent before doing actions that affect their clients. One CHW described client autonomy by sharing:

From the beginning, when I talk to them about the program, ... [I tell them] that we might have uncomfortable questions. I always tell people that they're free to skip a question, you know. That they don't have to necessarily decline the whole program... they can decide whether they want to talk about something or they don't (P8, 2025).

CHWs also build trust by following through on supporting their clients. They describe how clients who receive support for one thing are more likely to come back to ask for help with other things. Three of the CHWs shared that some clients are quicker to trust them because they represent their CBO, which is known in the community to be a trustworthy organization. Five of them also talked about how it is easier to build trust with people with whom they share a cultural background because they have a common understanding of norms, food, religion, and/or language.

6. Community health workers provide language access to their clients.

This is a sub-theme in the CHW Roles set. It supports the main theme (#4) by describing how CHWs provide language access to their clients. Some CHWs are able to provide language access directly because they speak the same language as some of their clients. They obtain help from their coworkers who have the language skills their clients need and employ the use of interpretation services when needed. Furthermore, CHWs also provide language access by decoding medical jargon and providing information to their clients in plain language. One CHW described their experience providing language access by saying:

Most of the people that I was assigned, my clients, I speak their language. ... And even those who don't speak the language I do, ... I communicate through the interpretation service that the King County offers. So I explain it clearly and in detail to the person that's interpreting. And they talk ... however long it takes, and we move forward (P2, 2025).

7. Community health workers face challenges related to capacity, logistics, and sufficient resources.

This is the main theme in the CHW Needs set. The challenges of community health workers inform what needs they have. When asked about challenges they face in their work, many participants talked about having insufficient capacity or resources to provide for their clients. CHWs shared that they wanted to do more to help their clients but sometimes could only refer them to programs which have limited resources or could only move their application along or provide a number to call. One CHW also described having limited time to reach all their clients for the CHW Asthma Program and AAA Study, so they felt that they had to focus on providing asthma care instead of talking about other topics. Participants also described logistical issues including getting in contact with their clients, driving to sites, and learning new programs. Nevertheless, participants share that their work is rewarding because they are able to help their clients with things they need.

8. Community health workers appreciate virtual communication because it is more convenient.

This is a sub-theme in the CHW Resources set and supports the main theme (#9), which describes the different resources that support CHWs. This sub-theme highlights virtual communications as a resource for CHWs. Most of the participants described how virtual home visits, which take place over the phone or through online video calls, are effective while being more convenient than in-person visits. They shared that clients are often more comfortable over the phone because they don't feel like they have to host guests. Clients can also multi-task if needed by simultaneously doing chores or taking care of children. For example, one participant shared:

Most people, since, you know, they're working families, and they're often sometimes multitasking. So it's good to get them on the phone, and they can continue doing with their chores... they're still actively participating ... it gives them more room to also do what ... they need to do (P8, 2025).

Another CHW shared an experience during which a client's camera showed water damage on the ceiling during a video call, which opened a conversation about potential mold growth and its relationship with asthma health. Another CHW also shared that virtual visits are preferred because personal safety is a concern during in-person home visits, where CHWs often enter clients' homes alone.

Some participants shared that they may meet clients in person at their CBO's office before connecting with them virtually, and that these in-person interactions support the trust-

building process with these clients. One CHW shared that in-person visits are more appropriate for certain clients who may need more support, such as the elderly.

The systems that CHWs work in

There are four themes related to the systems within which CHWs work, including their community-based organizations and the partnerships they have.

9. Community health workers draw from a variety of resources to support their clients.

This is the main theme in the CHW Resources set. Participants use many different resources to help them succeed in their roles as CHWs. Most participants mentioned the support of Public Health – Seattle & King County’s Asthma Team, which provided the training and materials for the CHW Asthma Program. CHWs shared that they benefit from regular meetings with the Asthma Team, their pulmonologist, and their fellow CHWs who administer the same program. Participants described that it is useful to have a space to ask questions and learn about the experiences of other CHWs. One participant described why the weekly meetings with PH-SKC are helpful by saying:

“[We] share resources, talk about information for the upcoming workshops and hear the updated status, ... [share] clients’ notes or something that we found very interesting and we have questions about. ... Sometimes the UW team joins and responds to some of the questions we have, and sometimes [the pulmonologist] is there responding medical related questions and it definitely clears out a lot of confusions and what to do next with the clients, ... how to approach certain type of situations. And it’s been very, very helpful and very supportive (P2, 2025).

Many CHWs also shared that they create and use resource lists which have been developed by their CBOs or collected on their own. As one participant described, “Even if I at the moment can’t don’t have ... any resource, I will ... put in the work to find it so we can build our resource lists up” (P5, 2025). These resource lists help CHWs keep track of where they can refer clients. CHWs also draw from the resources available at their CBOs which they can offer to their clients. These resources include basic needs, support with applying for resources, and community events.

Four of the participants described how their past experiences helped them with their work as a CHW and drew parallels between their previous work and their current work. These include CHWs’ educational backgrounds and their previous experience in customer service, community organizing, and interpreting.

Three of the five CHWs who were contracted to administer the CHW Asthma Program and AAA Study also described that they needed to take time to study asthma on their own to feel comfortable speaking to clients about the topic.

10. Community-based organizations use partnerships and grants to provide resources to clients, but they have limited resources.

This is a sub-theme in the CHW Needs set. It supports the main theme (#7) by describing some of the challenges that can arise when there is insufficient funding for CHWs. Many CHW resources are available because CBOs have access to grants which fund these efforts as well as partnerships with agencies such as Public Health – Seattle & King County. However, there are limits to the resources of the CBOs and therefore limits to what CHWs can provide for their clients. As one participant described, “The community health workers that have come to our program have been very good at what they do, but there’s, they have so many limitations because of no funding (P5, 2025).”

11. Community health workers don’t do a lot of public policy advocacy in their roles, but community-based organizations do.

This is a sub-theme in the CHW Resources set. It supports the main theme (#9) by describing how their organizations engage in advocacy to secure resources for their programs. When asked about their participation in public policy and advocacy, community health workers described the work that their organizations are doing, often led by leadership or policy experts. As one participant said, “I don’t do that work, really, but [my CBO] does. There’s a whole policy analyst that does that work” (P6, 2025). CHWs do not personally engage in advocating for policy changes or access to resources in their roles. Two of the participants described that they are personally part of other advocacy workgroups which are not housed in their CBOs.

Some CHWs also described their work in advocating for their clients individually. For example, they speak to their clients’ landlords or schools to address concerns their clients have shared. One participant described how they advocate for kids at schools, saying:

We do a lot of advocating when it seems like the school nurse or the schools are not really complying with the medication adherence for the kid. I have gone and talked with the principals. I go and talk with the nurses to make sure they understand (P5, 2025)

12. In addition to serving individual clients, community health workers also provide resources to the community through their community-based organizations.

This is a sub-theme in the CHW Resources set. It supports the main theme (#9) by describing resources and services available at CBOs which CHWs are able to offer to their clients. As one CHW described, “People come here to apply for section 8, apply for a utility services or rental assistance... or come here just for basic needs, let’s say, pick up a diaper or formula” (P2, 2025). CBOs also offer community events such as celebrations and farmers markets, economic support including free tax filing, and education such as health seminars. As mentioned earlier, CBOs also provide housing support, legal aid, assistance with social services, and other resources for anyone in need.

The needs of CHWs in their current roles and potentially expanded roles

13. While the training they received on asthma was helpful, contract community health workers needed self-study to feel comfortable delivering asthma education.

This is a sub-theme in the CHW Needs set. It supports the main theme (#7) by describing participants’ experiences with training for the CHW Asthma Program. When asked about resources that are helpful to them, all five contract CHWs referenced the training they received to administer the CHW Asthma Program and their time shadowing PH-SKC staff. CHWs reported that the training and shadowing were very helpful and informative. However, as mentioned above, most of them also shared that they still needed additional self-study to become comfortable with their asthma knowledge. Participants had to spend time reviewing the materials after the training, and some also did additional research on their own. One CHW described their experience with self-study, saying:

I’m more comfortable right now because I studied as well a lot about ... the asthma, the medications, even some of the medications which are not in workshops, ... the triggers, ... asthma in child, asthma in adults. (P3, 2025).

14. Community health workers report that they could provide other services but will need training.

This is a sub-theme in the CHW Needs set. It supports the main theme (#7) by reporting participants’ feedback about working on topics other than asthma. When asked about what other ways they can support environmental health, participants suggested health screenings, in-language outreach, helping clients create nutrition plans, or addressing soil and water contamination. Four participants also said that they think CHWs could do a broad range of topics if they received proper and sufficient training. Participants did not always specify what topics would be most appropriate or important but were more interested in supporting what the community needs.

15. Community health workers need mental health support.

This is a sub-theme in the CHW Needs set. It supports the main theme (#7) by suggesting that one specific need of CHWs is access to mental health care. As mentioned in Theme #2, seven of the eight participants talked about the mental health of their clients. Two participants related the mental health of their clients to their own mental health and described how it takes a toll to hear about and witness poor living situations. One participant also spoke about how it feels to have clients pass away. Most participants shared how quickly they become comfortable with their clients and that they often get to know each other well over the course of multiple long conversations. As CHWs build relationships with their clients, they become more affected by seeing their challenges. One participant summarized this experience by saying:

Something that we haven't totally addressed within our programs and community is the mental health of a CHW, ... what effects it has on you when you're dealing with somebody else's problems over [and over] ... because I find myself thinking about them all the time. (P5, 2025).

