Evaluation of a community-engaged approach to assess climate and disaster risk perception and priorities

Samantha Lovell

A thesis submitted in partial fulfillment of the
requirements for the degree of:

Master of Public Health

University of Washington
2023

Committee:

Nicole Errett, Chair
Ann Bostrom
Jamie Vickery

Program Authorized to Offer Degree:

Environmental and Occupational Health Sciences, School of Public Health

Abstract

Evaluation of a community-engaged approach to assess climate and disaster risk perception and priorities

Sam Lovell

Chair of Supervisory Committee: Nicole Errett
Department of Environmental and Occupational Health Sciences

As the Duwamish Valley community in Seattle, Washington and other environmental justice communities nationally contend with growing risks from climate change, there have been calls for a more community-centered approach to understanding impacts and priorities to inform resilience planning. To address this gap, a partnership of professionals and researchers from the University of Washington, the City of Seattle, Public Health Seattle & King County, the Washington State Department of Health, and the Duwamish River Community Coalition co-produced a survey instrument, and collected data from the community using an adapted approach based on the “Community Assessment for Public Health Emergency Response” (CASPER) method to engage community members and identify climate and resilience priorities as part of a pilot project titled the, “Seattle Assessment for Public Health Emergency Response,” (SASPER). This current research evaluates the process and outcomes of the SASPER to identify lessons learned for future assessments in Seattle and in communities across the country to inform efforts for inclusive community engagement in climate resilience. Drawing on tenets of culturally responsive evaluation, this evaluation uses a mixed-methods approach, combining quantitative survey data collected from youth and adult volunteers with qualitative information from in-depth key informant interviews with project team members. Data from the feedback surveys were summarized to identify the level of agreement volunteers had with various statements. Key informant interviews were recorded, professionally transcribed, coded, and thematically analyzed using the framework method for qualitative research. Volunteers provided positive feedback on the SASPER experience, with over 85% agreeing or strongly agreeing that they learned new skills, they were prepared for the surveying, and that they would participate in future assessments. The key informant interviews underscored that, while the SASPER may have demonstrated feasibility in a pre-disaster phase, the method may not be appropriate to use post-disaster or in meeting the needs and priorities of partners due to its lack of focus on equity and other logistical limitations. Future research should focus on identifying survey strategies that provide the rigor, reliability, and validity of the CASPER method while enabling a focus on equity in a less resource-intensive manner.

Background

Study Context and Overview

Seattle's Duwamish Valley (DV) is on the front lines of climate change. A designated environmental justice (EJ) community, the DV faces numerous environmental hazards that place community members at risk, including a Superfund Site and air pollution from roadways and industrial sources, and it is already experiencing climate impacts such as flooding [1]. Community-based organizations and leaders have worked for decades to reduce the large health disparities that exist within the DV compared to the rest of the city and to advance environmental and climate justice. As the DV and other EJ communities nationwide contend with growing climate risks, there have been calls for a more community-centered approach to understanding impacts and priorities to inform resilience planning. In response, the University of Washington (UW), Public Health–Seattle & King County, the Washington State Department of Health, City of Seattle, and the community-based organization the Duwamish River Community Coalition co-produced a novel, equity-centered approach to engage community members and collect information from DV households as part of a pilot project titled,"Seattle Assessment for Public Health Emergency Response," (SASPER). This current research evaluates the process and outcomes of the SASPER to identify lessons learned for future assessments in Seattle and in communities across the country to inform efforts for inclusive community engagement in climate resilience.

Climate Change Risk and Disproportionate Impacts

The Intergovernmental Panel on Climate Change (IPCC) defines risk as "the potential for adverse consequences for human or ecological systems," which, in the context of climate, "result[s] from dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards," [2]. The conceptualization of risk as a function of the interplay between a hazard, exposure, and vulnerability is broadly recognized by other authoritative bodies, though the ability or capacity to adapt is sometimes included as a separate key factor [3,4]. Vulnerability, defined as "the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a…hazard," is shaped by health, economic, social, and cultural factors [5]. The interaction between these factors results in substantial variation in the levels of climate and disaster risk and resulting impacts for different communities.

There is robust evidence indicating that marginalized communities, including low income populations and people of color, are disproportionately impacted by environmental risks in the US, such as air and water pollution, proximity to toxic waste sites, and more [6,7]. These environmental risks are magnified by climate change, resulting in increased air pollution, heat islands, and damage from extreme weather events that will fall more heavily on those who have been systemically disenfranchised [6,8]. As a result of their disenfranchisement, communities of color and low-income communities also have diminished capacity to prepare for, respond to, and recover from hazards and impacts, and face disproportionate losses from disasters and other hazards [6,9]. For example, an analysis of community impacts in Houston following the successive disasters of Hurricane Harvey followed by Winter Storm Uri during the COVID-19

pandemic found that predominantly African American communities faced higher levels of flooding and COVID-19 burden than other communities [10]. Furthermore, some policies designed to address disaster risk disproportionately benefit white individuals, resulting in racial inequities and fewer benefits for individuals with higher social vulnerability [11].

Resilience

There are many definitions of resilience, and interpretations often differ based on discipline, with the traditional focus being on infrastructure and the environment [12]. Increasingly, practitioners and academics have advanced the concept of community resilience, particularly with regard to climate change as it is critical to develop adaptation and mitigation strategies at the community level [12,13]. In the literature, resilience is frequently defined in terms of the capacity of a system to deal with change [14,15]. This often includes an acknowledgement of the importance of social connections and capacities, and, less frequently, other resources such as information and data [16,17,18]. Other studies have emphasized how efforts to build resilience must not only focus on promoting recovery, but also transformation and adaptation [15,19]. Resilience thus must be considered in any approach to address public health needs in a disaster, particularly in the context of a changing climate, and to strengthen communities more broadly [12,13].

Community engagement in climate, disaster, and resilience research and practice

Communities that are most impacted by climate change often are not included in efforts to plan, understand, and develop strategies to build resilience to climate risks [9, 20]. While there is a broad acknowledgement that public support is needed to advance climate adaptation strategies, engagement is often lacking [21].

Climate-related priorities can differ based on community attributes and experience. For example, Kreslake used a survey approach to understand climate-related policy priorities in three climate-vulnerable communities and found that residents of different income levels and races/ethnicities had different perceptions of which types of local mitigation and adaptation measures were most important [22]. As such, intentional, equitable, and community-centered approaches to climate resilience are necessary for both contextualizing and actualizing resilience plans [9]. The deliberate engagement of communities into climate planning has resulted in stronger programmatic and policy design in which local stakeholders are more invested in and trusting of the planning and policy design process [23]. In the climate and energy spaces specifically, research has examined different levels and understandings of participation to assess appropriateness of the policies. For example, Radtke (2014 and et al. 2018) describe how bottom-up initiatives in the energy sector result in more engaged and committed community participants as compared to initiatives that are driven top-down [24,25].

Importantly, there are many types of community engagement, with different levels of depth and ownership provided to community stakeholders. In assessing degrees of public participation in US policy planning processes, Arnstein posited eight levels of community participation, starting with manipulation, which is non-participatory, and ending at true citizen control of the process [26]. “Arnstein’s ladder of citizen participation,” is intended as a guide for understanding the

distribution of power in decision-making and engagement processes. Within the top “citizen control” rungs of the ladder is partnership, in which there is power-sharing and joint decision-making between community members and power holders [26].

Participatory, community-centered research can help demonstrate the disproportionate impacts of climate change on vulnerable populations [6, 27]. The benefits of community engagement through community-based participatory research (CBPR) has long been recognized in the academic space [28,29]. Further, the coproduction of climate knowledge to inform research and practice objectives is increasingly being recognized as an effective, though under-studied, method for stakeholder engagement and collection of climate information [30]. Coproduction is “the process of producing usable, or actionable, science through collaboration between scientists and those who use science to make policy and management decisions,” [30]. Key to this process is the development and maintenance of strong, trusting relationships between researchers and stakeholders involved, whether they are policy-makers or community leaders [31]. Recent studies have demonstrated that integrating communities in research to identify and assess climate health impacts makes the process more equitable and the output more relevant to communities [32].

However, there is currently limited understanding about how specific community-engaged approaches can concurrently foster community engagement around climate resilience planning while advancing research on climate health impacts.

Setting: Seattle’s Duwamish Valley

Washington State, USA is already experiencing the impacts of climate change, with cascading consequences to human health and wellbeing. Key climate-related hazards facing the state include heat waves, floods, landslides, coastal erosion and wildfires [27, 33]. The state has seen increasing temperatures, with three of the top ten highest average temperature years since 1895 all happening within the last seven years (2015-2022) [34]. Flooding is a substantial risk for the City of Seattle, and the Duwamish Valley could see more than six inches of sea level rise by 2050 and nearly two and a half feet by 2100 using different forecasts [27].

The Duwamish Valley neighborhoods of South Park and Georgetown have a combined population of approximately 5,600 and are among the most racially and ethnically diverse and lowest income neighborhoods in the city. Nearly one quarter of residents in the area are uninsured compared to 13% in the city, and 83% of residents in South Park and 66% in Georgetown are eligible for free or reduced lunches compared to 37% citywide [35].

The neighborhoods are mixed residential, industrial, and commercial land use, resulting in substantial environmental hazards. The DV is in close proximity to major transportation hubs including highways, the Port of Seattle, an airport and multiple flight paths; industrial sites; and the Lower Duwamish Waterway Superfund Site [36,37]. An analysis of environmental hazards in Washington found that census tracts in which there are high proportions of people of color and people living 185% below the Federal Poverty Line (FPL), such as Georgetown and South Park, experience disproportionately higher cumulative environmental risks compared to census tracts

with lower proportions of people of color and people living below the FPL [38]. Additionally, these communities experience fewer environmental benefits, including tree cover and access to healthy and culturally appropriate foods [35,37].

