Using Photovoice as a Tool for Community Engagement to Explore Environmental Health Disparities

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ABSTRACT
Photovoice was used as a participatory research method to document perceived local environmental hazards, pollution sources, and potential impact on health among community members to address environmental health disparities. A convenience sample of 16 adults in Orangeburg, South Carolina participated in Photovoice. Photos depicted positive and negative implications of the environment across seven themes: recreation and leisure; food access; hazards and pollution; health, human, and social services; economic issues; beautification; and accommodation and accessibility. Positive and negative photos demonstrated a high level of interest among community members in considering how the environment influences health and health disparities.

Keywords: Photovoice, community-based participatory research, environmental health, environmental hazards, environmental justice, health disparities

INTRODUCTION
In the fight to address health disparities, the national agenda must address environmental determinants of health disparities as important contributing factors. Environmental justice researchers have demonstrated that many low-income populations, populations of color, and marginalized and disenfranchised groups live in communities that experience a disproportionate risk from the burden of and exposure to environmental hazards (Gallagher et al., 2016; Gee & Payne-Sturges, 2004; Gutierrez & LePrevost, 2016; Morello-Frosch & Jesdale, 2006; Pais, 2017;
Payne-Sturges et al., 2015; Rice et al., 2014; Wilson, 2009). This disproportionate burden leads to increases in exposure to adverse environmental conditions and pollution within impacted communities. The cumulative impact of environmental injustice due to the spatial concentration of environmental conditions and pollution leads to increases in negative health outcomes and community stress and lower quality of life and community sustainability. Researchers have shown that differentially exposed communities, such as environmental justice populations, have increased health risks due to inequities in power and privilege in the form of racism and classism, segregation, socioeconomic status, and discrimination in community planning and zoning (Cutter & Finch, 2008; Doede, 2016; Eberhardt & Pamuk, 2004; Jackson, Anderson, Johnson, & Sorlie, 2000; Mohai & Saha, 2006; Northridge & Shepard, 1997; Pellow & Brulle, 2005; Pulido, 2000; Rice, Brandt, Hardin, Ingram, & Wilson, 2015; Rice et al., 2016; Rice et al., 2014; Rubin et al., 2007; Schmidtlein, Deutsch, Piegorsch, & Cutter, 2008). Other work has shown how socioeconomic vulnerability contributes to variation in community health and leads to health disparities, including higher levels of stress, morbidity and mortality, in communities overburdened by the presence of environmental hazards (Eberhardt & Pamuk, 2004; Gee & Payne-Sturges, 2004; Jackson et al., 2000; Pruitt et al., 2015). Environmental injustice leads to some communities and populations being overburdened by environmental hazards and pollution leading to differential exposure to both environmental and psychosocial stressors (Linder & Sexton, 2011; Sexton & Linder, 2011; Wilson, 2009). These communities are also underserved by a lack of a strong health-promoting infrastructure that can restrict their vulnerability and buffer them from the adverse health consequences of their differential exposure (Gee & Payne-Sturges, 2004; Gracia & Koh, 2011; Herian, Tay, Hamm, & Diener, 2014; Nweke, 2011; Nweke & Lee, 2011; Nweke et al., 2011; Wilson, 2009).

Identifying opportunities to engage communities experiencing environmental injustice presents opportunities for increased awareness and motivation to act through active engagement in a participatory research process. Photovoice is a method that uses documentary photography as a means of identifying social and cultural practices and experiences of individuals and communities (Wang & Burris, 1997; Wang, Anderson, & Stern, 2004; Wang, Morrel-Samuels, Hutchison, Bell, & Pestrunk, 2004; Wang & Pies, 2004). Photovoice has been a tool widely used in CBPR to understand community member perspectives about aspects of their community that impact their health from environmental affects and disparate conditions to health decision making (Brickle & Evans-Agnew, 2017; Cannuscio, 2010; Cannuscio, Weiss, & Asch, 2010; Kovacic, Stigler, Smith, Kidd, & Vaughn, 2014; Mahmood et al., 2012; Redwood et al., 2010; Strack, Lovelace, Jordan, & Holmes, 2010; Thomas, Owens, Friedman, Torres, & Hebert, 2013). In other instances, this tool has been used to understand challenges in diverse populations, identify social injustices, inform improvement of services, and apprise new community engagement practices (Carlson, Engebretson, & Chamberlain, 2006; Grieb et al., 2013; Haque & Eng, 2011; Ornelas et al., 2009; Stevens, 2010). Thus, Photovoice, as a participatory research tool, is an ideal option for communities experiencing environmental threats to health. Environmental conditions and pollution pose serious threats to health and wellbeing.