Themes and Concepts

The CHW Roles Study investigated how the roles of CHWs align with the Settlement Health Map and the National C3 Council's CHW Core Roles. Prior to data collection, CHWs were expected to mostly work in the Lifestyle and Community spheres of the Settlement Health Map. However, the study found that CHWs mostly focus only on the Lifestyle sphere by working with individuals and families to improve their asthma health and by supporting them with other resources when possible. This finding may be specific to this cohort of CHWs who focus on asthma management; CHWs who work for other organizations or have other foci may do more community-facing work.

Much of the work of community-based organizations is similarly centered in the Lifestyle sphere. They support individuals and families one by one with taxes, housing, applications, employment, and other services including the CHW Asthma Program. CBOs offer these services and resources to the public and therefore affect the Community sphere by helping many individuals and families in the community. They also affect the Local Economy sphere by supporting individuals' economic health. CHWs and their CBOs affect the People sphere by supporting each of their clients' individually.

CBOs also work in the Community sphere directly, though CHWs are only sometimes involved in this work. They provide resources such as food, supplies and materials, health education seminars, farmers markets, and community events. These enrich the community and provide to many at once, resulting in benefits to the Local Economy, Lifestyle, and People spheres.

Participants did not describe much work within any spheres larger than the Local Economy sphere. They referred to some work that their CBOs are doing to improve their built environments, but they did not participate in this work as CHWs.

Participants in the CHW Roles Study fulfilled all the National C3 Council's CHW Core Roles to some extent. Much of their work is aligned with the following roles:

- Role #1: Cultural Mediation Among Individuals, Communities, and Health & Social Service Systems
- Role #2: Providing Culturally Appropriate Health Education and Information
- Role #3: Care Coordination, Case Management, and System Navigation
- Role #4: Providing Coaching and Social Support
- Role #6: Building Individual and Community Capacity
- Role #9: Conducting Outreach

For the following two roles, the CHWs mostly directed their work toward individuals rather than communities. Participants do a lot of individual advocacy for their clients and they complete home assessments for asthma health. Two CHWs are involved in educating systems as part of advocacy groups.

- Role #5: Advocating for Individuals and Communities
- Role #8: Implementing Individual and Community Assessments

CHWs in this group did address Role #7 (Providing Direct Services) by meeting basic needs for food and other resources, but they did not conduct health screenings or basic services. This may be because the CHW Asthma Program is focused on providing education to clients. Regarding Role #10 (Participating in Evaluation and Research), most of the participants were involved in the AAA Study and therefore in this research study. However, the interview and survey did not directly ask them if they were otherwise involved in the evaluations of CHW programs or other research.

Study Strengths and Limitations

The CHW Roles Study has a small sample size and recruited from a specific cohort of CHWs. Among the eight participants in this study, one was not involved in the CHW Asthma Program or the AAA Study. The other seven were trained on the CHW Asthma Program and AAA Study protocols and therefore have common experiences regarding these two projects. These seven participants also regularly attend meetings together led by the CHW Asthma Program Manager. Responses from these participants and themes that arise from this study may be influenced by what the team has learned or discussed. One of

the seven participants was trained on these projects but never attended home visits with families. In total, six participants had experiences interacting with families for the CHW Asthma Program and the AAA Study.

All participants in the CHW Roles Study have received training and/or work primarily in asthma care. Responses from participants reflected the focus on asthma, even when discussing other environmental health issues. With a small sample size, the common topic of asthma helped to bound the broad topic of environmental health and guide the development of themes. However, the focus on asthma may have resulted in missed opportunities to discuss environmental health issues which are not related to respiratory health but are otherwise important in the participants' communities.

Finally, the principal investigator (PI) of the CHW Roles Study is professionally connected to the study participants. The PI has worked as a research assistant for the AAA Study for the past year and has attended home visits with several of the community health workers. This relationship may have prevented participants from sharing information about the CHW Asthma Program or AAA Study that may be perceived as criticism. On the other hand, this relationship may have resulted in participants being more comfortable with sharing their thoughts and feelings about their experiences as CHWs.

Discussion

The Settlement Health Map

The CHW Roles Study shed some light on the effectiveness of the Settlement Health Map (Figure 1) for understanding environmental public health. The nested spheres in this model illustrate how a person's health is affected by various factors of increasing scale. The Settlement Health Map was useful in this study for guiding the development of research questions and for framing how social determinants of health are affected by environmental factors. The model was also helpful for understanding which spheres the participant community health workers and their community-based organizations operate in. The study found that the work of the CHWs was focused most on the Lifestyle sphere and that their CBOs worked in the Community and Lifestyle spheres.

The Settlement Health Map was also somewhat able to illustrate how the work of CHWs and CBOs affects other systems. It appropriately emphasized the close relationships between neighboring spheres. For example, the model shows the Local Economy sphere within the Activities sphere and outside the Community sphere. This illustrates that impacts to the local economy greatly affect the community and the activities people do.

However, this study shows that there is a context in which people and communities live, and that this context is created by the natural and built environments, the economy, programs and policies, and many other factors. The Settlement Health Map is limited because its nested design suggests that spheres are sequential and only interact with adjacent spheres. In this study, it was challenging to use the model to illustrate more complex relationships between spheres. This study suggests that the Settlement Health Map can be stronger if it showed more connections among spheres rather than connecting each sphere only to its neighbors.

A proposed update to the Settlement Health Map is provided below in Figure 3. Like the original (Figure 1), this version places people at the center. This updated People sphere contains the Lifestyle and Activity spheres from the original Settlement Health Map. The Community sphere immediately surrounds the People sphere and represents the social and familial networks in which people belong. The next sphere in this updated model is the Local Ecosystem and consists of the built environment, natural environment, local economy, and local politics, which interact with each other to create the local setting in which the people and community live. Finally, the largest sphere is the Global Ecosystem, which contains global forces, national and global politics, macro-economy, and other settlements and regions. This sphere represents the larger contexts in which local ecosystems exist.

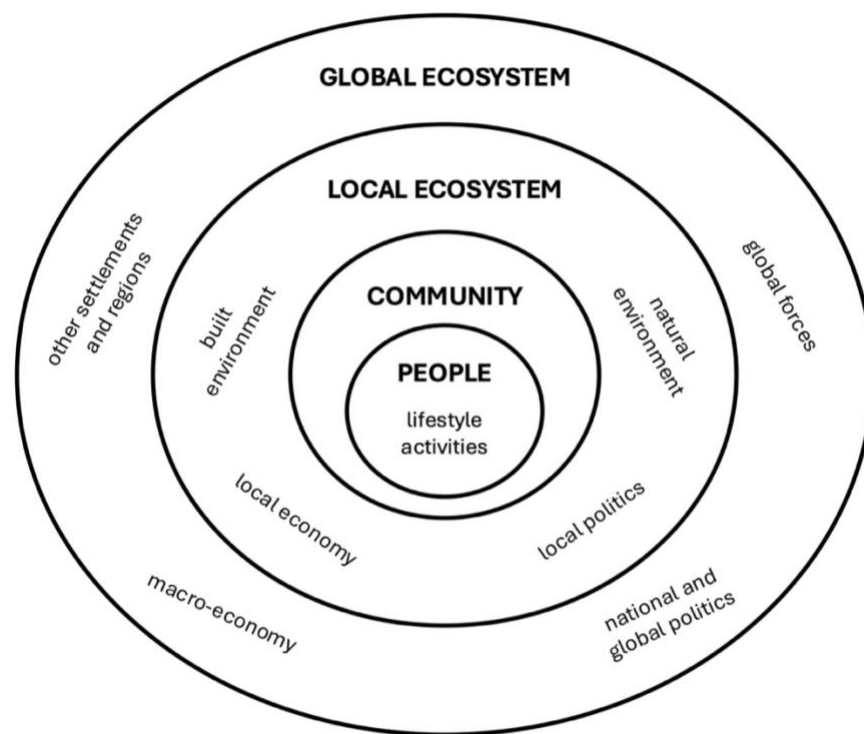


Figure 3: Proposed Update to the Settlement Health Map

Like the original Settlement Health Map, the updated design shows a nested series of spheres. However, it should be noted that direct relationships occur between non-adjacent spheres. For example, a person may be affected by local policies without mediation from their community.

One key difference between the original and updated models is the placement of the Activity and Lifestyle spheres. In the Settlement Health Map, the Activity sphere includes working, shopping, moving, living, playing, and learning, and the Lifestyle sphere includes diet, physical activity, and work-life balance. These two spheres are out of place among the rest of the spheres. The Global Ecosystem, Natural Environment, Built Environment, Local Economy, and Community spheres are environments in which people live, work, and play. Meanwhile, the Activity and Lifestyle spheres are actions that people do or situations they are in. Lifestyles and activities are affected by people's situations and impact their health. In the updated model, these two spheres are placed within the People sphere because they are components of a person's "nature, health, and well-being," which is defined in the People sphere of the original Settlement Health Map.