As a result of disproportionate environmental burdens and socioeconomic factors that increase health risks, there are significant health disparities in the DV. An analysis of cumulative health impacts faced by Washington communities identified South Seattle, where South Park and Georgetown are located, as one of eight highly impacted clusters in the state, reflecting both high levels of pollutant exposure and vulnerability [38,39]. This builds on past research on ten representative Seattle zip codes in which the zip code that includes South Park and Georgetown had the highest cumulative impact score [40]. Health disparities faced in these communities include higher rates of chronic illnesses, cardiovascular disease, asthma hospitalization, and worse outcomes for life expectancy and infant mortality compared to other Seattle areas [36]. For example, residents of Georgetown and South Park have a life expectancy that is 13 years shorter than residents in the predominantly white, affluent neighborhood of Laurelhurst [35,41].

Outside of the climate context, there is a need for increased preparedness in the area due to the risk presented by a Seattle Fault earthquake, which has the potential to be as high as magnitude 7.5 [33]. Areas in the DV are on soil vulnerable to ground failure during earthquakes. Additionally secondary hazards presented by such an earthquake include liquefaction, landslides, and fires. The anticipated adverse health impacts from climate and non-climate-related hazards are a result of a combination of social, environmental, and economic factors, in which communities of color and communities with lower incomes, such as those in the DV, will face the highest level of risk [27].

Community-engagement in environmental decision-making in Seattle

The City of Seattle has centered community voice and engagement in its efforts to advance environmental justice and build climate resilience. The City's Equity and Environment Agenda was co-created with the community and informed by multiple community engagement conversations to understand the priorities of residents [37]. The sessions found that many community members are concerned about the combination of environmental hazards facing them and suggested the need for community engagement to shape environmental policies.

The City has also begun development of the Duwamish Valley Resilience District (DVRD), a multistakeholder effort seeking to advance environmental justice and racial equity in climate adaptation efforts [42]. The DVRD will build off of the Duwamish Valley Action Plan (DVAP) and use principles identified in the City's Equity and Environment Agenda [37,35]. These initiatives were developed through city-community partnerships to advance environmental justice and collaboration. Through the process of developing the DVAP, community partners identified the following priority areas of focus: a healthy environment, parks and open spaces, community capacity, economic opportunity and jobs, mobility and transportation, affordable housing, and public safety [35].

Seattle Assessment for Public Health Emergency Response

Project Design and Goals

Complementing these efforts, the Seattle Assessment for Public Health Emergency Response (SASPER) project, which is the focus of this research, is a collaborative research effort between the UW, the City of Seattle, the Duwamish River Community Coalition (DRCC), the Washington State Department of Health and Public Health–Seattle & King County (PHSKC) that aims to co-create and pilot a climate adaptation and disaster response needs assessment tool responsive to and informed by the DV community's needs and priorities. The SASPER needs assessment approach was based on the CDC's Community Assessment for Public Health Emergency Response (CASPER) method, which is designed to gather household-level information about communities for emergency managers and public health officials through door-to-door surveying, described in detail below [43].

Co-production and community-centering were central elements and values embedded within the SASPER project design and implementation. UW researchers initiated discussion of the project idea using a deliberate process for creating the team and building the concept of the SASPER, with an understanding that the research must be conducted in service of the community. Importantly, the project builds on an existing relationship between the DRCC (the community partner organization) and the UW's Interdisciplinary Center for Exposures, Diseases, Genomics, and Environment (EDGE). To advance the collaborative process to shared decision-making, the team jointly developed a community partnership agreement outlining principles of shared respect, trust, and decision-making and commitment to invest in a community leadership approach to decision-making at the start of the project.

The SASPER aimed to assess household-level climate change and health impacts and priorities for resilience activities through a process that facilitates the empowerment of DV community members to engage in climate action planning with the ultimate goal of increasing disaster preparedness and climate resilience in the region. The results of the SASPER will serve different partner interests, including informing development of the City and community's preparedness and resilience building efforts, providing lessons learned for a Standard Operating Guidelines (SOG) document for future health agency climate and disaster-related assessment efforts, and providing insight into the feasibility and appropriateness of implementing an equity-centered and community-engaged needs assessment tool focused on climate and disaster hazards.

SASPER Survey Preparation and Implementation

The SASPER survey instrument was developed based on the knowledge of and needs expressed by DRCC, the City of Seattle Duwamish Valley Program, the Washington State Department of Health, and PHSKC, in addition to existing resources, such as validated demographic, disaster, and climate questions from CDC's CASPER toolkit and the National Institute of Environmental Health Sciences Disaster Research Response Resources Portal [43,44]. Different survey sections were developed among small teams with community, government, and academic representatives. The entire project team provided feedback on

individual sections, and approved the final survey tool. The survey was also reviewed by a CDC representative to ensure appropriateness for the CASPER method.

We used a collaborative process to recruit volunteers to conduct the door-to-door surveys, leveraging the strength of partner networks. Engagement of the Duwamish Valley Youth Corps (DVYC), a program of DRCC that provides advocacy, organizing, and EJ opportunities to youth in the DV, was central to the volunteer recruitment process. The project team viewed involvement of the youth as an important opportunity to build capacity among the DVYC members and benefit the SASPER process by providing a learning opportunity for the youth to participate in the trainings, survey practice, and data collection. We also recruited UW students from various on-campus programs, including the School of Nursing and Student Epidemic Action Leaders Team, and public health and medical professionals through PHSKC's Public Health Reserve Corps program.

In developing teams to conduct the surveying, we identified approximately 15 teams with two DVYC members and two adult volunteers each, following best practices for working with youth [45]. As possible, we paired adult volunteers from different organizations (i.e. paired UW students with PHRC members) to increase age diversity per CDC recommendation, with the potential added benefit of fostering a learning and cross-disciplinary experience. Furthermore, we identified known language needs in specific areas where we conducted surveys, and, if possible, assigned an adult volunteer to the area who could speak the language. For example, we ensured that each team in South Park, where there is a large percentage of Spanish speakers, had at least one member who was fluent or conversational in Spanish.

CDC provided two training sessions to prepare volunteers for the door-to-door surveying: a youth-focused training and a separate training for adult volunteers. The DVYC training focused on building familiarity and comfort with the concept of interviewing strangers in addition to other "soft skills." The second training included more technical information aimed at the students and health professionals. In addition to the CDC training, the DVYC had several other sessions to practice surveying and ask questions of the research team.

As the SASPER aimed to engage representative voices and enable equitable involvement, survey materials were translated into nine languages known to be most common to the DV communities and a live language line with interpreters in most languages was available for surveyors. All survey participants who completed the survey were compensated with a $25 gift card.

To prepare and inform the community about the SASPER effort, the team employed a multi-pronged outreach approach. Project partners attended community meetings in South Park and Georgetown to describe the project, distributed flyers in key community locations the weekend and days prior to the first surveying, used social media to spread the word about the project, and notified the police about the upcoming activities.

We conducted door-to-door surveying on Saturday October 29 (~11AM-2PM), Thursday November 3 (~1PM-6PM), and Saturday November 5 (~10:30AM-2PM), and completed 134 surveys through these efforts. While the Saturday sessions included the full volunteer team (UW, PHRC, DVYC, and other project staff), the Thursday session only included UW staff as it was previously unplanned and added in an effort to increase participation and potentially engage households who may not be available on the weekends. In order to further increase representation and provide alternative opportunities for involvement, the team left flyers with a link to complete the survey online at households that surveyors had visited without making contact with anyone in the household following the final survey day. Through the online survey campaign, we received an extra 33 surveys. In total, we collected 167 surveys.

CASPER Method

The CASPER sampling method involves two stages, starting with identifying clusters probabilistically and then selecting a representative sample of households within each of the clusters. The CDC has provided a toolkit with step-by-step guidance for implementation [43].

Originally designed to be undertaken before or following a disaster, the method has broad applications and has been used outside of the disaster context including to gather information about community health and examine public awareness of various topics [43]. Between 2012 and 2016, there were 99 CASPERs conducted in the US with involvement by CDC, an increase from the prior period of 2003-2012 in which there were 53 [46,47]. The majority of the CASPERs assessed preparedness (53.5%) and the others related to response and recovery (27.2%) or topics other than disasters (19.2%) [46,47].

Despite the increase in CASPERs being implemented, publicly available results of the process and summative evaluations of the approach are lacking. A notable exception is an evaluation of a CASPER led by the Washington County Public Health Agency in Oregon, in which the team conducted a hotwash (a structured debrief to obtain feedback from staff) after the exercise, had an evaluator at the site to independently evaluate the process, and compiled the learnings into an After-Action Report [48]. Important lessons learned from this CASPER included the need to over-sample clusters, over-recruit volunteers, test out and ensure adequacy of language services, and understand the large time and staff commitment for preparing and implementing the assessment [48]. A less formal evaluation of a CASPER was also led by the Portsmouth Health Department (PHD) in Virginia, who partnered with local and state health jurisdictions, a medical school, and city partners [49]. The PHD identified several considerations for future CASPERs, including incorporating community partner feedback into survey design, allowing more time for survey development, “ground-truthing” cluster locations, and taking additional steps to ensure buy-in from partners in the process [49].

SASPER Evaluation

Given the lack of CASPER evaluations, there remains a gap in understanding the strengths and limitations of using the CASPER approach to collect data in different circumstances. In response, this evaluation focuses on the planning and implementation of the SASPER, a modified CASPER approach that seeks to center equity and community in the process.

We drew on culturally responsive evaluation (CRE) tenets for the assessment. CRE presents a framework for ensuring an evaluation process is responsive to context-specific cultural values and beliefs [50,51]. This involves the integration of cultural values into each step of the process, from design to dissemination, centered with the core principles of responsibility and responsiveness [52]. For example, we shared key evaluation questions with the project leadership for review and feedback. Additionally, a core aim of the evaluation is understanding the degree to which the project was community-engaged and -centered.