Understanding the association between perceptions and knowledge of exposures to environmental hazards may provide more information about what needs to be and what can be done to address poor environmental conditions. To learn more about these perceived (and in
Using Photovoice as a Tool for Community Engagement to Explore Environmental Health Disparities - Brandt et al.

In many cases, actual) environmental health risks, the Coordinating Center of Excellence in the Social Promotion of Health Equity in Research, Research Education and Training and Community Engagement and Outreach (CCE-SPHERE) in the Arnold School of Public Health at the University of South Carolina, in collaboration the Community Action Board, Inc. (CAB) and community partners in Orangeburg County, South Carolina used Photovoice to assess the environment and explore environmental health disparities within an environmental justice community. The CAB was comprised of diverse and representative members of the community including community and faith-based leaders, public health officials, residents, and advocacy groups interested in environmental health disparities in the Orangeburg, South Carolina area.

METHODS

Study Design

As part of an ongoing environmental health study (i.e. CCE-SPHERE), existing relationships were used to determine appropriate methods for conducting an assessment of the environment and exploring environmental health disparities. Photovoice was used to document the perceptions of local environmental hazards and pollution sources and the potential impact on health among a convenience sample of residents in Orangeburg County, South Carolina. Orangeburg is recognized as a hub of African-American life in this area, and a well-known center of the Civil Rights Movement in South Carolina. More than 60% of residents identify as Black or African American, and there is high economic instability with about one-quarter of residents living in poverty and less than 20% of residents obtaining post-high school education. In terms of health, Orangeburg County has higher negative health indicators and lower positive health indicators as compared to the rest of the state, e.g., high rates of diabetes and hypertension, low rates of physical activity, high rates of infectious disease. Further, Orangeburg County has had a growing industrial landscape and challenges with infrastructure to support such growth while maintaining environmental integrity. Orangeburg was an ideal setting for this work examining perceptions of the influence of environment on health.

Procedures were based on discussions with the CAB of the CCE-SPHERE, review of the literature, and other applications of Photovoice in South Carolina (Brickle & Evans-Agnew, 2017; Carlson et al., 2006; Thomas et al., 2013; Wang & Burris, 1997). After meeting with the CAB in Orangeburg, plans were made to begin Photovoice implementation in the Orangeburg area. Community members (n=16) were recruited with the assistance of the CAB. Interested individuals participated in one information session, one of four photo selection meetings, and one “show and tell” meeting upon collection of the photos.

Research Staff Training

Research staff attended two training sessions prior to the project launch. The training sessions included an overall introduction to Photovoice methodology, information on the Orangeburg setting, emphasis of eligibility criteria, the three-phase approach (i.e. information session, photo selection meeting, and “show and tell” session), review of Photovoice documents and forms, and a role play practice of the process. Twelve research staff members participated in the training. Prior to each Photovoice activity, i.e. information session, photo selection meeting, and “show and tell” session, trained research staff received emails to reinforce methodology.

Participant Recruitment

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The main study population was residents (aged 18 years or older) living in Orangeburg County, South Carolina. Inclusion criteria were: 18 years or older; currently live in Orangeburg County and have lived there for at least one year; ability to communicate effectively in English, including reading and comprehending the informed consent form and Photovoice instructions and completing the brief intake form asking descriptive questions about each participant. Those individuals not meeting the inclusion criteria were excluded from participation. Members of the CAB identified and approached eligible individuals to participate in the Photovoice research activity. Eligible individuals also were identified through social, employment, and neighborhood networks in Orangeburg County. Recruitment for Photovoice was done in person and/or over the phone, via email, or using social media through personal contact. Members of the CAB were also invited to participate if inclusion criteria were met. Eligible and interested individuals were invited to attend an information session.

**Photovoice Methodology**

Information about and the use of Photovoice to tell the story of the environment – where people work, live, and play – and its impact on health was explained at the information session. Those attending the information session and were interested in participating completed the informed consent process by having a research staff member review the consent form and then signed his/her name on the consent to indicate voluntary agreement to participate. Following the consent process and completion of a brief intake form to capture descriptive characteristics of those that elected to participate, participants received equipment (i.e. camera, camera case, camera charger, and abbreviated instructions for using the camera) as well as specific instructions on using the digital camera and taking photos. Equipment distribution was noted for each participant by his/her identification number, and each participant signed a form acknowledging receipt of the equipment and their intention to return the equipment. Each participant was asked to take at least 10 and up to 25 photos of objects or places (excluding people) that they felt showed characteristics of the physical environment and possible impact on health. A photo location tracking form was provided for participants to record specific information about the date and location of each photo. At the information session, participants made appointments to attend photo selection meetings and received a photo selection meeting appointment card with the date and time of the appointment and research staff contact information.