The proposed update has a new Local Ecosystem sphere which includes the following components: built environment, natural environment, local economy, and local politics. The Local Ecosystem sphere was created to highlight the local context in which people and communities live and to include components which influence and interact with each other to create this context. The original model had Built Environment, Natural Environment, and Local Economy spheres, and included politics as an external factor which affected all spheres within Global Ecosystem. The suggested update distinguishes between local politics and national and global politics and places them in the Local Ecosystem and Global Ecosystem spheres respectively.

The updated design of this model emphasizes that institutions should understand the interrelated components that make up our local ecosystems. This study suggests that CHWs and CBOs primarily work in this Local Ecosystem sphere and can make significant advances in public health if their role is better understood in the network of local politics, local economy, built environment, and natural environment.

The National C3 Council's CHW Core Roles

The CHW Core Roles developed by the National Council on CHW Core Consensus Standards (National C3 Council) provided a strong framework for understanding the roles and experiences of the participants in the CHW Roles Study. Each of the ten CHW Core Roles contained two or more sub-roles, which provided specificity and detail to assess

whether the roles were met. In addition to the Core Roles, the National C3 Council also developed Core Skills and Core Qualities, which were not used in this study. These complement the Core Roles by describing what is needed to do the work of CHWs. The CHW Core Roles, Skills, and Qualities used together would be helpful for assessing CHWs' strengths and areas for growth. CHWs can self-assess using these tools and use them to advocate for more training or other resources.

The CHW Core Roles are national standards developed in collaboration with CHWs nationwide. The National C3 Council acknowledges that CHWs work in a variety of settings, and that everyone's roles are affected by the communities and organizations within which they work. Therefore, the Core Roles are designed to provide guidance or recommendations for CHWs rather than outline required tasks. The CHW Roles Study's findings suggest that the National C3 Council's characterization of the Core Roles is appropriate, given that the study participants' alignment with the Core Roles was related to what their organizations and programs focus on.

As study participants described their experiences working as CHWs, a recurring experience was their provision of mental health support for their clients. Community health workers comfort their clients, listen to their problems, provide advice, and help them process personal problems. Engaging with clients in this way also places a mental health burden on the CHWs themselves.

The CHW Core Roles do not reflect this finding from the study. Role #4, "Providing Coaching and Social Support," is related to mental health support but does not sufficiently describe this finding. The National C3 Council's CHW Core Roles can be improved by adding a role about providing mental health support. While CHWs are not necessarily mental health professionals, specifying this role can help to provide them with skills and training to provide some mental health care and make mental health care referrals. Furthermore, adding this role can help CHWs access the mental health care they need to continue to be successful in their work.

Findings

The CHW Roles Study learned about the experiences of CHWs, the clients they support, and the systems they work in. The study participants are employed by different organizations, including four community-based organizations and PH-SKC. Most of the participants who are not employed by PH-SKC are contracted by them to work in the CHW Asthma Program. Each participant is a CHW who is trained in asthma care and has experience with providing direct services to clients.

The American Public Health Association (APHA) defines a community health worker as “a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served”⁵⁰. However, this study shows that the trust between a CHW and the community should not be assumed but rather earned. While it may be assumed that CHWs always share race or ethnicity, class, language, or other commonalities with their clients, this study found that sometimes CHWs must work to connect across cultural differences, sometimes even with the use of interpretation services. Even when CHWs do share a cultural background with their clients, they build trust through more ways than connecting over their shared culture.

CHWs are professionals who have the important skill of high emotional intelligence. Their work requires them to understand social cues, to listen to the explicit and implicit wants and needs of their clients, and to act accordingly. Study participants shared many ways they build trust with their clients, including taking the time to listen to them, obtaining consent, and providing them with whatever resources they can share. Ultimately, the common theme is that CHWs respect their clients and prioritize their dignity and autonomy. They educate without being judgmental and encourage them to advocate for themselves and their health. Clients come to trust CHWs over multiple meetings and long conversations. As clients grow to trust CHWs, CHWs also form bonds with their clients and develop caring relationships with them.

The study also found that participants learn about many different needs of their clients, even when they initially connect to discuss asthma management. These include economic challenges such as finding employment and affording basic needs, challenges with housing access and quality, and issues with public transportation. Clients who are immigrants and refugees also need support with resettlement and legal services. Furthermore, participants report that their clients need mental health support, especially because they face cumulative burdens which compound their stress.

This study aimed to understand how the roles of CHWs can be expanded to other topics or programs outside of medical health. The data show that CHWs already work to address the whole health of their clients. They offer services provided by their CBOs, make referrals to other programs, or guide their clients through social services. CHWs keep resource lists to help themselves keep track of what they can share with their clients.

This study also found that participants are most focused on asthma-related health. When asked to name other environmental health issues they would like to address, participants mentioned mold and humidity, air pollutants, allergens, and spaces to exercise, all of which relate to asthma. Participants also noted that they could work on other topics but

would need sufficient training. It was important to them that they felt sufficiently knowledgeable about each topic on which they engage with the public. If CHWs are to work on multiple projects, it may be most effective to scaffold training about new topics on those they are already knowledgeable about and to discuss how the topics intersect.

CHWs should be better supported if they are asked to work in expanded roles. Participants shared that they needed time to study on their own before they felt comfortable speaking about asthma. When training CHWs on other topics, it will be important to provide them with resources and time to absorb the information and learn more at their own pace. CHWs are also often employed based on what funding is available. One way to improve the work environment for CHWs is to increase their job stability by securing longer-term grants or more reliable resources.

Participants were not directly asked about mental health, but each mentioned their clients' struggles with stress, depression, or accessing services. The challenges of clients also take a toll on the mental health of CHWs, who care for their clients and want to help them succeed. As two participants said, CHWs themselves need better access to mental health care to help them deal with the emotional and interpersonal parts of their work.

CHWs who participated in this study largely did not work directly in public advocacy, though this work was being done by others in their CBOs. Rather, CHWs are mostly focused on roles in which they interface with individuals or families. This may be a missed opportunity, since CHWs have direct knowledge about the situations of their clients and can be a powerful voice for advocacy. Two of the participants are involved in advocacy groups and shared that their lived experiences are important in these spaces. CBOs can benefit by including CHWs when advocating for improved programs and policies, and more funding for the frontline work they are doing for their communities.

Findings from Informational Interviews

The CHW Roles Study also conducted informational interviews with professionals who manage and support CHWs. Moving forward, these five interviewees will be referred to as “interviewees” and the eight CHW study participants will be referred to as “participants.”

Interviewees provided additional context for the data gathered from study participants. They discussed how the experience of a CHW can be vastly different based on the setting they work in. This was reflected in the participants' high focus on asthma care due to the nature of their current work. Even among the study participants, who all worked on asthma, their work varied based on the mission of their organization. CHWs could also have different experiences based on their employer. The participants in this study worked

for a public health government agency and community-based organizations. Other CHWs are part of different government agencies such as the Seattle Department of Neighborhoods or work in clinical settings like Seattle Children's Hospital.

Furthermore, interviewees discussed how "community health worker" is one title among many of people who uplift community voices and connect them to resources. There are also community advocates, *promotores de salud*, patient navigators, community liaisons, social workers, and more. Each of these roles have similarities and differences based on the neighborhoods they work in, the priorities of their communities, and the organizations they work for.

Interviewees also described different ways CHWs are supported in this region. The Washington State Department of Health has a Community Health Worker Training Program through which they offer free online courses including a CHW Core Competency Course and Health Specific Modules. This is a prime example of how a government agency can support CHWs in gaining the training and education they need to provide services.

Furthermore, interviewees described various networks wherein CHWs come together to build capacity, support each other, and learn from each other. These networks can be organized based on geographical area and/or topic of interest. For example, there are networks based in Whatcom County and in southwest Washington State, and others which focus on supporting migrants and refugees or the Latinx community. These networks are spaces in which CHWs can find opportunities and share resources with each other.

The informational interviews also shed light on how grants and funding affect CHWs. Interviewees shared that they constantly look for sources of funding that can support the work that is needed and keep CHWs employed. However, this system results in CHWs shifting among different projects. Sometimes programs have to be discontinued, or employees' contracts need to be terminated due to a lack of funding. Similarly, participants described past projects that have ended because there is no longer funding. For example, P2 shared that most of their grants ended in 2024, so a lot of their CBO's programs are no longer running.

Recent shifts in funding priorities at the national level have affected research grants, and this has directly impacted the CHW Asthma Program and AAA Study. The program's Centers for Disease Control and Prevention (CDC) grant was cancelled, then reinstated. With higher demands on the Washington State budget, the program also faced the possibility that it would not receive state funding in the upcoming budget. CHWs are particularly vulnerable to these shifts in funding because they are often contract workers

rather than permanent employees. Their employment stability depends on the dependability of funds which support their work.

Conclusion

The CHW Roles Study sought to (1) explore the roles of community health workers in building relationships with clients and addressing broader community health needs and (2) evaluate how the CHW model can be adapted to other programs and service areas to address public health challenges. Based on a qualitative study of eight individuals, CHWs were found to be skilled professionals who make personal connections with their clients based on respect and autonomy. This study's findings suggest that CHWs already support their clients in many ways even when their job protocol is specific to one focus area, which is asthma education among these participants. CHWs can expand to more topics if they have access to additional training and resources. They can be better supported in their work with more stable funding, training and education, and access to mental health care.