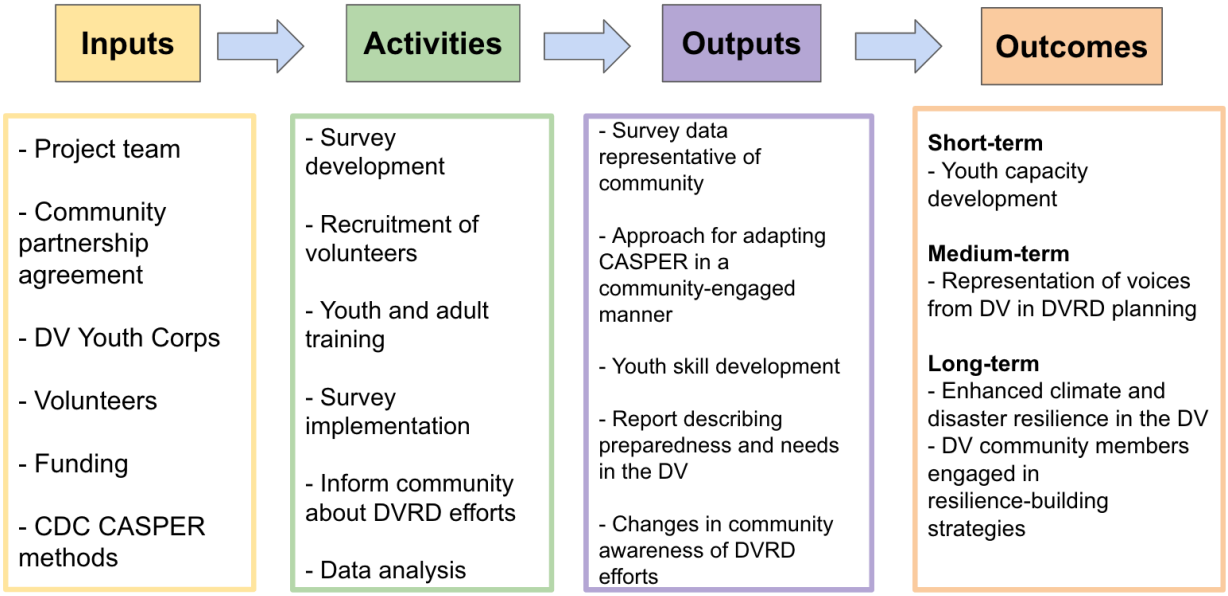
Our evaluation focuses on both the project process and outcomes as it seeks to assess the SASPER's impacts and adherence to intended implementation. Furthermore, it is utilization-focused because it aims to inform future practice. Through a mixed-methods approach, the evaluation design includes collection of quantitative data through a feedback survey completed by SASPER volunteers that was completed the day they first participated in door-to-door surveying, and in-depth key informant interviews with project team members to gain deeper insight into the effectiveness of the project. This evaluation will provide important insights to guide future assessments that seek to engage and center the needs of EJ communities in understanding climate and resilience priorities.

Methods

Logic model

To guide the evaluation process, we developed a logic model that identifies the main inputs, activities, outputs, and outcomes from the SASPER surveying process (Figure 1). Key inputs to the process include personnel (the project team, DVYC, and volunteers), the community partnership agreement, funding, and the CASPER methods from CDC. Activities include the survey development, recruitment and training of volunteers, survey implementation, informing the community about the DVRD and SASPER efforts, and data analysis. Intended outputs of the process are survey data that is representative of the DV community, an approach for adapting CASPER in a community-engaged and -centered manner, DVYC skill development, a report describing the climate and resilience priorities and needs in the DV, and changes in community awareness of the DVRD efforts. In the short and medium term, intended outcomes of the process were capacity development of the youth, and inclusion of DV voices in the DVRD planning efforts. In the long-term, intended outcomes of the SASPER are to enhance climate and disaster resilience in the DV and facilitate a process for stronger engagement of the DV community in building and implementing resilience strategies. Importantly, however, this evaluation is not able to assess the long-term outcomes of the project.

Figure 1. Logic model documenting SASPER project inputs, activities, outputs and outcomes.



Key Evaluation Questions

Using the logic model, we identified key evaluation questions (KEQs) that outline the broad questions the evaluation should address [53,54]. We took an iterative approach to the development of the KEQs, including sharing a preliminary draft with the project leadership team to ensure their feedback was incorporated into the evaluation process.

The final KEQs are:

1. How effective was the SASPER survey in collecting information representative of the Duwamish Valley (DV)?
2. To what extent was the SASPER survey implemented as intended?
3. How and to what extent did the SASPER enable Duwamish Valley Youth Corps (DVYC), UW Student Epidemic Action Leaders, Public Health Reserve Corps, and other volunteers to develop new skills?
4. Was the SASPER an effective method for building awareness of DVRD project activities among DV community members?
5. Did all project partners feel that their perspectives and needs were considered and addressed through the SASPER survey planning and implementation process?
6. How feasible would it be to conduct a future SASPER in the same or other communities?

Feedback Surveys

A short feedback survey was developed in order to collect immediate input from volunteers and the DVYC members following survey collection. The survey provided several statements regarding respondents' level of preparation, skill development, the appropriateness of the surveying method, and willingness to participate in future surveying events. Respondents were asked to rank their agreement with these statements on a scale of strongly disagree to strongly agree, with the option to indicate they didn't know the answer. Additionally, a free-response

section enabled volunteers to provide information not already captured in the closed-option questions, including suggestions to improve future community disaster needs assessments, ways to improve future volunteer experiences, and other feedback.

On Saturday October 29 and November 5, the feedback survey was distributed to each volunteer and DVYC member upon their return to the SASPER Headquarters following the door-to-door surveying. The DVYC and adult volunteer surveys were collected and stored separately to enable comparison between the respondent types. Feedback surveys were not completed by the team that participated in the extra surveying day on Thursday November 3. The paper surveys were manually entered using Google Forms and the resulting data were downloaded into an excel spreadsheet for analysis using RStudio.

Data were summarized to identify the level of agreement the volunteers and DVYC members had with the survey statements. Data was then analyzed using Fisher's exact tests to assess differences in agreement with the various statements between adult volunteers compared to youth volunteers. The open-response questions were analyzed by organizing responses into themes using an informal inductive approach and summarizing the themes across questions [55].

Interviews

An iterative process was used to develop the interview guide. We developed and refined interview questions based on the previously-identified KEQs, the logic model, and goals of the SASPER as identified by the project team.

We selected interviewees based on involvement in the SASPER process, and included one or more representatives from each of the partner organizations. We sought feedback on additional interviewees from each partner organization to ensure the organizations' perspectives were adequately represented in the evaluation.

Interviews were conducted online using Zoom, and each interview was recorded after obtaining verbal consent from the interviewee. The interviews were professionally transcribed and coded using NVivo Qualitative Analysis software. 20% of the interviews were co-coded by another researcher to ensure consistency and reliability.

To analyze the interviews, we used the framework method through combined deductive and inductive strategies [56]. Our first step was drafting a codebook based on our evaluation and interview questions and logic model. We added codes inductively as new themes emerged. After finishing the coding process, we summarized each code by interview and developed a matrix with the summaries to further analyze and synthesize the findings. Finally, we summarized the findings in an analytic memo.

Results

Feedback Surveys

Fifty eight respondents completed the feedback surveys: 33 adult volunteers and 25 DVYC members.

Quantitative data

The vast majority of respondents, regardless of whether they were youth or adults, agreed or strongly agreed with each statement provided in the feedback survey. Specifically, 96% of respondents strongly agreed or agreed that the approach was appropriate for collecting information representative of the community, 95% strongly agreed or agreed that they learned a new skill and that the community learned something about the Duwamish Valley Resilience District work through the outreach, 92% strongly agreed or agreed that they were prepared to conduct door-to-door surveys, 91% that they would participate in future assessment before a disaster, and 87% that they would participate in a future assessment after a disaster.

There were several differences in the responses between adult volunteers and the DVYC members (Table 1).

Table 1. Comparison of adult and youth volunteer responses to day-of feedback survey. Response scale: Strongly disagree (there were no responses in this category), disagree, agree, and strongly agree. **signifies significant results. N=58.

Survey Question	Strongly agree		Agree		Disagree		P- value
	Youth	Adult	Youth	Adult	Youth	Adult	
I learned a new skill through this experience.	16%	52%	76%	45%	8%	3%	**0.012****
I felt prepared to conduct door-to-door surveys.	20%	67%	64%	30%	4%	0%	**0.001****
I believe that this door-to-door sampling approach was appropriate for collecting information representative of the broader community.	52%	58%	44%	39%	4%	3%	0.894
I believe the community learned something new about the Duwamish Resilience District through my team's outreach today.	36%	36%	64%	55%	0%	0%	0.788
I would participate as a volunteer in future community assessments for public health emergency response before a disaster.	28%	64%	56%	33%	8%	0%	**0.011****

I would participate as a volunteer in future community assessments for public health emergency response <u>following</u> a disaster.	24%	64%	60%	24%	8%	0%	**0.002****

There was a significant difference between volunteer types in level of agreement with the statements regarding skill development and level of preparation for the surveying. A higher percentage of adult volunteers strongly agreed with the statements compared to the youth, who had a higher percentage of the lower category of “agree.”

There was not a significant difference between volunteer types in level of agreement with the statements regarding the appropriateness of the sampling approach and whether the community learned something about the DVRD efforts. Youth and adult volunteers reported similar levels of agreement on both statements, with a small percentage disagreeing about the appropriateness of the method but the majority agreeing or strongly agreeing with both.