During the photo selection meeting, participants met with a research staff member to select up to 10 photos from those that they had taken and provided written descriptions. Each staff member worked with one participant at a time to upload all photos taken by the participant and displayed the photos on the laptop screen for the participant to review. Participants took between three and in some cases more than 100 photos, and the staff member asked the participant to choose up to 10 photos that he/she felt best represented how the environment affected the health of their community. Each staff member worked with the participant to identify up to 10 photos focusing on photos of the highest quality and those that were most important to the participant. Once up to 10 photos were selected, the staff member asked the participant if he/she was satisfied with the final selections and revisited other options if not. The staff member proceeded to utilize the photos and photo location form for each selected photo to record written descriptions and ascertain additional information about the context of each photo.
Using the mnemonic “PHOTOS,” the staff member asked a series of questions for which they recorded the participant’s responses, which was based on work by Wang et al. (Wang & Burris, 1997). The following specific questions were asked of the participant for each selected photo:

- Does this photo represent where you work, live, or play or some combination?
- What is happening in the photo?
- Why did you take a picture of this?
- What does this picture tell us about your environment?
- How can this photo provide opportunities to improve health in your community?
- How would you title this photo in one sentence?

A final title for each photo and brief description was developed by the participant and staff member to accurately capture the intent and meaning of the photo. Following these questions, the staff member reviewed the information that he/she recorded to confirm with the participant that this information was accurate and as intended. This process was repeated for up to 10 selected photos for each participant. The time for this process ranged from 15 to 90 minutes. Each participant received $20 for his/her time and effort at the photo selection meeting.

Following photo selection meetings, participants were informed of the “show and tell” meeting. The project coordinator arranged for selected photos to be developed (processed) and made copies available to participants at a “show and tell” meeting. The research team conducted initial analysis and interpretation of photos to prepare a presentation to share initial findings with participants, CAB members, and other interested members of the Orangeburg community and included time for questions and discussion. The “show and tell” meeting provided an opportunity to view their own photos and the photos taken by other participants and discuss environmental concerns and health issues. The “show and tell” meeting was audio recorded to aid interpretation of data. The “show and tell” meeting and data interpretation were completed in June 2012. Participants who were unable to attend the meeting received copies of their photos by mail.

Data Management

The project coordinator served as the manager of materials and data for the project. The completed informed consent forms included the participant’s name and contact information. At the information session, designated research staff reviewed the consent form to ensure that it was completed and signed and assigned a unique study identification number. This unique study identification number was used on all materials for a given participant. When photos were selected and descriptions of photos written and audio recorded, a unique study identification number was used to match participants to their informed consent form. Photos and descriptions were stored by participant identification number and the “show and tell” audio recording was transcribed verbatim into a Microsoft Word document. Data sources for analysis included intake forms, photos, written descriptions, and the “show and tell” transcript.

Data Analysis and Interpretation

In-depth analysis and interpretation of the Photovoice data occurred over four months and final review took place with members of the CAB. The first wave of analysis and interpretation focused on the selected photos (n=160) and written descriptions. Intake forms were analyzed in Excel to calculate descriptive statistics to describe participants. Copies of photos were initially
sorted by the research team into positive, negative, and unknown depictions based on environment and health. Written descriptions supplemented the photos when positive or negative depiction was unclear. The research team completed the initial sorting process and photos were grouped together based on emergent themes. The first analysis and interpretation of data resulted in grouping photos supplemented by written descriptions as positive, negative, or unknown and were organized by the preliminary themes of (1) Recreation and Leisure; (2) Food Access; (3) Hazards/Pollution; (4) Human and Social Services; (5) Economic issues; and (6) Beautification.

After obtaining the transcription of the “show and tell” meeting, the research team convened for an additional analysis and interpretation meeting. Photos and written descriptions were reviewed in-depth by groups of two to three research team members based on a review of the positive, negative, or unknown classification of the photo and the preliminary category to which the photo was assigned. After this initial review by small groups, the full research team considered the preliminary organization of the photos and identified and expanded seven emergent themes to include (1) Recreation and Leisure; (2) Food Access; (3) Hazards and Pollution; (4) Health, Human, and Social Services; (5) Economic Issues; (6) Beautification; and (7) Accommodation and Accessibility. Small groups then engaged in a process of organizing photos by subthemes within the newly defined categories considering positive, negative, and unknown classification and written descriptions were also used in this process. Categories and subthemes were used to interpret the collective photos for their implications for how the environment affects health.