Findings from the CHW Roles Study support previous research which has found that CHWs enhance the positive effects of health interventions. This study suggests several reasons why CHWs may be so effective. Participants in this study highlighted ways in which they personally connect with their clients and build trust with them. They also have access to a network of resources and are therefore able to support their clients with different needs, rather than only providing one service. In this case, study participants not only provided asthma care, but helped their clients with housing, legal aid, other health education, access to supplies, and other resources. This finding suggests that to support CHWs and to maintain and enhance their impact on communities, CHWs should continue to be provided with the means to provide a breadth of resources and should be given enough time and capacity in their work to build connections with each of their clients. Agencies and organizations should also continue to recruit, hire, and train CHWs from diverse cultural backgrounds and pay them sufficiently for their skills, including their cultural knowledge and language abilities.

One aim of this study was to understand if and how CHWs can support health in non-medical topics and settings. We found that CHWs often already provide resources in a variety of non-medical fields and topics, though study participants often delineated between the work they do as CHWs and what they do when working under another title in their same organization. Furthermore, participants emphasized the importance of training if they were to help clients with other concerns. This suggests that CHWs have the capacity for a variety of roles, but need effective training to apply this wider skillset to support different needs.

As mentioned above, CHWs also need continued funding and a support network to do this work. Meanwhile, CHWs are knowledgeable about communities' wants and needs because of their experience providing direct services. CBOs should involve their CHWs in advocacy work to leverage this knowledge. Additionally, CHWs should be supported with mental health care because they are frontline workers who witness and build deep connections with people who are facing challenges in their day-to-day lives.

Future research can gather perspectives from a larger sample of CHWs who work in different topic areas besides asthma care. It will also be important to learn what funding models can be effective at increasing employment stability for CHWs who are employed by different types of organizations. Research can also identify what forms of mental health support are helpful for CHWs and how it can be made available to them.

Chapter IV

Conclusions

This research sought to learn about the roles of community health workers (CHWs) by investigating their roles in the Community Health Worker Asthma Program (CHW Asthma Program) and the Airport, Air Quality, and Asthma Research Study (AAA Study). In both projects, community health workers mediate interactions between institutions and members of the community. The CHW Asthma Program is managed by Public Health – Seattle & King County, and the AAA Study is conducted by the University of Washington’s Department of Environmental and Occupational Health Sciences.

Future Directions

This study’s evaluation of the AAA Study protocol found that CHWs improved its ability to recruit a diversity of participants, keep them engaged throughout the study period, build trust with them, and earn high participant satisfaction with their experience in the study. More research is needed to further study the work of liaisons including community health workers, community advocates, and *promotores de salud*. While this study focused on asthma, future studies should seek to understand the impact of liaisons on other topics that affect community health and well-being. For example, it would be important to study the effect of community advocates in community engagement and the work of CHWs in other clinical settings such as hospitals. Research can also evaluate whether and how institutions can involve these staff to better connect with communities of color, low-income communities, or other groups which have histories of marginalization.

The CHW Roles Study found that clients’ satisfaction with public health programs and their trust of institutions are important to the success of public health interventions. Meanwhile, many assessments of health interventions focus solely on gathering data on clinical outcomes. Future studies about CHW-administered interventions should incorporate non-clinical metrics to better understand participants’ experiences with the research. These non-clinical metrics can include clients’ satisfaction with the program, their comfort with self-advocacy, and their access to a variety of medical and non-medical resources.

To expand the CHW Roles Study, further studies can gather perspectives from a larger sample of CHWs, including those who work in topic areas other than asthma care. These studies can expand on the methods of the CHW Roles Study by conducting second interviews with participants and by hosting focus groups with CHWs who work on the same project or in the same organization.

It will also be essential to identify funding models that can effectively fund CHWs and increase their employment stability. Research can investigate how institutions can design CHW programs to be more supportive of their staff, including through the provision of mental health support. Because CHWs are frontline public health professionals who need access to mental health services, future studies should also identify what forms of mental health support for CHWs are effective and how best to provide this resource.

Practical Recommendations

The results of this study lead to practical recommendations for organizations that employ community liaisons, that affect the health and wellbeing of their communities, and which fund and design public health efforts.

Community Liaisons and Public Health

- Organizations in any field should hire community liaisons to build relationships with communities and enhance public health.

This evaluation of the AAA Study protocol found that CHWs were central to the AAA Study's success in building trusting relationships with a diversity of participants. This evaluation supports the body of research which finds that CHWs enhance community health and wellbeing by improving the effectiveness of interventions. It finds that particularly with regard to asthma and air pollution, CHWs provide these community health benefits. Organizations and programs that address community health can increase their impact by including CHWs in their budgets, planning, and implementation. CHWs allow programs to better engage with a diversity of community members and to foster collaborative, trusting relationships with them. CHWs increase community health literacy, amplify calls to address environmental harms, and improve the health of community members.

Public health impacts are present in all fields, not just in traditional public health or in medicine. In particular, the built environment has significant impacts to public health. For example, this research is concerned with the impacts of aviation and transportation on air pollution and asthma. Another example is the availability of reliable and frequent transit, which supports people's ability to travel to work, attend medical appointments, enjoy recreational activities, and see friends and family. Additionally, a solid waste system which is properly sited and managed ensures that people are not exposed to pathogens from waste and that environmental impacts are minimized.

The CHW Roles study found that CHWs can and do support their clients on a variety of topics outside of traditional public health, and that built environment challenges have a great impact on client health. Organizations, companies, and agencies within and outside of traditional public health and medicine therefore need to understand the health impacts of their work and to learn how they can improve the health of the communities they affect. Organizations in any field can and should hire liaisons such as CHWs to engage and build trust with their residents or constituents and enhance their health.

Lessons from this research should also inform the design of legislation and policies which seek to improve public health, especially relating to air pollution. In recent years, there has been increasing interest in addressing the impacts of air pollution, noise, and other cumulative burdens among airport communities in south King County. This interest is reflected in the following bills which have been proposed by Washington State Congressman Adam Smith [D-WA] multiple times: the Aviation Impacted Communities Act, the Aviation Noise and Emissions Mitigation Act, and the Protecting Airport Communities from Particle Emissions Act.⁵¹ These bills and other public health legislation should not only allocate funding toward public health, but also collaborate with community liaisons to design and implement community-based public health programs.

Environmental Justice

- Washington State should fund and co-create environmental justice solutions with community liaisons to improve the implementation of the HEAL Act.

This study found that CHWs improve relationships between institutions and frontline communities by building trust with community members, identifying stressors that people face, helping people access a variety of resources, and advocating for their communities. In the AAA Study, CHWs were essential to recruiting participants from a diversity of geographies and racial and ethnic identities in a region of the county with lower incomes and more people of color. The CHW Roles study found that CHWs serve a diversity of clients, many of whom experience a variety of economic and medical challenges. CHWs build trusting relationships with their clients both over common experiences and across differences by respecting their autonomy, dignity, and cultural backgrounds.

Environmental justice is a priority in Washington State. In 2021, the state passed the Health Environment for All (HEAL) Act,⁵² which mandated seven state agencies to identify and address environmental health disparities. In addition to other elements, the HEAL Act directs funding toward communities which are highly impacted by environmental health issues, creates and funds an environmental justice council, promotes community

engagement with disadvantaged communities, and calls for an assessment of past and future environmental legislation.

Front and Centered is a coalition of community organizations which contributed to the development of the HEAL Act. In its 2024 Frontline Report on HEAL Progress, Front and Centered assessed how well the HEAL Act has been implemented so far, and outlined three key findings and three core recommendations.⁵³ One key finding is that “meaningful opportunities for participation are few,” and one core recommendation is to “engage community members early and intentionally.” Through these conclusions, the report calls for agencies to build better relationships with communities and to improve collaboration with communities to identify environmental harms and develop solutions. This feedback from Front and Centered highlights the need for better community engagement and public participation in addressing environmental justice issues.

Washington State should adapt or create CHW-led and CHW-administered programs to better implement the HEAL Act. It should include funds to hire CHWs as permanent staff at government agencies and community-based organizations (CBOs) in its budget and to provide them with training and resources. Washington State should also include CHWs or community liaisons in decision-making processes by appointing them to advisory boards or formalizing avenues for them to advocate for their communities.

The CHW Roles Study found that the lives of their clients, and therefore the work of CHWs, intersect the work of multiple state agencies such as the Department of Transportation and the Department of Health. Meanwhile, another key finding in Front and Centered’s 2024 Frontline Report is that “cross-coordination is needed within and among agencies” that are tasked to comply with the HEAL Act. The state can address this shortcoming by hiring community liaisons as permanent staff and creating a community liaison program within the state government. These staff would support coordination and collaboration among state agencies as they connect with communities.

Support for CHWs

- Organizations should provide CHWs with stable employment, mental health resources, agency in their roles, and access to peer support networks.