Finally, there was a significant difference between volunteer types and the willingness to participate in future assessments before and after a disaster. Specifically, a higher percentage of adult volunteers strongly agreed that they would participate in future assessments both before and after a disaster compared to youth, who had higher percentages of agreement with the statements.

<u>Qualitative data</u>

Suggestions to improve future community disaster needs assessments broadly fell into the following categories: the survey implementation process, the survey content, and preparation for the surveying. Several volunteers noted the complexities inherent with door-to-door surveying, including that many people did not open the door and it would have been helpful to survey over more days and times. Additionally, a volunteer suggested that the youth could have asked more of the questions since respondents seemed more receptive when the youth were leading. Regarding survey content, volunteers noted that the survey could have been shorter, clearer, and written with more plain language to ensure understanding. One volunteer noted that the question about wildfires confused some households, as it was not specific to wildfire smoke. For survey preparation, volunteers were interested in more practice time with all team-members, piloting the survey questions with community members, and recommended more efforts to inform the community about the surveying, including through mailers.

Similar to the suggestions for improving future needs assessments, the volunteers recommended ways to facilitate better volunteer experience specific to the survey implementation process, survey content, and preparation. Specifically, recommendations included ensuring each group had an individual fluent in Spanish, reducing the size of large clusters, and having more volunteers for surveying. With regards to supplies, volunteers reported that they would have had an easier experience if there were better maps with more details, more clipboards (and reminding volunteers to take them), a script with introductory

language to use before the youth read out the consent form, and a clearly written handout describing roles of the different volunteer types. Finally, volunteers suggested including time for familiarization with the surveying packets and practicing more before starting the survey day and recommended providing volunteers with specific instructions for surveying clusters that had already been surveyed during a previous day.

When asked for any other information, volunteers provided feedback in categories of training, community outreach, capacity development, and youth involvement. Several volunteers noted that they would have preferred more time at the start of the day for practice and for team building. Regarding outreach, some volunteers described how households had heard about the surveying while others were not aware that the effort would be happening. Volunteers noted how the experience helped them build skills, particularly verbal communication skills. Finally, many adult volunteers noted that they strongly enjoyed working with the youth, describing how youth team-members did a wonderful job and the community members appreciated seeing them.

Suggestions and observations are summarized below in Table 2.

Table 2: Summarized feedback from volunteers who completed the day-of feedback survey.

Theme	**Suggestions and Observations from Volunteers**	**Example**
Implementation process	- Longer survey day - Survey on weekdays/ nights - Consider later start time for weekends	“More days, if possible!” “Random surveying might mean not collecting as many responses, but I understand why it's important.”
Training and preparation	- More time to practice - More time to get to know team-members - Ensure all teams have supplies (clipboards, enough surveys, etc.) - Consider better map for teams	“The packet was awesome... but it would have been useful to have more time to get familiar with it.” “A sheet that reminds us of flow and roles for interviews (had to remember who does what with 4 people).”
Survey content	- Condense survey intro - Shorten survey - Use more plain language	“I think the survey could be reworked…Some people had trouble answering questions.”
Community outreach	- Send mailers to community - Some houses knew the surveying was happening; others unaware	“It could be helpful to inform the community about the days of the survey so they would be home.”
Youth involvement	- Have youth ask more of the questions	“Individuals were smiling and happy to see/encourage youth when they were speaking.” “I ♡ DVYC! (and DRCC)”

		"The kids were great!"
Overall experience	- Positive experience with strong learning opportunities - Youth were critical to the process	"it was well planned and organized." "I liked the experience of working in the community. Engaging the Youth Corps was a great idea."

Interviews

Eleven interviews were conducted with project team leadership on Zoom between February 22 and March 7, 2023, with a range of 20 minutes to 1 hour per interview. Five interviewees were affiliated with UW, four with government agencies, and two with community-based organizations (CBOs).

Survey Preparation and Implementation

Interviewees, overall, had favorable comments about the survey preparation and implementation process, though nearly every interviewee noted constraints to and challenges of the process. Challenges and recommendations described by interviewees are summarized in Table 3 and overarching recommendations on the process and outcomes of the SASPER are highlighted in Figure 2.

Table 3. Challenges and recommended solutions specific to survey preparation and implementation

Survey Process Stage	Challenge	Recommendation
Development	Refining survey to the final, short length	Use small groups focused on specific topics to identify questions
		Clarify the limitations of the final survey to the project team
		Share examples of previous CASPER questionnaires with the project team
		Hold one or several in-person meetings to ensure full engagement
	Identifying question response options that are as relevant as possible to the community	Consider community focus groups to support survey development and identify topical questions and responses
	Finalizing survey and	Build out clear timeline, particularly if

	translations in required time	working with multiple partners
Content	Ensuring terminology is accessible and appropriate for all community members	Do not use jargon or acronyms
		Ensure local language speakers review and provide feedback on survey translations
		Use supplementary content to aid the surveying and provide concrete examples (e.g. of communication materials)
	Communicating questions with multiple response options	Do not use long lists; include short list of relevant options or open response
Training	Providing audience-relevant and appropriate training for all volunteers	Hold separate trainings targeted for each volunteer type (i.e. if including youth volunteers)
		If working with youth volunteers, ensure training is engaging and interactive
	Implementing training within time constraints	Develop a robust schedule for the training which allows time for survey practice and team-building
Notice & Outreach	Raising awareness of surveying efforts among community	Increase outreach efforts: consider mailers once the survey clusters are identified, radio, etc.
Implementation	Conducting adequate number of surveys according to CASPER methods	Use a range of times for surveying (mix of weekend/ weekdays and afternoon/ evening)
		Conduct surveying in season with adequate daylight for evening surveying
		Consider including online option for the survey from the start, with multiple language options
	Ensuring enough volunteers for necessary number of teams	Overrecruit volunteers (particularly adult volunteers if working with youth)

To develop the survey, the project team ultimately formed small groups focused on specific topics to identify questions. This process was described as efficient and fair: one interviewee expressing that it, “was pretty well done...it was really well communicated...And with people's limited time and capacity, I think having had it staffed by people who could do a lot of the lifting and then nudge people and schedule meetings and stuff, I think it was handled extremely well, given the time pressures," (Govt. 4). Despite this streamlined process, it was still difficult to

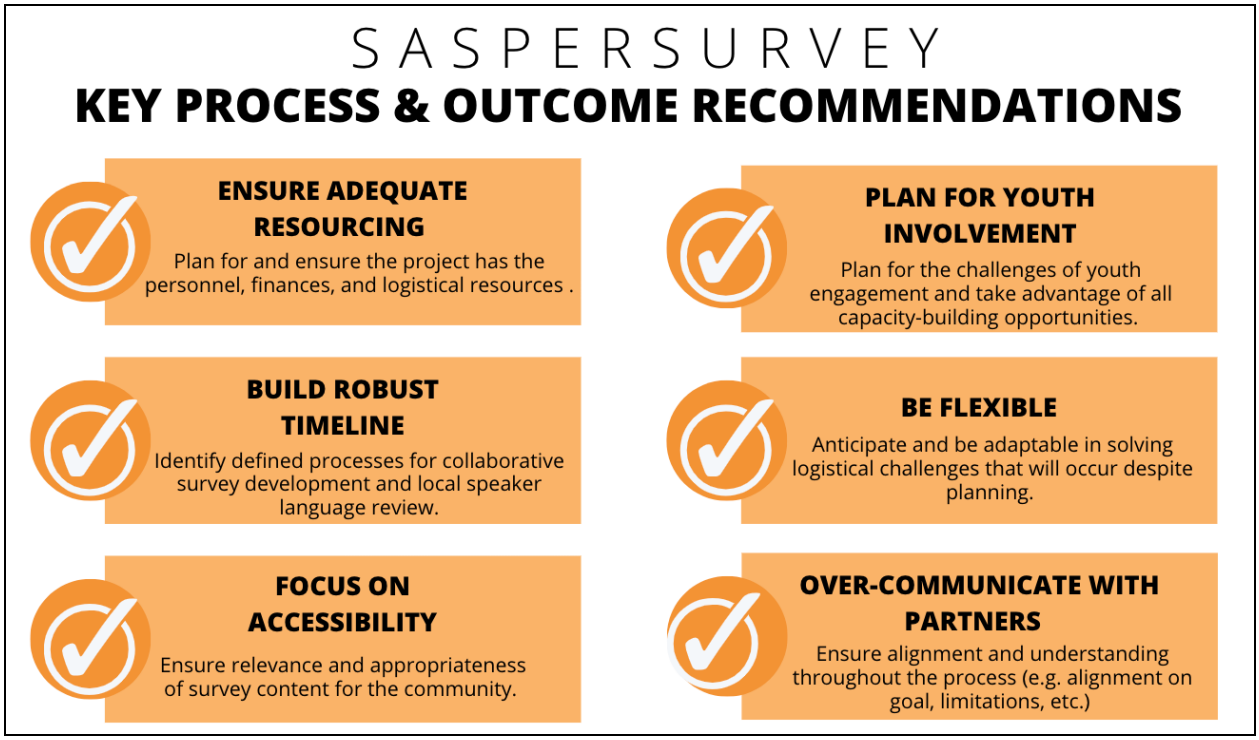
reduce the number of questions on the survey to ensure the content fit on one page (double-sided) and could be completed within 15 minutes (as recommended by CDC), with one interviewee noting, “I think it [the survey] was useful. I think the first draft that was a lot more comprehensive would have been more useful, but I do understand," (Govt. 3). Additionally, the survey development took longer than anticipated, truncating the time available for local language speakers to review and provide feedback on the survey and translations. This limited the accessibility of the survey, particularly for individuals who do not speak English, as one interviewee said, “Well, working with the public, obviously, some will understand it and some will not. I think it's always challenging for people that are non-English speakers just because of the technical wording of things," (CBO 2).