Throughout the progression of implementation, analysis, and interpretation, the research team utilized an iterative member checking process to assess the procedures. Data analysis and interpretation occurred in small and large groups with interpretation of data (intake forms, photos, written descriptions, transcript) reviewed by all research team members. In addition to the involvement of research team members, participants and CAB members reviewed the findings prior to further dissemination.

RESULTS
Telling the Story of the Environment through Photos

Sixteen participants took part in the study. All participants were African American/Black, non-Hispanic. A majority of the participants were female (81%), employed full-time (31%), worked in the health care field (63%) and had greater than a high school education (88%). A large majority of participants were home owners and rated Orangeburg as a “very good” place to live and believed that the environment was a “very important” factor causing disease. Each participant took a range of three to more than 100 photos and 160 were included with written responses for analysis.

Utilizing photos, written descriptions, and the transcript of a “show and tell” session with participants, research team members engaged in an iterative process of reviewing photos and developing a framework in which to interpret the photos to identify health concerns related to the environment in Orangeburg. CAB members were involved in the process of interpreting photos and confirming categories. Photos were organized by the following seven emergent categories: (1) Recreation and Leisure; (2) Food Access; (3) Hazards and Pollution; (4) Health, Human, and Social Services; (5) Economic Issues; (6) Beautification; and (7) Accommodation and Accessibility.
Accessibility. Positive photos (e.g., fresh fruits and vegetables, community gardens) and negative photos (e.g., standing water, abandoned houses) demonstrated a high level of interest among community members in considering how the environment influences health and contributes to health disparities.

Recreation and Leisure. Among those who took part in the study, 27 pictures were selected related to recreation and leisure activities. A majority of the pictures were related to parks, public recreation opportunities, walking trails, and exercise facilities (Figure 1). One participant said:

“This walking trail at Edisto Gardens provides nice scenery while walking and exercising. It’s a family trail, serene, and quiet. It is conducive to good health and healthy lifestyles. It’s an opportunity to improve overall health.”

Figure 1. Walking trail at Edisto Gardens

Other participants commented on issues related to the safety of public recreational facilities mentioning that there were some places that were safe to go at certain times and at other times it was not safe. One participant discussed a photo taken of a picnic table that had left over debris from people smoking, drinking, and playing Dominoes. The participant mentioned that the older lady who lives in the area is afraid to say something and that there are a lot of neighborhood kids being exposed to this kind of activity. Another participant took a picture of a playground that provided an environment for local children to play and provide physical activity, however, there were dumpsters next to the playground area that brought about cause for concern as they could potentially negatively impact health (Figure 2). The participant said this about the playground photo:

“I guess the racial issue...it’s just the idea that in the African American area there are trash dumps beside the black neighborhood.”
Food Access. A majority of the pictures selected related to food access were positive and highlighted the use of roadside and farmer’s markets, old country stores, and community gardens. Participants talked about the convenience of an old country store that has food and other items for one stop shopping (Figure 3). The convenience of a one stop shop store was mentioned because for the participant, nothing else was around for access. The participant stated:

“An old country store with birdhouses, plants, mulch...and all at a grocery store! It’s a one stop shop! This reminds me of the need for a one stop shopping for other things like medical care. It can be hard to be healthy and coordinate specialty care. It takes a lot of energy to be healthy!”
There was also discussion among participants about the presence of a community garden for people with limited incomes. The idea for its conception was that it would encourage healthy eating among residents, and create access to fresh vegetables free of pesticides and chemicals (Figure 4). The expectation of the community garden was that if you partake of the food, then you gave back to it in the form of labor to make sure that it was sustained. There was much concern among residents about the chemicals used to grow food and their interaction with certain medications. One participant stated:

“This community vegetable garden is growing for a cause – to be health conscious. The vegetables are for those with limited incomes because the fruits and vegetables are expensive, and they can get fresh vegetables for free. No chemicals in this garden to interact with meds.”

Figure 4. This community vegetable garden

Other participants mentioned the garden being a good idea because they knew it was fresh and people used to grow their own food in the past so they viewed it as a positive aspect of their community. In contrast, another participant voiced their concerns about damage that may have been done to the land used to grow the food because no one had been there to test the quality of the soil. Comments emerged from the group about unhealthy food options. One participant talks about McDonald’s being a place for unhealthy snacks and the over saturation of fast food outlets. Fast food was mentioned as an issue in this community because of the busy lifestyles and fast food sometimes being the only sources of convenient food available.