The CHW Roles Study found that CHWs need more stable employment, sufficient training, a network of peers, and mental health support. Community liaisons such as CHWs are often contract workers who work part-time or whose roles are temporary and subject to the availability of grants and funding. Rather, employers should hire liaisons as full-time permanent employees with benefits to improve their work environments and personal

wellbeing. They should invest in their liaisons by providing training on a variety of community health topics and connecting them to a network of peers. Organizations should also involve liaisons in decision-making and program design because they are experienced frontline public health staff who are knowledgeable about the people they serve.

The CHW Roles Study also found that CHWs at CBOs are unique assets to communities because CBOs are trusted by their communities, have experience collaborating with them, and are known to provide community benefits. However, smaller operations such as CBOs have limited funds and require external support to be able to foster community liaison programs. Stable funding from state or federal budgets or other grantors can allow CBOs to hire liaisons as permanent employees provide them with the resources they need to thrive. This would support public health, increase the capacity of CBOs to support their communities, and improve the work environments of community liaisons. The state of Washington can leverage the HEAL Act, mentioned above, to support liaison programs in CBOs frontline communities.

Conclusion

This study's assessment of the AAA Study protocol found that it benefited from CHWs' involvement in its development and implementation. CHWs enhanced study participants' engagement and satisfaction with the study and provided important insights as to how participants would interact with study materials. This research also included a qualitative study about the experiences of CHWs, and found that they are skilled professionals who make personal connections with their clients based on respect and autonomy. Even when their job protocol is specific to one field (such as asthma), CHWs support clients with many other resources and topics, including non-medical care, if they have access to training and resources. This research finds that CHWs need better support in their work with more stable funding, training and education, and access to mental health care.

Understanding the value of community health workers and supporting their work can have great impacts for the communities they serve. The CHW Roles Study shows that community health workers can play a key role in public health research because of their ability to connect with and engage the people they serve. Furthermore, the role of community health workers can expand past the fields of medicine and public health. Any institution which seeks to engage more meaningfully with their residents and constituents can use a similar model. Hiring community health workers, navigators, liaisons, *promotores*, and advocates can contribute to increasing community engagement and public participation which in turn can support a shift toward more collaborative decision-making between institutions and the communities they seek to support.

Appendices

Appendix A: The National C3 Council's CHW Core Roles⁴⁸

C3 Project CHW Roles and Competencies Review Checklist

Use the following checklists to assess how CHW role and skills linked to CHW trainings, practice, and/or policies align with the Community Health Worker Core Consensus Project.

ROLES

Table 1: COMMUNITY HEALTH WORKER ROLES/SCOPE OF PRACTICE	
☐ Checklist for personal, programmatic, and policy review	Community Health Worker Core Consensus Project Roles/Scope of Practice
Role: Functions that CHWs serve in communities and the health care system. For example, CHWs provide health education. Scope of Practice: An all-inclusive list of roles and tasks which an occupation includes in its scope of work. The exact mix of these roles and tasks for any one individual will vary based on the needs of those served and host organizations.	
ROLE	SUB-ROLES
☐ 1. Cultural Mediation Among Individuals, Communities, and Health and Social Service Systems	a. Educating individuals and communities about how to use health and social service systems (including understanding how systems operate) b. Educating systems about community perspectives and cultural norms (including supporting implementation of Culturally and Linguistically Appropriate Services [CLAS] standards) c. Building health literacy and cross-cultural communication
☐ 2. Providing Culturally Appropriate Health Education and Information	a. Conducting health promotion and disease prevention education in a manner that matches linguistic and cultural needs of participants or community b. Providing necessary information to understand and prevent diseases and to help people manage health conditions (including chronic disease)
☐ 3. Care Coordination, Case Management, and System Navigation	a. Participating in care coordination and/or case management b. Making referrals and providing follow-up c. Facilitating transportation to services and helping address barriers to services d. Documenting and tracking individual and population level data e. Informing people and systems about community assets and challenges
☐ 4. Providing Coaching and Social Support	a. Providing individual support and coaching b. Motivating and encouraging people to obtain care and other services c. Supporting self-management of disease prevention and management of health conditions (including chronic disease) d. Planning and/or leading support groups
☐ 5. Advocating for Individuals and Communities	a. Advocating for the needs and perspectives of communities b. Connecting to resources and advocating for basic needs (e.g. food and housing) c. Conducting policy advocacy

☐ 6. Building Individual and Community Capacity	a. Building individual capacity b. Building community capacity c. Training and building individual capacity with peers and among CHW groups
☐ 7. Providing Direct Service	a. Providing basic screening tests (e.g. height, weight, blood pressure) b. Providing basic services (e.g. first aid, diabetic foot checks) c. Meeting basic needs (e.g., direct provision of food and other resources)
☐ 8. Implementing Individual and Community Assessments*	a. Participating in design, implementation, and interpretation of individual-level assessments (e.g. home environmental assessment) b. Participating in design, implementation, and interpretation of community-level assessments (e.g. windshield survey of community assets and challenges, community asset mapping)
☐ 9. Conducting Outreach*	a. Case-finding/recruitment of individuals, families, and community groups to services and systems b. Follow-up on health and social service encounters with individuals, families, and community groups c. Home visiting to provide education, assessment, and social support d. Presenting at local agencies and community events
☐ 10. Participating in Evaluation and Research*	a. Engaging in evaluating CHW services and programs b. Identifying and engaging community members as research partners, including community consent processes c. Participating in evaluation and research: i) Identification of priority issues and evaluation/research questions ii) Development of evaluation/research design and methods iii) Data collection and interpretation iv) Sharing results and findings v) Engaging stakeholders to take action on findings
*Asterisks denote new roles from 1998-2016; several sub-roles have been expanded	

Appendix B: Online Form and Survey

Survey p. 1

CHW Roles Study

Thank you for your interest in participating in the Community Health Worker (CHW) Roles study. The goals of this study are to:

- Describe the roles of CHWs, and
- Investigate how these CHW roles can be applied to other programs and agencies to improve community engagement and public participation in projects that affect public health.

You are eligible to be part of this study if you are or were a contract or staff CHW with the King County CHW Asthma Program, or if you are otherwise a community health worker who interacts with community members. All identifiable information, including names and community-based organizations, will be removed from any reports to Public Health - Seattle & King County.

1. Are you staff at Public Health - Seattle & King County?
 - a. Yes → Benefits and Risks version A
 - b. No → Benefits and Risks version B
 - c. I don't know → Benefits and Risks version A

Survey p. 2

Benefits and Risks (version A = PHSKC staff)

You may decline to answer any questions or choose to end your participation in the study at any time. If you choose to participate, you will:

- Fill out a 10-minute survey about yourself and your experience as a CHW, and
- Participate in a 60-minute phone or Zoom interview during which we ask you more questions about your role as a CHW and consider how they can be applied to other programs.

If you are staff at Public Health - Seattle & King County, you will be asked to complete these activities during work time.

Some benefits to this study include:

- You will contribute to scientific research about how agencies and programs can better connect with clients about public health.

Some risks and inconveniences to participation this study include:

- You will be asked to take some time to fill out the survey and participate in the interview.
- While the study team will follow protocols to ensure confidentiality and anonymity, it is possible that a data breach will result in your personal information being released.

Benefits and Risks (version B = not PHSKC staff)

You may decline to answer any questions or choose to end your participation in the study at any time. If you choose to participate, you will:

- Fill out a 10-minute survey about yourself and your experience as a CHW, and
- Participate in a 60-minute phone or Zoom interview during which we ask you more questions about your role as a CHW and consider how they can be applied to other programs.

Some benefits to this study include:

- If you complete both the survey and interview, you will be provided with a \$20 gift card as compensation for your participation. PHSKC staff will not receive this \$20 compensation and will be asked to participate during work hours.
- You will contribute to scientific research about how agencies and programs can better connect with clients about public health.

Some risks and inconveniences to participation this study include:

- You will be asked to take some time to fill out the survey and participate in the interview.
- While the study team will follow protocols to ensure confidentiality and anonymity, it is possible that a data breach will result in your personal information being released.

2. Did you read the information above and understand the benefits and risks to participation in this study?
3. Do you agree to participate in a survey and interview?

If you selected "Yes" for both questions, you will be taken to the survey when you click "Next Page."

Survey stop text

IF participant says no to either question on page 1, it triggers the Survey Stop Action:

Thank you for your interest in the CHW Roles Study. You indicated that:

- You did not read and understand the study, or
- You do not agree to participate.

If you want to start over, follow this link: https://redcap.link/chw_roles.

If you would like to learn more about the study before agreeing to participate, please contact Pam at ***@uw.edu.

Survey p. 3

Survey

To help us prepare for the interview, please fill out the following survey. It will take up to 10 minutes to complete.