Regarding the SASPER survey implementation, interviewees described adaptations the project team developed to improve the process. Proactive modifications to the standard CASPER that were made to center equity and community included translating survey materials into the languages most common in the DV, providing a live interpretation line, compensating households with a gift card, and engaging the DVYC as volunteers. Nearly all of the interviewees described how involving the DVYC in the SASPER was critical to its success and provided an important capacity building opportunity:

> "having the Duwamish Valley Youth Corps participate was incredible for a variety of reasons in terms of what the spirit of it was and engaging the young people…But [also] willingness to participate...folks noted that the minute the youth corps member had to leave towards the end of the day, the willingness for folks to…engage in conversation also plummeted," (Govt. 1).

Reactive adaptations to the original project plan were also made in response to logistical challenges to achieve the necessary number of surveys. These changes included adding an extra survey day and providing an online option for households to complete the survey. Despite these additional efforts, the final survey number was slightly short of the CDC-recommended number for statistical significance 162 included in SASPER survey sampling frame vs. 168 for CASPER).

Figure 2. Overarching recommendations based on the SASPER evaluation to overcome process and outcome challenges.



Survey Outcomes

The key survey outcomes of focus for the evaluation are the representativeness of the information collected, capacity-building among volunteers, and awareness-building of resilience efforts in the DV. An interviewee noted that the partnership, itself, has had broader impacts amongst the community: the project has, “set a precedent on how partnerships and collaboration between academia and the UW community happen in the Duwamish Valley and I don't think we all, including community partners, will expect any less. So I think that's very powerful," (Govt. 3). Additionally, an interviewee noted how the information from the survey will shape the work at their agency: “I now have…input that I received through a statistically sound process…based on the CDC on what are community priorities… I can go back to my people and say this is it, this is where we need to put money, this is what we need to prioritize in terms of work plans,” (Govt. 3).

Representativeness

Interviewees described the representativeness of the SASPER survey in different ways, with most noting it in terms of race/ethnicity of the DV vs. the survey, though some also described the representativeness of the method itself. Specifically, most interviewees noted that the racial/ethnic breakdown of the survey respondents did not appear to be representative of the DV community. However, several interviewees described that the content of the responses did seem aligned with the priorities of community members according to the interviewees’ perceptions. Several interviewees described how the surveying method itself was not representative because it did not take deliberate steps to center the voices of Black, Indigenous, and People of Color (BIPOC) individuals. As such, one interviewee expressed, “I really never

understood and or agreed with the randomized [approach] because I feel like some…important places in the neighborhood were missed," (CBO 1).

Volunteer experience

The majority of interviewees able to speak to the volunteer experience described how it was a unique and important experience for adult and youth volunteers, one saying the learning went "beyond hard skills," (Govt. 4). For adults, in addition to building survey skills and knowledge about the CASPER process, the experience enabled a greater understanding and awareness of the DV community, particularly for those who have never been to the area, and the importance of community-engaged research efforts. In voicing this, one interviewees said, "having this very deeply important experience of going into the community, talking with people, it highlights the importance of that as a way to understand the needs short and long-term and experiences, concerns of the people who really should be driving…our work and solutions," (UW 3). Youth volunteers developed new interpersonal and public speaking skills, learned about public health and research methods, and built confidence by being part of the broader project effort. One interviewee noted, "I also think it was great to be able for them to feel like they are participating in this important effort, that they understand their power that they have by doing this" (CBO 1).

Awareness-building

Though not a primary goal of the surveying effort, the SASPER did help to raise awareness about the DVRD work. One interviewee said, "It was great. We would've never been able to give a heads up to this many people…So that was quite successful," (Govt. 3).

Survey Implications

Feasibility

Interviewees had mixed responses when considering the feasibility of conducting a similar surveying effort, though most expressed that it would be feasible, particularly prior to a disaster, with several caveats. The project was resource- and labor- intensive, and extremely challenging to coordinate logistically. However, as the team has now been through the process once and has developed the necessary skills, several interviewees expressed that it would be easier to do again. The caveat is that replicating the surveying with the same adaptations to center community and equity requires significant resources. One interviewee recalled, "going back to the point CDC made early on about you could do a CASPER in a week. Well, you can't really do that if you're really trying to get the community buy-in and making sure everyone's at the table. And so… if you're thinking about doing this as a community-engaged process for planning or otherwise, to make sure that you have built in enough time and financial resources to do that from an equitable perspective," (UW 1).

Co-production

In describing the partnership among the organizations, all interviewees able to speak to it had positive comments about the collaboration, though several academic and government partners said they would defer to the community partners in making that judgment. In providing the community-partner perspective, an interviewee conveyed that, "I do feel like we gave good

information about the community to be represented and also recommendations…So I don't know if it was one hundred percent co-design, but it was definitely a good share [of] responsibility," (CBO 1). Several interviewees described elements that were important to building the project collaboratively, including having a community-based organization at the table, developing the community partnership agreement, UW taking on logistical work to alleviate the burden on community partners, having staff with trusted relationships to function as "connectors" between the partner organizations, and altering project plans as needed in service of community priorities.

Additional Lessons Learned

Interviewees described the unique nature of the SASPER project in terms of the number of project partners representing different sectors and how valuable the process itself was in addition to the information gained through the process. Though the project was rooted in the CASPER method, there were many modifications built into the process to center equity and community in the process, and the team also had to be flexible and develop creative solutions to overcome new challenges. One interviewee commented on the novelty of the SASPER: "I have not been aware of any other project like this happening [at UW]. And pick a thread…a door-to-door-based surveying project, a climate change-resilience project, a community-involved, community-led, community-driven, community-collaborated project, a project working with youth….And I wish there was more of it, or hope that there'll be more of it," (UW 3).

The SASPER provided an opportunity to test the CASPER approach with modifications, and several interviewees questioned when this approach is appropriate. Key limitations of the approach identified by the project team include that it is extremely resource and labor intensive, it does not enable a centering of BIPOC voices, and it provides a limited ability to make demographic and/ or geographic comparisons. Several interviewees expressed that other types of door-to-door surveying may be more beneficial in specific circumstances, such as specifically surveying BIPOC individuals, using community service providers to survey specific racial/ ethnic groups, and surveying all households in a given area of interest.

Discussion

This study provides important new insights regarding the challenges and opportunities of using a CASPER approach in community-centered research concerned with equity. The key learnings of this evaluation for future research and practice are: 1) the SASPER innovations were valuable but resulted in a more resource-intensive and logistically-challenging project and 2) while the SASPER may have demonstrated feasibility in a pre-disaster phase, the method may not be appropriate to use post-disaster or in meeting the needs and priorities of partners due to its lack of focus on equity and other logistical limitations.

One of the key additions of the SASPER was engaging the DVYC in the project by having a training focused on preparing the youth for the surveys, implementing survey practice days for youth, and including two DVYC members in each of the approximately 15 survey teams. The

DVYC is a project of the DRCC which provides a broad range of EJ and job-related experiential learning opportunities for youth ages 13-18 from South Park and Georgetown [57]. There does not appear to be evidence of youth involvement in other CASPER assessments, though there is some documentation of youth engagement in community assessments and, more broadly, in community-health research and community-engaged projects. A study from nearly 30 years ago supported routine engagement of youth in community health needs assessments by presenting examples of involvement and highlighting the benefits [58]. Specifically, Israel and Ilvento described how a Florida county health agency partnered with a local high school to train and guide students in developing, implementing, and analyzing a community survey, with students expressing their desire to continue community-involved work in the future [58]. Despite this, a 2017 study noted the dearth of youth involvement in community assessments [59]. Focusing on Massachusetts, Chen found that 20% of community health needs assessments in the state engaged youth, though the engagement was mainly as research subjects, not as participants in the process [59].

More broadly, there are many examples nationally of youth-engaged and youth-led community projects focused on health, climate, and resilience, including a wide range of projects spearheaded by the DVYC [60]. In the San Francisco, CA Bay Area, the youth group People Organizing to Demand Environmental and Economic Rights (PODER) developed and implemented a door-to-door survey to identify priorities and concerns related to resilience in their community [61]. Shoreline, a program run by several academic institutions with support from multiple advisory boards, has chapters in high schools along the Gulf Coast with the goal of making “fundamental changes in the lives of youth, their families, their communities, and beyond” [62].

There are strong benefits of engaging youth in research and community projects, both for the youth participants themselves and for the projects. Specifically, youth-engaged research can make the research more relevant by incorporating the unique perspectives of youth [63,64]. CBPR involvement and civic engagement activities can enable youth to develop new skills and have exposure to new opportunities and perspectives on community issues and solutions – potentially leading to more civic engagement in adulthood [64–66]. Indeed, SASPER adult volunteers and project leadership highlighted how critical youth team members were for engaging community members and conducting the surveys. Furthermore, the day-of feedback surveys indicated that the youth involved in the SASPER felt they built new skills and were interested in participating in future efforts.

As such, we recommend working with youth for similar community projects, though research teams and partners must be prepared and plan for the challenges of and considerations for youth engagement. Most importantly, materials, training, and processes should be tailored to the needs and skills of youth [59], and it may be beneficial to have a youth program leader take an active role in planning and implementing training. Additionally, project leaders should consider training adaptations and potential adaptations to the project scope to increase the youth skill development opportunity of the research. For example, a SASPER interviewee noted that, during the portion of the surveying that the adults led, the youth could have been conducting

another form of data collection or doing something more productive than waiting for their turn in the surveying. Finally, project leaders must ensure that academic and institutional policies for youth engagement and protection are followed, and these added steps should be built into the planning timeline.