1. What is your name?
2. What is your email address?
3. What is your phone number?
4. Do you prefer to be contacted through your email address or phone number?
5. Are you a community health worker?
6. Which community-based organization do you work for?
 - a. African Community Housing and Development
 - b. Cultivate South Park
 - c. Lutheran Community Services NW
 - d. Public Health – Seattle & King County
 - e. Villa Comunitaria
 - f. Other: ____

7. In your role as a CHW, which topics do you address? Select all that apply.
- a. Navigating the healthcare system
 - b. Mental health
 - c. Housing
 - d. Transportation access
 - e. Asthma
 - f. Immigration and refugee resettlement
 - g. Education
 - h. Employment
 - i. Job skills training
 - j. Food security
 - k. Nutrition
 - l. Access to utilities (e.g., water, electricity, gas)
 - m. Environmental or ecological health
 - n. Climate change
 - o. Air pollution
 - p. Land use
 - q. Physical activity and exercise
 - r. Youth
 - s. Elders and aging
 - t. Domestic violence
 - u. Economic development
 - v. Other: _____
8. How long have you worked as a community health worker?
- a. Less than 1 year
 - b. 1 to 3 years
 - c. 4 to 6 years
 - d. 7 to 10 years
 - e. More than 10 years
 - f. I don't know
 - g. Prefer not to answer
9. For the King County CHW Asthma Program, how many families have you conducted virtual or in-person home visits with?
- a. Fewer than 5 families
 - b. 5 to 10 families
 - c. 11 to 20 families
 - d. 21 to 50 families
 - e. More than 50 families
 - f. I don't know
 - g. Prefer not to answer
10. For the AAA Research Study, how many families have you conducted in-person home visits with?
- a. Fewer than 2 families
 - b. 3 to 5 families

- c. 6 to 10 families
 - d. More than 10 families
 - e. I don't know
 - f. Prefer not to answer
11. How important do you feel CHWs are to the success of the PHSKC Asthma Education Program?
- a. Likert: not important – somewhat important – important – very important – extremely important
12. How important do you feel CHWs are to the success of the AAA Research Study?
- a. Likert: not important – somewhat important – important – very important – extremely important

Survey completion text

Thank you for taking this survey. Please use this link to schedule an interview: [LINK]. If none of the available times work for you, please contact Pam at ***@uw.edu or XXX-XXX-XXXX. Thank you!

Confirmation email

Subject: CHW Roles Study

Hello [first_name],

Thank you for your interest in participating in the CHW Roles Study! If you have not yet done so, please sign up for an interview time using this link: [LINK]. You can also contact Pam at ***@uw.edu or XXX-XXX-XXXX to schedule an interview.

As a reminder, if you choose to continue your participation, you will participate in a 60-minute phone or Zoom interview during which we ask you more questions about your role as a CHW and consider how they can be applied to other programs.

Some benefits to this study include:

- If you complete both the survey and interview, you will be provided with a \$20 gift card as compensation for your participation. PHSKC staff will be asked to complete the survey and interview during work time instead of receiving the \$20 compensation.
- You will contribute to scientific research about how agencies and programs can better connect with clients about public health.

Some risks and inconveniences to participation this study include:

- You will be asked to take some time to fill out the survey and participate in the interview.
- While the study team will follow protocols to ensure confidentiality and anonymity, it is possible that a data breach will result in your personal information being released.

Thank you!

Appendix C: Semi-Structured Interview Guide

Introduction = 5 mins

Script

Hello, my name is Pamela Lim, and I am a graduate student at the University of Washington studying Public Health and Urban Planning. Thank you for taking the time to speak with me today.

This interview is part of a study exploring the role of community health workers in asthma education and broader public health programs. I am specifically interested in learning about your experiences with the King County CHW Asthma Program and the AAA research study. My goal for these interviews is to gain insights and help inform future programs that can benefit from a similar community health worker model.

This interview will take up to 60 minutes. It is completely voluntary and you may stop at any time, and we can skip any questions you don't want to answer. With your permission, the interview will be recorded, transcribed, and summarized to ensure accuracy. All data will remain confidential and securely stored, and I will remove personally identifiable information from this interview. We will share the study findings with you, and your identity will not be included in the report.

As a reminder of the potential risks to participating in this study: while we will follow protocols to ensure confidentiality and anonymity, it is possible that a data breach will result in your personal information being released.

If you have any questions or concerns, you can contact my supervisor Dr. Elena Austin at XXX-XXX-XXXX.

Questions

- Do you have any questions for me before we start?
- Do you agree to start the interview and the recording?

Interview Questions

A: You and your community-based organization (CBO) = 10 mins

Goals:

- Ease into the conversation
- Learn about the areas of work the CHW and their CBO engage in

#	Question + Follow-up(s)	Potential responses
1	Can you tell me about [your organization]? What work do they do? • What work do you do and what communities do you serve? • What is your role at your organization? • How does your CBO's work relate to asthma?	• They work as a CHW at their CBO • They have a different role/title

#	Question + Follow-up(s)	Potential responses
2	Tell me about the work you do as a community health worker. This can be your work in the Asthma Program and the AAA Study or in other topics. • Please describe your interactions with clients. For example, do you speak on the phone, or visit them at home? • How do you build trust with clients? For example, do you provide resources such as education, medical care, and food security?	
3	What are some challenges you face in your work as a community health worker?	• Limited capacity (time, staffing) • Limited funding/resources • Burnout • Establishing trust • Building partnerships
4	What opportunities or resources have helped you succeed as a community health worker?	• Training • Career development courses • Networking

B: CHW roles = 15 mins

Goals:

- Learn how CHWs address community and lifestyle health
- Draw parallels (or identify differences) between the interviewee's experiences with the C3 CHW roles

#	Question + Follow-up(s)	Potential responses
1	How do you support your individual clients' health as a community health worker? • Do you provide culturally appropriate or culturally specific care? If so, how? Can you share some examples? • Do you provide cultural mediation? Cultural mediation means bridging cultural differences between clients and others (health providers, social service organizations, etc.) • Do you help clients navigate the healthcare system? If so, how? • What kind of outreach do you do? Focus: "lifestyle" sphere	• Translation and interpretation • Connecting to services • Communicating with providers/systems
2	How do you support the community as a community health worker, beyond your work with individual clients? • Do you provide any training or education to your community? Focus: "community" sphere	• Training/education • Facilitating community conversations • Hosting community events • Providing services
3	With the training you received from King County and the AAA team, how comfortable or confident are you in speaking to clients about asthma and air quality?	

C: Public participation, planning, and community health = 25 mins

Goals:

- Learn if and how CHWs engage in policy work
- Find out if the interviewee seems open to working in other built environment topics. If so: which, why, and under what circumstances?
- Learn if and how CHWs address the activities their clients/community members do, their local economy, and their community's built environment

#	Question + Follow-up(s)	Potential responses
1	Besides asthma, what other environmental health issues do you think could be addressed by community health workers? <i>Environmental health considers our surroundings and how they affect our wellbeing.</i>	• Water quality • Soil quality • Communicable diseases (e.g., COVID, bird flu) • Food access • Transportation access • Exposure to chemicals and toxins • Occupational health • Access to green spaces and recreation • Access to childcare • Access to physical activity • Housing access • Climate mitigations (e.g., weatherization)
2	How is your community or CBO involved in local decision-making, advocacy, or engagement with local agencies? <i>For example for [specific topic, e.g. transportation, green space]:</i> • <i>Working with [agency, e.g. SDOT] to identify community priorities</i> • <i>Working with [agency] to design services that meet the needs of your community (e.g., culturally competent services)</i> • <i>Advocating for resources such as... [protected crosswalks, bike lanes]</i> • Do you personally support this work? If so, how? • How does the information flow? For example, is it bottom-up from the community, or top-down from an agency or your CBO director? • In your role, do you have the opportunity to amplify community voices?	• Training/education • Facilitating community conversations • Hosting community events • Providing services
3	Do you hear any concerns about the built environment from your clients or from the community? These include topics such as housing, transportation, noise, walkability, and green space. • What do you hear and how do you receive this information? • What do you do with this information? • In your role, do you have the opportunity to amplify community voices? Focus: "built environment" sphere	

#	Question + Follow-up(s)	Potential responses
4	Do you see any of these topics connecting to asthma or other health concerns you address as a CHW? • Would you feel comfortable working on these issues similarly to how you are working on asthma? What support would you need to do so? • How do you think CHWs can help clients improve or maintain their health in relation to these issues?	

Wrap-up = 5 mins

Thank you for sharing your thoughts and experiences with me today.

- Is there anything else you think is important for me to know about your role as a CHW?
- Do you have any questions for me?

After this study, I would like to share my findings with you.

- Would you like to receive this report?
- Would you like to provide feedback? We can share the report with you even if you do not provide feedback.