The second key learning from this evaluation was that the CASPER method may not be appropriate to meet or align with project partners' priorities and goals due to its lack of focus on equity, its rigidity in design, and the resources required to conduct a CASPER. First, the CASPER method was not developed as an equity-centered tool: it is a rapid needs assessment designed to obtain data representative of a population [43]. One of the main benefits of the approach is that it has been validated as providing population-representative data [67,68]. Compared to simple random or convenience sampling, CASPER's two-stage cluster sampling strategy is less biased, the data needed to implement it is often more-easily available (i.e. identifying clusters using census data), and it requires a smaller sample size to be representative [69]. As a result, data from CASPERs is used and accepted widely by public health and emergency preparedness managers for official purposes, including for community health assessments [69–72]. This was noted by SASPER interviewees as an important benefit of the approach: the perception of validity and official nature of using a CDC method makes it more likely that audiences, such as government agencies, will accept the data and use it to inform resourcing and policy decisions.

Despite these positive elements, the randomized nature of the sampling does not enable focusing on specific racial/ethnic or language-speaking groups, and the manner in which CASPER data is analyzed does not allow for comparing different demographic groups or neighborhoods. As stated in the CASPER toolkit, the method is not appropriate to assess specific populations, and, if that is the goal, researchers should use another approach [43]. This is a notable limitation for community assessments that use CASPER as a data collection method, as health agencies and hospitals often use such studies to understand the needs of vulnerable populations and make decisions regarding resource allocation and supportive programming [73]. The limitations identified by our partners echo those from a prior CASPER used for a comprehensive Community Health Needs Assessment that involved a partnership between Wake County Human Services, WakeMed Health and Hospitals, Duke Raleigh Hospital, Rex Healthcare, Wake Health Services, the Capital Care Collaborative, and United Way of the Greater Triangle and the North Carolina Institute for Public Health. They too noted that the inability to describe demographic health disparities was a challenge of using the method [71].

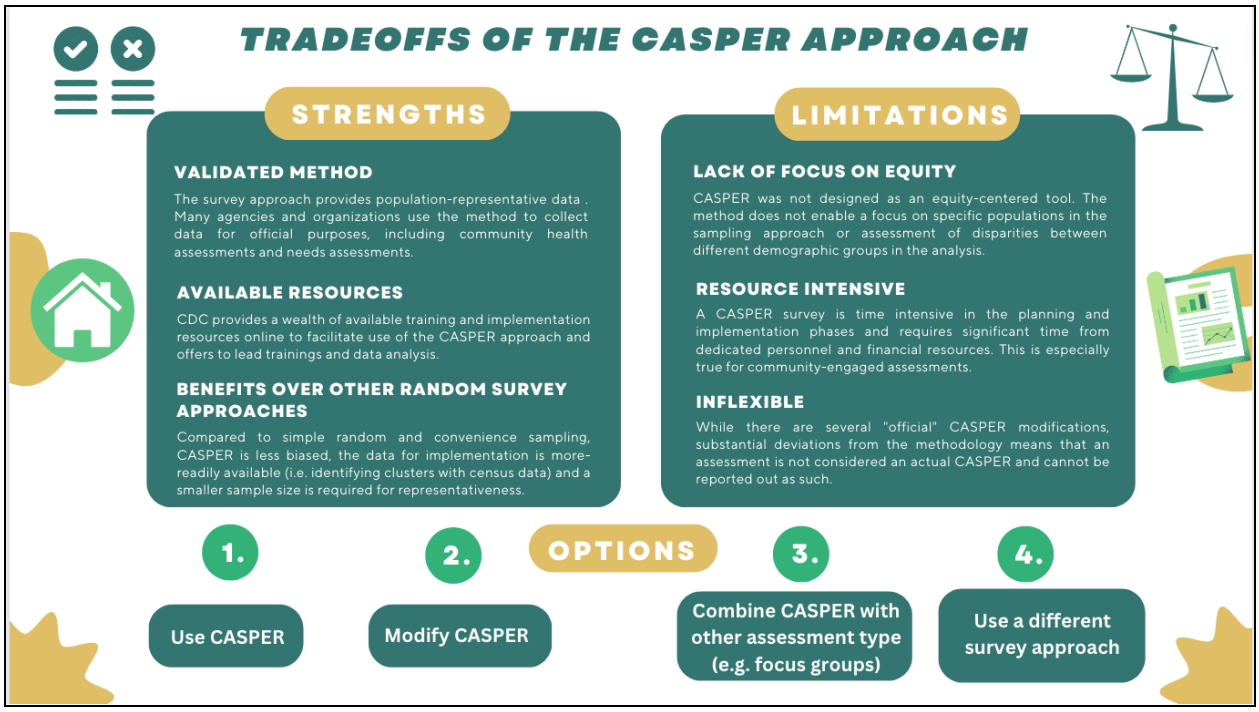
Furthermore, the other identified disadvantage of the CASPER approach is that it is highly resource-intensive, particularly when additional steps are taken to engage community members and groups equitably. While CDC states that CASPER is "quick, relatively inexpensive, [and] flexible," this was not our experience; a previous evaluation also emphasized the personnel, financial, and logistical challenges of the approach [43,48]. This in itself may be a barrier for using CASPER to collect data for community-engaged assessments, especially if the project

does not include a partner like a university or other entity that is able to take on the major logistical and financial burdens of the project.

Moving forward, there is a need to identify surveying strategies that provide the rigor, reliability and validity of the CASPER method while enabling a focus on equity in a less resource-intensive manner. With an increased focus on racial equity and environmental justice at the national level [74], we recommend CDC or other stakeholders assess modifications to CASPER to consider equity. Such modifications might include adaptations to oversample specific populations and facilitate the analysis of health disparities. Recent innovative CASPER adaptations, including a study in Alabama that modified CASPER to assess health disparities between Hispanic and non-Hispanic white populations [75], should be collated, reviewed, and evaluated to assess replicability and validity of the approaches.

In place of CASPER, however, researchers can consider other surveying strategies (some of which are less labor- and resource-intensive) that may provide adequate and appropriate data to meet a project team's needs. Specifically, SASPER interviewees discussed that, following a flooding event in South Park, community service providers that serve specific racial/ ethnic groups conducted door-knocking multiple times a day to every household in the impacted area. This micro-targeted and comprehensive outreach enabled bi-directional, language-appropriate communication and support to community members in the immediate post-disaster phase; however, such approaches may not be scalable to disasters with broader impact areas. Another option is combining CASPER surveying with other data collection approaches, such as interviews, focus groups, and photovoice, in order to provide richer, more inclusive data about a community. Specific to the SASPER project, the team had originally planned to supplement the surveying data collection with focus groups. While the focus groups were ultimately replaced with informal listening sessions as a result of community needs and priorities, this highlights the value of combining quantitative survey data with qualitative data sources (in addition to the need to adjust projects to align with a community's goals). Additionally, community health assessments often have a survey component (some of which, as discussed, use CASPER) combined with other qualitative components [73]. See Figure 3 below for discussion of the method tradeoffs and next steps.

Figure 3. The key strengths and limitations of the CASPER approach, as identified through the SASPER evaluation process and recommended options for project teams following consideration of the method tradeoffs.



Strengths and Limitations

Our evaluation of the SASPER project uncovered partner perspectives and feedback on the process and identified recommendations and needs for future research and practice. It adds to the sparse existing literature assessing CASPER beyond the validity of the method, providing novel insights about the feasibility and appropriateness of adapting CASPER to collect data in a community-engaged, equity-centered approach. Our findings suggest limitations with the ability of the method to highlight and assess the concerns and priorities of marginalized populations. As CASPER is frequently used to make important decisions in disaster contexts and in public health planning, it is critical that researchers evaluate the equity implications of the method. As such, we recommend that future projects that use CASPER conduct an evaluation of their project, including equity considerations, and that future research evaluate ways to better center equity in the approach.

There are several important limitations to this evaluation. Respondents to the day-of feedback surveys had, overall, strong positive responses. While this agreement may have been legitimate, there also may have been a demand effect in which respondents felt compelled to be more-favorable about the effort [76]. Even though the surveys were anonymous, which should allow for more-candid feedback, it is difficult to fully mitigate a potential demand effect and interpret the impacts. Interviews with key team-members were conducted several months following the surveying effort. While this may have allowed stakeholders more time to reflect on and fully-form their perspectives, the time lag could also have contributed to recall bias, limiting feedback specificity. Additionally, the data for the evaluation was only obtained from volunteers in the surveying and those deeply involved in the project. As such, the impacts of the effort on community members and their perspectives of the project are not in the scope of the evaluation.

Finally, there are benefits and limitations to this being an internal evaluation. While there may be less objectivity and willingness to share negative feedback with an internal evaluation, the approach also enables a deeper understanding of and familiarity with the subject matter than with an external evaluation [77].

Conclusion

As communities, and particularly EJ communities, grapple with worsening impacts of climate change, it is increasingly important to develop and test strategies for equitably identifying community-level priorities for resilience actions. In response, researchers and professionals from UW, City of Seattle, PHSKC, WA DOH, and DRCC co-produced the “SASPER” project to document household and community-level climate, health, and disaster priorities to build resilience in Seattle’s DV communities. This evaluation sought to assess the effectiveness, feasibility, and appropriateness of the SASPER approach to capture community-level resilience priorities. We used a mixed-method approach, combining survey data from SASPER volunteers with in-depth interviews with core SASPER team-members to evaluate the project. Youth and adult volunteers provided very positive feedback about the SASPER surveying experience, with the vast majority agreeing or strongly agreeing that they were prepared for the surveying, they learned from the experience, the community learned about the DVRD work, and that they would participate in future assessments. Key informant interviews highlighted strengths of the SASPER, including proactive additions to center equity and reactive changes to increase participation and accessibility. While the project may have proven feasible in a pre-disaster context, the resource and personnel requirements and constraints of the CASPER approach with regards to equity may seriously limit the appropriateness of the method post-disaster and in other contexts depending on project goals and communities of focus.

Overall Conclusions

This evaluation highlights the benefits and challenges of using a modified CASPER survey to identify climate and resilience concerns and priorities through a community-engaged, equity-centered approach.

We identified several overarching process and outcome recommendations that are pertinent for co-produced community surveys regardless if a team is using a CASPER approach. Firstly, the project team must ensure adequate resourcing. The SASPER team, particularly UW researchers who led the logistical side of the planning and implementation, emphasized how resource-intensive the project was from a personnel, financial, and logistical standpoint, and that they would triple the budget were they to replicate the project. Next, it is critical for the team to develop a robust timeline prior to starting the project that includes the necessary time for adequate partner engagement and community outreach while meeting important deadlines. Somewhat relatedly, the team must focus on making the survey as accessible as possible for the community. This includes ensuring content is relevant and specific to local goals and context in addition to language accessibility. While the SASPER team was able to translate the survey into the nine languages most commonly spoken in the DV, we did not have the time to have local language speakers review the content and were unable to take other steps to improve

relevance of the survey (e.g. by using community focus groups to inform survey development, as originally planned). Next, we recommend engaging local youth groups in community assessments as it is a positive opportunity for youth capacity building and, in our experience, will benefit the project through improved community responsiveness. However, the project team must plan for this engagement, including by developing adapted training specific to youth needs and team-building activities with adult team-members and identifying appropriate roles for the youth. Next, the project team must be prepared to be flexible and adapt to changing circumstances. For example, the SASPER team made several reactive adaptations to increase survey responses, including adding a weekday afternoon surveying and an online option for households. Lastly, project teams should over-communicate with partners throughout the process to ensure alignment and understanding on key project elements. For example, there was some confusion regarding the inability to conduct intra-CASPER comparisons amongst the SASPER team.

In addition to these process specific learnings, the evaluation pointed to broader takeaways regarding 1) the value and the challenges of the SASPER additions and 2) the feasibility and appropriateness of the CASPER approach. The steps the SASPER team took to center equity and community voice into the assessment, including engaging the DVYC, compensating households, and providing for language accessibility, added enormous value and were cited as key elements that led to the success of the project by team members. However, these steps increased the resource-intensiveness of the project. While the project may have demonstrated feasibility in a pre-disaster phase, there are broader concerns about the appropriateness of the method and feasibility in a post-disaster context. Specifically, the resource-intensiveness of a CASPER, particularly with steps to improve accessibility, engage partners, and center community voice, may be prohibitive for organizations that do not have adequate resourcing - especially in a disaster context. Additionally, the CASPER was not developed as an equity-centered tool: it does not enable a focus on specific groups in the data collection or analysis phase. As such, the tool may not align with a team's goals if a priority is to uplift the voices of BIPOC individuals, and it may be prudent to use a different survey approach or combine the CASPER with other assessment types. In considering the tradeoffs of using a CASPER, it is important to note that the approach is a validated, frequently-used method that does have benefits over other survey approaches [67-69].

Finally, this research underscores the value of evaluating surveys to uncover novel insights regarding effectiveness, appropriateness, and feasibility of a project. It appears there is only one peer-reviewed article evaluating a CASPER survey and few anecdotal descriptions in the gray literature. As CASPERs are increasingly used not only post-disaster but also for community health assessments which inform jurisdictional resourcing and priority-setting, the lack of evaluation of the approach is notable.

We recommend that future researchers and teams that use CASPERs for data collection conduct evaluations of their projects. This can help establish robust guidance for when a CASPER is and is not appropriate in addition to pointing to areas where more research is necessary. We also recommend that CDC or other stakeholders specifically assess how equity

can better be considered and addressed through CASPER surveys. As racial equity and environmental justice are increasingly prioritized and funded at the national level, and climate change and related disasters continue to disproportionately affect BIPOC communities, it is imperative that approaches to needs assessments highlight impacts on and needs of these individuals and communities.

References

1. South Park flooding. [cited 7 Apr 2023]. Available: https://www.seattle.gov/utilities/your-services/sewer-and-drainage/flooding-response/south-park-flooding

2. Andy Reisinger A, Howden M, Vera C, Garschagen M, Hurlbert M, Kreibiehl S, et al. The concept of risk in the IPCC Sixth Assessment Report: A summary of cross working group discussions. Intergovernmental Panel on Climate Change; 2020. Available: https://www.ipcc.ch/site/assets/uploads/2021/02/Risk-guidance-FINAL_15Feb2021.pdf

3. Disaster risk. [cited 7 Apr 2023]. Available: https://www.undrr.org/terminology/disaster-risk

4. Asian disaster reduction center（ADRC). [cited 7 Apr 2023]. Available: https://www.adrc.asia/

5. Donner W, Rodríguez H. Population Composition, Migration and Inequality: The Influence of Demographic Changes on Disaster Risk and Vulnerability. Soc Forces. 2008;87: 1089–1114.

6. Lynn K, MacKendrick K, Donoghue EM. Social vulnerability and climate change: synthesis of literature. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; 2011. doi:10.2737/pnw-gtr-838

7. Johnston J, Cushing L. Chemical Exposures, Health, and Environmental Justice in Communities Living on the Fenceline of Industry. Curr Environ Health Rep. 2020;7: 48–57.

8. Smith GS, Anjum E, Francis C, Deanes L, Acey C. Climate Change, Environmental Disasters, and Health Inequities: The Underlying Role of Structural Inequalities. Curr Environ Health Rep. 2022;9: 80–89.

9. Pelling M, Garschagen M. Put equity first in climate adaptation. Nature. 2019;569: 327–329.

10. Adepoju OE, Han D, Chae M, Smith KL, Gilbert L, Choudhury S, et al. Health Disparities and Climate Change: The Intersection of Three Disaster Events on Vulnerable Communities in Houston, Texas. Int J Environ Res Public Health. 2021;19. doi:10.3390/ijerph19010035

11. Bento A, Elliott JR. The Racially Unequal Impacts of Disasters and Federal Recovery Assistance on Local Self-Employment Rates. Social Currents. 2022;9: 118–138.

12. Keim ME. Building human resilience: the role of public health preparedness and response as an adaptation to climate change. Am J Prev Med. 2008;35: 508–516.

13. Wulff K, Donato D, Lurie N. What is health resilience and how can we build it? Annu Rev

Public Health. 2015;36: 361–374.

14. Kais SM, Islam MS. Community Capitals as Community Resilience to Climate Change: Conceptual Connections. Int J Environ Res Public Health. 2016;13. doi:10.3390/ijerph13121211

15. Rachunok B, Nateghi R. Overemphasis on recovery inhibits community transformation and creates resilience traps. Nat Commun. 2021;12: 7331.

16. Carmen E, Fazey I, Ross H, Bedinger M, Smith FM, Prager K, et al. Building community resilience in a context of climate change: The role of social capital. Ambio. 2022;51: 1371–1387.

17. Bajayo R. Building community resilience to climate change through public health planning. Health Promot J Austr. 2012;23: 30–36.

18. Fayoumi A, Sutanto J, Mauthe A. A Conceptual Framework for Designing an Effective Community Resilience Management System. In: Sakurai M, Shaw R, editors. Emerging Technologies for Disaster Resilience: Practical Cases and Theories. Singapore: Springer Singapore; 2021. pp. 101–125.

19. Mochizuki J, Keating A, Liu W, Hochrainer-Stigler S, Mechler R. An overdue alignment of risk and resilience? A conceptual contribution to community resilience. Disasters. 2018;42: 361–391.

20. Tina Yuen, Eric Yurkovich, Lauren Grabowski and Beth Altshuler. Guide to Equitable, Community-Driven Climate Preparedness Planning. Urban Sustainability Directors Network; 2017.

21. Moser SC, Pike C. Community engagement on adaptation: Meeting a growing capacity need. Urban Climate. 2015;14: 111–115.

22. Kreslake JM. Perceived Importance of Climate Change Adaptation and Mitigation According to Social and Medical Factors Among Residents of Impacted Communities in the United States. Health Equity. 2019. pp. 124–133. doi:10.1089/heq.2019.0002

23. Wiseman J, Williamson L, Fritze J. Community engagement and climate change: learning from recent Australian experience. International Journal of Climate Change Strategies and Management. 2010;2: 134–147.

24. Radtke J. A closer look inside collaborative action: civic engagement and participation in community energy initiatives. People, Place & Policy Online. 2014;8. Available: https://extra.shu.ac.uk/ppp-online/wp-content/uploads/2014/12/closer-look-collaborative-action.pdf

25. Radtke J, Holstenkamp L, Barnes J, Renn O. Concepts, Formats, and Methods of Participation: Theory and Practice. In: Holstenkamp L, Radtke J, editors. Handbuch Energiewende und Partizipation. Wiesbaden: Springer Fachmedien Wiesbaden; 2018. pp. 21–42.

26. Arnstein SR. A Ladder Of Citizen Participation. J Am Inst Plann. 1969;35: 216–224.

27. An Unfair Share Exploring the Disproportionate Risks from Climate Change Facing

Washington State Communities. UW Climate Impacts Group, UW Department of Environmental and Occupational Health Sciences, Front and Centered and Urban@UW, 2018; 2018. Available: https://cig.uw.edu/wp-content/uploads/sites/2/2018/08/AnUnfairShare_WashingtonState_August2018.pdf

28. Israel BA, Schulz AJ, Parker EA, Becker AB. Review of community-based research: assessing partnership approaches to improve public health. Annu Rev Public Health. 1998;19: 173–202.

29. Duran B, Wallerstein N. The conceptual, historical and practical roots of community based participatory research and related. Community Based Participatory Research for Health. unknown; 2003. pp. 27–52.