Appendix D: Codebook

Type	ID	Parent	Depth	Title	Description	Appli- cations	Related Themes
deductive	1		0	advocacy	CHWs engaging in advocacy	23	
inductive	2	1	1	advocacy_individual	CHW advocating for individuals or families	9	4
inductive	3	1	1	advocacy_policy	engagement in changing policies	15	11
inductive	4		0	all_connected	discussion on whether asthma, environmental health, public health, etc. are all connected	10	4, 13
inductive	5		0	asthma_comfort	their comfort in speaking about asthma and air quality	5	14
deductive	6		0	cbo_scope	the scope of work of their CBO	72	10
deductive	7	6	1	cbo_communities	the communities served by the CHW and/or their CBO	19	1, 10
inductive	8	6	1	cbo_grant_funding	programming influenced by grants	8	10
inductive	9	6	1	cbo_partnerships	partnerships with other agencies or organizations	31	10
inductive	10	6	1	cbo_personal_role	the role of the CHW in their CBO	12	4, 10, 12
deductive	11	6	1	cbo_services	services provided by the CBO	23	4, 10
deductive	12		0	challenges	challenges as a CHW	41	7
deductive	13	12	1	challenges_burnout	challenges as a CHW: burnout	0	7
deductive	14	12	1	challenges_capacity	challenges as a CHW: limited capacity	7	7
inductive	15	12	1	challenges_cultural	challenges as a CHW: cultural differences with clients	3	7
deductive	16	12	1	challenges_fundingresources	challenges as a CHW: limited funding and/or resources available	15	7
inductive	17	12	1	challenges_logistical	challenges as a CHW: logistics (scheduling, driving, etc.)	15	7
deductive	18	12	1	challenges_partnerships	challenges as a CHW: partnerships with organizations	2	7
inductive	19	12	1	challenges_safety	challenges as a CHW: safety	2	7
deductive	20	12	1	challenges_trust	challenges as a CHW: building trust with clients	1	7
inductive	21		0	chw_work	the chw's asthma work	22	
inductive	22	21	1	work_notasthma	how the CHW supports the client with things besides asthma	8	2, 4

Type	ID	Parent	Depth	Title	Description	Appli- cations	Related Themes
inductive	23	21	1	work_rewarding	interviewee shares that their work is rewarding	3	7
inductive	24	21	1	work_trainingneed	need for more training to do environmental health work	13	13, 14
inductive	25		0	client_needs	needs of the client	29	
inductive	26	25	1	needs_economic	economic challenges that people or the community face(s)	26	2
inductive	27	25	1	needs_medical	medical needs of the client besides asthma	5	2
deductive	28		0	client_support	ways they support clients now	83	4
deductive	29	28	1	support_education	ways they provide training or education to the client	30	4
inductive	30	28	1	support_jargon	need to simplify or explain medical jargon	11	4, 6
inductive	31	28	1	support_medical	ways they provide the client with medical advice	3	4
deductive	32	28	1	support_navigation	ways they guide clients through the healthcare system	29	4
inductive	33	28	1	support_referrals	referring the client to another program or agency	26	4
inductive	34	28	1	support_supplies	providing the client with supplies and materials that help with asthma control	15	4
deductive	35		0	client_support_ideas	ways they think they can support clients	4	13
deductive	36		0	client_trust	ways the CHW builds and maintains trust with clients	68	5
inductive	37	36	1	trust_cbo	client trust related to their familiarity with the CBO	4	5, 10
inductive	38	36	1	trust_consent	building trust by establishing client consent and autonomy	13	5
inductive	39	36	1	trust_culture	building trust based on a shared culture	13	5
inductive	40	36	1	trust_respect	respecting the client	45	5
inductive	41	36	1	trust_support	building trust by providing support and resources	11	5
inductive	42		0	communication	how the CHW communicates with their clients	27	
inductive	43	42	1	communication_outreach	how the CHW conducts outreach to get clients for the asthma program or AAA study	7	1, 4

Type	ID	Parent	Depth	Title	Description	Applications	Related Themes
deductive	44	42	1	virtual_inperson	virtual vs. in-person communication with clients	21	8, 10
inductive	45		0	community_facing	community-facing work that the CHW/CBO does	15	
inductive	46	45	1	comm_discussion	facilitating discussions for community	5	11
inductive	47	45	1	comm_education	ways they provide training or education to the community	4	12
inductive	48	45	1	comm_events	hosting events for community	6	12
deductive	49		0	cultural_care	ways they provide culturally appropriate support for clients	20	1, 5
deductive	50		0	envhealth_issues	environmental health issues	74	2, 3
deductive	51	50	1	envhealth_childcare	other environmental health issues: childcare access	0	2, 3
inductive	52	50	1	envhealth_climate	other environmental health issues: climate mitigations	2	2, 3
deductive	53	50	1	envhealth_commdisease	other environmental health issues: communicable diseases, e.g., covid	1	2, 3
deductive	54	50	1	envhealth_exposure	other environmental health issues: exposures to toxins or chemicals	0	2, 3
deductive	55	50	1	envhealth_food	other environmental health issues: food access	8	2, 3
deductive	56	50	1	envhealth Greenspace	other environmental health issues: green spaces, recreation, physical activity	9	2, 3
deductive	57	50	1	envhealth_housing_access	other environmental health issues: housing access	17	2, 3
deductive	58	50	1	envhealth_housing_quality	other environmental health issues: housing quality	13	2, 3
deductive	59	50	1	envhealth_occupation	other environmental health issues: occupational health	0	2, 3
deductive	60	50	1	envhealth_soil	other environmental health issues: soil quality	2	2, 3
deductive	61	50	1	envhealth_transportation	other environmental health issues: transportation access	20	2, 3
deductive	62	50	1	envhealth_water	other environmental health issues: water quality	2	2
inductive	63		0	interpretation	providing interpretation for clients	21	6
inductive	64	63	1	interpretation_CBO	CBO (not CHW) providing language interpretation for clients	6	6

Type	ID	Parent	Depth	Title	Description	Applications	Related Themes
deductive	65	63	1	interpretation_CHW	CHW providing language interpretation for clients	9	6
inductive	66	63	1	interpretation_service	use of an interpretation service	6	6
deductive	67		0	local_economy	ways they support the local economy	11	12
inductive	68	67	1	econ_comm_support	supporting the local economy through community events	7	12
inductive	69	67	1	econ_indiv_support	supporting the local economy by supporting individuals	4	12
inductive	70		0	mentalhealth	mental health	20	
inductive	71	70	1	mentalhealth_chw	need for mental health support for CHWs	6	15
inductive	72	70	1	mentalhealth_client	need for mental health support for clients	13	2, 15
inductive	73	70	1	mentalhealth_stigma	stigma surrounding mental health	1	2
inductive	74	70	1	mentalhealth_therapy	accessing therapy or counseling for mental health	2	2, 15
deductive	75		0	resources	resources for CHWs	46	9, 14
inductive	76	75	1	resources_background	background knowledge or past experiences of the CHW	7	9, 14
inductive	77	75	1	resources_meetings	check-in meetings with PH-SKC team, UW, doctor	4	9, 14
deductive	78	75	1	resources_networking	resources for CHW: networking	18	9, 14
inductive	79	75	1	resources_phskc	resources for CHW: support from the PHSKC asthma team	15	9, 14
inductive	80	75	1	resources_selfstudy	CHW studying on their own to learn more about asthma	6	9, 14
deductive	81	75	1	resources_training	resources for CHW: trainings	13	9, 14

References

1. Arnstein SR. A Ladder of Citizen Participation. *Journal of the American Planning Association*. 2019;85(1):24-34. doi:10.1080/01944363.2018.1559388
2. IAP2. Spectrum of Public Participation. Published online 2018. https://www.iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf
3. Hoffman J. Toward Civic Co-production: Using Worldbuilding to Go Beyond Participation in Urban Planning and Enact More Equitable Cities. *Front Sustain Cities*. 2022;4:907541. doi:10.3389/frsc.2022.907541
4. Capotescu C, Chodon T. Community Health Workers' Critical Role in Trust Building Between the Medical System and Communities of Color. *Am J Manag Care*. 2022;28(10):497-499. doi:10.37765/ajmc.2022.89247
5. CDC. About Asthma. Asthma. February 18, 2025. Accessed February 26, 2025. <https://www.cdc.gov/asthma/about/index.html>
6. CDC. Most Recent Asthma Data. Asthma Data. November 21, 2024. Accessed February 26, 2025. <https://www.cdc.gov/asthma-data/about/most-recent-asthma-data.html>
7. CDC. Asthma as the Underlying Cause of Death. May 8, 2024. Accessed February 27, 2025. https://www.cdc.gov/asthma/asthma_stats/asthma-deaths_2001-2021.html
8. CDC. Asthma-related Healthcare Use. May 8, 2024. Accessed March 14, 2025. <https://www.cdc.gov/asthma/national-surveillance-data/healthcare-use.htm>
9. Ilmarinen P, Juboori H, Tuomisto LE, Niemelä O, Sintonen H, Kankaanranta H. Effect of asthma control on general health-related quality of life in patients diagnosed with adult-onset asthma. *Sci Rep*. 2019;9(1):16107. doi:10.1038/s41598-019-52361-9
10. Sullivan PW, Ghushchyan V, Navaratnam P, et al. The national burden of poorly controlled asthma, school absence and parental work loss among school-aged children in the United States. *Journal of Asthma*. 2018;55(6):659-667. doi:10.1080/02770903.2017.1350972
11. Glazebrook C, McPherson AC, Macdonald IA, et al. Asthma as a Barrier to Children's Physical Activity: Implications for Body Mass Index and Mental Health. *Pediatrics*. 2006;118(6):2443-2449. doi:10.1542/peds.2006-1846
12. Gehring U, Wijga AH, Hoek G, et al. Exposure to air pollution and development of asthma and rhinoconjunctivitis throughout childhood and adolescence: a population-based birth cohort study. *The Lancet Respiratory Medicine*. 2015;3(12):933-942. doi:10.1016/S2213-2600(15)00426-9

13. Bowatte G, Lodge C, Lowe AJ, et al. The influence of childhood traffic-related air pollution exposure on asthma, allergy and sensitization: a systematic review and a meta-analysis of birth cohort studies. *Allergy*. 2015;70(3):245-256. doi:10.1111/all.12561
14. Yu Z, Koppelman GH, Boer JMA, et al. Ambient ultrafine particles and asthma onset until age 20: The PIAMA birth cohort. *Environmental Research*. 2022;214:113770. doi:10.1016/j.envres.2022.113770
15. Wright RJ, Hsu HHL, Chiu YHM, et al. Prenatal Ambient Ultrafine Particle Exposure and Childhood Asthma in the Northeastern United States. *Am J Respir Crit Care Med*. 2021;204(7):788-796. doi:10.1164/rccm.202010-3743OC
16. Weichenthal S, Bai L, Hatzopoulou M, et al. Long-term exposure to ambient ultrafine particles and respiratory disease incidence in Toronto, Canada: a cohort study. *Environ Health*. 2017;16(1):64. doi:10.1186/s12940-017-0276-7
17. Guarnieri M, Balme JR. Outdoor air pollution and asthma. *The Lancet*. 2014;383(9928):1581-1592. doi:10.1016/S0140-6736(14)60617-6
18. Esposito S, Tenconi R, Lelii M, et al. Possible molecular mechanisms linking air pollution and asthma in children. *BMC Pulm Med*. 2014;14(1):31. doi:10.1186/1471-2466-14-31
19. Paciência I, Cavaleiro Rufo J, Moreira A. Environmental inequality: Air pollution and asthma in children. *Pediatric Allergy Immunology*. 2022;33(6):pai.13818. doi:10.1111/pai.13818
20. Austin E, Xiang J, Gould TR, et al. Distinct Ultrafine Particle Profiles Associated with Aircraft and Roadway Traffic. *Environ Sci Technol*. 2021;55(5):2847-2858. doi:10.1021/acs.est.0c05933
21. Schraufnagel DE. The health effects of ultrafine particles. *Exp Mol Med*. 2020;52(3):311-317. doi:10.1038/s12276-020-0403-3
22. Lenssen ES, Janssen NAH, Oldenwening M, et al. Beyond the Runway: Respiratory health effects of ultrafine particles from aviation in children. *Environment International*. 2024;188:108759. doi:10.1016/j.envint.2024.108759
23. US EPA O. Indoor Air Quality. November 2, 2017. Accessed March 18, 2025. <https://www.epa.gov/report-environment/indoor-air-quality>
24. Maung TZ, Bishop JE, Holt E, Turner AM, Pfrang C. Indoor Air Pollution and the Health of Vulnerable Groups: A Systematic Review Focused on Particulate Matter (PM), Volatile Organic Compounds (VOCs) and Their Effects on Children and People with Pre-Existing Lung Disease. *IJERPH*. 2022;19(14):8752. doi:10.3390/ijerph19148752

25. Sheehan WJ, Phipatanakul W. Indoor allergen exposure and asthma outcomes. *Current Opinion in Pediatrics*. 2016;28(6):772-777. doi:10.1097/MOP.0000000000000421
26. Tessum CW, Paoletta DA, Chambliss SE, Apte JS, Hill JD, Marshall JD. PM_{2.5} pollutants disproportionately and systemically affect people of color in the United States. *Sci Adv*. 2021;7(18):eabf4491. doi:10.1126/sciadv.abf4491
27. Rowangould GM. A census of the US near-roadway population: Public health and environmental justice considerations. *Transportation Research Part D: Transport and Environment*. 2013;25:59-67. doi:10.1016/j.trd.2013.08.003
28. Ferguson L, Taylor J, Davies M, Shrubsole C, Symonds P, Dimitroulopoulou S. Exposure to indoor air pollution across socio-economic groups in high-income countries: A scoping review of the literature and a modelling methodology. *Environment International*. 2020;143:105748. doi:10.1016/j.envint.2020.105748
29. Woo B, Kravitz-Wirtz N, Sass V, Crowder K, Teixeira S, Takeuchi DT. Residential Segregation and Racial/Ethnic Disparities in Ambient Air Pollution. *Race Soc Probl*. 2019;11(1):60-67. doi:10.1007/s12552-018-9254-0
30. Plotkin W. “Hemmed in”: The Struggle against Racial Restrictive Covenants and Deed Restrictions in Post-WWII Chicago. *Journal of the Illinois State Historical Society*. 2001;94(1):39-69.
31. Turner MA, Greene S. *Causes and Consequences of Separate and Unequal Neighborhoods*. Urban Institute; 2022. Accessed March 18, 2025. <https://www.urban.org/racial-equity-analytics-lab/structural-racism-explainer-collection/causes-and-consequences-separate-and-unequal-neighborhoods>
32. King County. Consolidated Demographics Index for King County Census Tracts / demographic index area. Published online March 2, 2018. Accessed March 18, 2025. https://gis-kingcounty.opendata.arcgis.com/datasets/e23a07e847a7440dabac76ede52b521d_2687/explore?location=47.435087,-121.571033,10.00
33. Johnson K, Solet D, Serry K. *Community Health and Airport Operations Related Noise and Air Pollution: Report to the Legislature in Response to Washington State HOUSE BILL 1109*. Public Health Seattle & King County; Assessment, Policy Development and Evaluation Unit; 2020.
34. Min E, Piazza M, Galaviz VE, et al. Quantifying the Distribution of Environmental Health Threats and Hazards in Washington State Using a Cumulative Environmental Inequality Index. *Environmental Justice*. 2021;14(4):298-314. doi:10.1089/env.2021.0021

35. King County. Asthma data dashboards - King County, Washington. Accessed March 18, 2025. <https://www.kingcounty.gov/en/dept/dph/about-king-county/about-public-health/data-reports/climate/asthma>
36. King County. Community Health Worker Asthma Program. Accessed March 18, 2025. <https://www.kingcounty.gov/en/dept/dph/health-safety/health-centers-programs-services/community-health-workers>
37. Ebrahimifakhar A, Poursadegh M, Hu Y, Yuill DP, Luo Y. A systematic review and meta-analysis of field studies of portable air cleaners: Performance, user behavior, and by-product emissions. *Science of The Total Environment*. 2024;912:168786. doi:10.1016/j.scitotenv.2023.168786
38. James C, Bernstein DI, Cox J, et al. HEPA filtration improves asthma control in children exposed to traffic-related airborne particles. *Indoor Air*. 2020;30(2):235-243. doi:10.1111/ina.12625
39. Lee GH, Kim JH, Kim S, Lee S, Lim DH. Effects of Indoor Air Purifiers on Children with Asthma. *Yonsei Med J*. 2020;61(4):310. doi:10.3349/ymj.2020.61.4.310
40. Krieger J, Song L, Philby M. Community Health Worker Home Visits for Adults With Uncontrolled Asthma: The HomeBASE Trial Randomized Clinical Trial. *JAMA Intern Med*. 2015;175(1):109. doi:10.1001/jamainternmed.2014.6353
41. Loftus C, Lim P, Shirai JH, Tchong French MI, Capps J, Austin E. The Airport, Air Quality and Asthma (AAA) Indoor Air Intervention Trial for Children with Asthma: Protocol for a Community Based Study in South King County, Washington. 2025 (in preparation)
42. Schatz M, Sorkness CA, Li JT, et al. Asthma Control Test: Reliability, validity, and responsiveness in patients not previously followed by asthma specialists. *Journal of Allergy and Clinical Immunology*. 2006;117(3):549-556. doi:10.1016/j.jaci.2006.01.011
43. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*. 2009;42(2):377-381. doi:10.1016/j.jbi.2008.08.010
44. Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics*. 2019;95:103208. doi:10.1016/j.jbi.2019.103208
45. Radack T, Meade M, Woods B. Techniques for Improving Electronic Survey Response Rate. *Clinical Spine Surgery: A Spine Publication*. Published online October 30, 2023. doi:10.1097/BSD.0000000000001548

46. Freels L, Herman A, Lukas S, et al. Asthma control and associated risk factors among adults with current asthma: Findings from 2019 behavioral risk factor surveillance system asthma call-back survey. *Respiratory Medicine*. 2024;221:107479. doi:10.1016/j.rmed.2023.107479
47. Manning B, Fagan M, Kruse J, et al. Respondent Characteristics by Survey Modality in a Pragmatic Trial of Black and Latinx Adults with Asthma. In: *Survey Research or Cross-Sectional Study*. American Academy of Family Physicians; 2023:3963. doi:10.1370/afm.21.s1.3963
48. National C3 Council. C3 Competencies Checklist. Published online 2019. Accessed April 30, 2025. <https://www.c3council.org/resources?pgid=m0ufzxlh-f1ace223-1684-4a9d-b08c-bf4ddb4a7e>
49. Barton H, Grant M, Guise R. *Shaping Neighbourhoods: For Local Health and Global Sustainability*. Third Edition. Routledge; 2021.
50. APHA. Community Health Workers. American Public Health Association. Accessed April 30, 2025. <https://www.apha.org/apha-communities/member-sections/community-health-workers>
51. Library of Congress. Adam Smith. Accessed May 31, 2025. <https://www.congress.gov/member/adam-smith/S000510>
52. *Healthy Environment for All Act*. Vol RCW 70A.02.; 2021. Accessed May 31, 2025. <https://app.leg.wa.gov/RCW/default.aspx?cite=70A.02>
53. Patschke M, Diaz D, Wedekind N, Gruen D. *2024 Frontline Report on HEAL Progress*. Front and Centered; 2024.