30. Meadow AM, Ferguson DB, Guido Z, Horangic A, Owen G, Wall T. Moving toward the deliberate coproduction of climate science knowledge. Wea. Climate Soc., 7, 179--191. 2015.

31. Lemos MC, Morehouse BJ. The co-production of science and policy in integrated climate assessments. Glob Environ Change. 2005;15: 57–68.

32. Ziegler TB, Coombe CM, Rowe ZE, Clark SJ, Gronlund CJ, Lee M, et al. Shifting from “Community-Placed” to “Community-Based” Research to Advance Health Equity: A Case Study of the Heatwaves, Housing, and Health: Increasing Climate Resiliency in Detroit (HHH) Partnership. International Journal of Environmental Research and Public Health. 2019. p. 3310. doi:10.3390/ijerph16183310

33. Hazards - Washington state department of ecology. [cited 7 Apr 2023]. Available: https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Hazards

34. Ncei. MI. Statewide Time Series. [cited 7 Apr 2023]. Available: https://www.ncdc.noaa.gov/cag/statewide/time-series/45/tavg/12/12/1895-2022?base_prd=true&begbaseyear=1901&endbaseyear=2000

35. Duwamish Valley Action Plan. City of Seattle; 2018.

36. Appendix B: Environmental Justice Analysis for the Lower Duwamish Waterway Superfund Cleanup. Environmental Protection Agency; 2013. Available: https://d10k7k7mywg42z.cloudfront.net/assets/512fbf027a507244640002ea/ej_analysis_ldw_feb_2013.pdf

37. Equity and Environment Agenda. City of Seattle Equity & Environment Initiative; 2016. Available: https://www.seattle.gov/Documents/Departments/OSE/SeattleEquityAgenda.pdf

38. Min E, Piazza M, Galaviz VE, Saganić E, Schmeltz M, Freelander L, et al. Quantifying the Distribution of Environmental Health Threats and Hazards in Washington State Using a Cumulative Environmental Inequality Index. Environ Justice. 2021;14: 298–314.

39. Washington Environmental Health Disparities Map. [cited 14 May 2022]. Available: https://doh.wa.gov/data-statistical-reports/washington-tracking-network-wtn/washington-environmental-health-disparities-map

40. Gould L, Cummings BJ. Duwamish Valley Cumulative Health Impacts Analysis. Just Health Action and Duwamish River Cleanup Coalition, ; 2013.

41. King County Census Tracts. [cited 14 May 2022]. Available: https://vizhub.healthdata.org/subnational/usa/wa/king-county

42. Duwamish Valley Resilience District. [cited 7 Apr 2023]. Available: https://www.seattle.gov/environment/equity-and-environment/duwamish-valley-program/duwamish-valley-resilience-district

43. Community Assessment for Public Health Emergency Response (CASPER). 20 Aug 2020 [cited 14 May 2022]. Available: https://www.cdc.gov/nceh/casper/default.htm

44. Disaster research response (DR2) program. In: National Institute of Environmental Health Sciences. [cited 7 Apr 2023]. Available: https://www.niehs.nih.gov/research/programs/disaster/index.cfm

45. UW youth program best practices. In: Office of the Youth Protection Coordinator. [cited 7 Apr 2023]. Available: https://www.washington.edu/youth/program-planning/

46. Schnall A, Nakata N, Talbert T, Bayleyegn T, Martinez D, Wolkin A. Community Assessment for Public Health Emergency Response (CASPER): An Innovative Emergency Management Tool in the United States. Am J Public Health. 2017;107: S186–S192.

47. Bayleyegn TM, Schnall AH, Ballou SG, Zane DF, Burrer SL, Noe RS, et al. Use of Community Assessments for Public Health Emergency Response (CASPERs) to Rapidly Assess Public Health Issues - United States, 2003-2012. Prehosp Disaster Med. 2015;30: 374–381.

48. Repp KK, Hawes E, Rees KJ, Vorderstrasse B, Mohnkern S. Lessons Learned From an Epidemiologist-Led Countywide Community Assessment for Public Health Emergency Response (CASPER) in Oregon. J Public Health Manag Pract. 2019;25: 472–478.

49. Using CASPER methodology to collect neighborhood-level health data. In: PHNCI [Internet]. 28 Feb 2018 [cited 7 Apr 2023]. Available: https://phnci.org/innovations/using-casper-methodology-to-collect-neighborhood-level-health-data

50. Hood S. Culturally Responsive Performance-Based Assessment: Conceptual and Psychometric Considerations. J Negro Educ. 1998;67: 187–196.

51. Frierson H, Hughes G. A guide to conducting culturally responsive evaluation. The 2002 User-Friendly Handbook for Project Evaluation. National Science Foundation; 2002. pp. 63–73.

52. Hood S, Hopson RK, Kirkhart KE. Culturally Responsive Evaluation. Handbook of Practical Program Evaluation. Hoboken, NJ, USA: John Wiley & Sons, Inc.; 2015. pp. 281–317.

53. CDC. Evaluation Questions: Evaluation Learning Series. In: National Center for Chronic Disease Prevention and Health Promotion. 2019. Available: els3_evaluation_questions-508.pdf

54. Specify the key evaluation questions. In: BetterEvaluation. [cited 7 Apr 2023]. Available:

https://www.betterevaluation.org/frameworks-guides/rainbow-framework/frame/specify-key-evaluation-questions

55. Tolley EE, Ulin PR, Mack N, Robinson ET, Succop SM. Qualitative Methods in Public Health: A Field Guide for Applied Research. John Wiley & Sons; 2016.

56. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. BMC Med Res Methodol. 2013;13: 117.

57. Duwamish Valley Youth Corps. In: Duwamish River Community Coalition. [cited 17 Apr 2023]. Available: https://www.drcc.org/duwamish-valley-youth-corps

58. Israel GD, Ilvento TW. Everybody wins: Involving youth in community needs assessment. Journal of Extension. 1995;33: 1–7.

59. Chen BH. Engaging Youth in Community Health Needs Assessments: What are the Opportunities, Methodological Approaches, Contributions, and Feasibility. Dissertation. Boston University School of Public Health ; 2017. Available: https://open.bu.edu/ds2/stream/?#/documents/174762/page/1

60. Moss study. In: Duwamish River Community Coalition. [cited 17 Apr 2023]. Available: https://www.drcc.org/moss-study

61. Gonzalez R. Community-Driven Climate Resilience Planning: A Framework. National Association of Climate Resilience Planners ; 2017. Available: community_drive_resilience_planning_from_movement_strategy_center.pdf

62. SHOREline home. In: National Center for Disaster Preparedness | NCDP. 25 Apr 2013 [cited 21 Apr 2023]. Available: https://ncdp.columbia.edu/microsite-page/shoreline/shoreline-home/

63. Ewan LA, McLinden D, Biro F, DeJonckheere M, Vaughn LM. Mapping the Views of Adolescent Health Stakeholders. J Adolesc Health. 2016;58: 24–32.

64. Flicker S. Who benefits from community-based participatory research? A case study of the Positive Youth Project. Health Educ Behav. 2008;35: 70–86.

65. World youth report on youth civic engagement. [cited 17 Apr 2023]. Available: https://www.un.org/development/desa/youth/publications/2016/07/world-youth-report-on-youth-civic-engagement/

66. Gallerani DG, Besenyi GM, Wilhelm Stanis SA, Kaczynski AT. “We actually care and we want to make the parks better”: A qualitative study of youth experiences and perceptions after conducting park audits. Prev Med . 2017;95: S109–S114.

67. Henderson RH, Sundaresan T. Cluster sampling to assess immunization coverage: a review of experience with a simplified sampling method. Bull World Health Organ. 1982;60: 253–260.

68. Lemeshow S, Robinson D. Surveys to measure programme coverage and impact: a review of the methodology used by the expanded programme on immunization. World Health Stat Q. 1985;38: 65–75.

69. Public health surveying – right at your door. In: UNC Gillings School of Global Public Health. 21 Mar 2017 [cited 15 Apr 2023]. Available: https://sph.unc.edu/nciph/public-health-surveying/

70. Horney J, Davis MK, Davis SEH, Fleischauer A. An Evaluation of Community Assessment for Public Health Emergency Response (CASPER) in North Carolina, 2003-2010. Prehosp Disaster Med. 2013;28: 94–98.

71. Alfano-Sobsey E, Ledford SL, Decosimo K, Horney JA. Community health needs assessment in Wake County, North Carolina: partnership of public health, hospitals, academia, and other stakeholders. N C Med J. 2014;75: 376–383.

72. Schigoda MSKD. CASPER Method for Primary Data Collection in Community Health Assessments: A North Carolina Case Study. North Carolina Institute for Public Health, Gillings School of Global Public Health; 2014 May. Available: CASPERMethodForPrimaryDataCollectionInCommunityHealthAssessments.pdf

73. CDC - Assessment - community health Assessment - STLT gateway. 9 Jan 2023 [cited 17 Apr 2023]. Available: https://www.cdc.gov/publichealthgateway/cha/assessment.html

74. The White House. Executive Order on further Advancing Racial Equity and Support for Underserved Communities Through the federal government. In: The White House. 16 Feb 2023 [cited 21 Apr 2023]. Available: https://www.whitehouse.gov/briefing-room/presidential-actions/2023/02/16/executive-order-on-further-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/

75. Howell CR, Su W, Nassel AF, Agne AA, Cherrington AL. Area based stratified random sampling using geospatial technology in a community-based survey. BMC Public Health. 2020;20: 1678.

76. Mummolo J, Peterson E. Demand Effects in Survey Experiments: An Empirical Assessment. Am Polit Sci Rev. 2019;113: 517–529.

77. Conley-Tyler M. A Fundamental Choice: Internal or External Evaluation? Evaluation Journal of Australasia. 2005;4: 3–11.