Hazards and Pollution. Several photos selected referenced hazards and pollution where images of structural damage to local infrastructures, standing polluted water, environmental toxins, abandoned buildings, and trash were apparent. A majority of the photos fell into the hazards and pollution category. Participants realized that things they had not necessarily thought about in their environment began to stick out and they would capture them in photos. Photos that depicted sinkholes, potholes, and unrepaired streets raised themes of safety. Another theme
related to hazardous living also emerged. One example included images of exposed power lines and transformers too close to homes (Figure 5). One participant said:

“So I spoke with a friend of mine who’s an engineer and he said these are very commonly used in under resourced areas; that in places where the expense can be accommodated that can be a closed system.”

Figure 5. Power lines close to residential housing

Another participant says this about a nearby cement plant (Figure 6):

“Generations of toxic soup from this cement plant and hazardous waste burning. Our environment is unsafe and a threat to our health.”

Figure 6. Cement plant and hazardous waste burning
Other concerns about sitting and contaminated water in streams and rivers and were also discussed among participants. One participant talked about the contaminated drinking water and commented:

“Columbia, SC which has a very antiquated water system is said to have one of the best water systems in the country. So what about 45 miles away, not even the edge of the county...so 45 miles from the center of Columbia to here and we have issues with drinking water.”

Health, Human and Social Services. A number of pictures were taken related to health care facilities and services, such as the Council on Aging, the Social Security Administration, dental offices, and public safety offices. Some participants mentioned that they had no idea health care facilities would be viewed as important. One participant talked about the Social Security Administration photo possibly being negative, but most of the pictures captured in this category were positive and communicated access to health care resources (Figure 7)

![Department of Social Services](image)

**Figure 7.** Orangeburg Department of Social Services

*Economic issues.* Photos that fell in the economic category were largely related to images of closed businesses, abandoned homes resulting in safety concerns, health concerns, and illegal or unwanted activity and risk for the community. Participants discussed the issue of blocks of boarded up houses and residential buildings in need of repair where people still reside which could reflect the general economic circumstances of the community resulting in poorer health outcomes (Figure 8). One participant said about the string of boarded up houses:

“*Your Ghetto, My Ghetto, Our Ghetto*”

Another participant discussed a new Goodwill store being built in the area:

“*The community, for the people that’s right there in the community. Say you go to that store and you just got maybe $10 to go around there. That store is not gone last, that store is not going to make it. Its back there by the jail, the jailhouse is right there and houses are all around...*”
Figure 8. Rows of boarded up housing

*Beautification.* People who live in areas that are well kept may take better care of themselves and have improved mental health. In effort to capture more positive perspectives, residents were asked to take pictures of things that they thought positively contributed to their health. One resident took a photo of newly built medians with fresh flowers and palm trees but makes comments that this new feature would have been better served elsewhere (*Figure 9*). The participant stated:

“Could’ve went other places, that’s the same thing I was thinking when I saw the picture, thinking that’s a picture of Russell St. and wasted dollars.”

Other pictures of mural paintings were discussed among participants. A mural painting is a way of a community reclaims their community (*Figure 10*). One participant said:

“If you are passing through and just glance, you really think these people are real, but it’s actually on the side of an abandoned building.”
Accommodation and Accessibility  Participants took photos of crosswalks for wheelchairs, bicycles, and strollers as well as accessible curbs and wide handicapped parking spaces (Figure 11). One participant mentioned:

“This is something positive about the small town of North. The mayor paid attention to have a wide sidewalk.”
DISCUSSION

A number of positive depictions of the Orangeburg County were captured by participants; however, there was also a great deal of concern about a variety of environmental hazards that were considered a threat to their health. As such, participants were able to make the necessary connections that underscored the importance of environmental justice work needed in underserved communities, as reported previously in the literature (Gee & Payne-Sturges, 2004; Nweke & Lee, 2011; Wilson, 2009). This demonstrated, similar to participatory research efforts with other environmental justice communities, that the broadly defined environment is salient and acknowledged as a determining factor in health (Rubin et al., 2007; Wilson, 2009). Emphasis on social determinants when intersecting with the role of the environment provides a more balanced indicator of root causes of differential factors contributing to health and disparities in health outcomes (Linder & Sexton, 2011; Sexton & Linder, 2011; Wilson, 2009).

The seven emergent themes identified through a participatory, iterative process, with members of the research team, CAB, and participants, reflected previous reports in the literature. The themes also represented ideal opportunities for change through action. The photographs also stimulated discussion about action steps for changing environmental conditions to improve health. The interplay between participants during such discussions, including members of the research team and CAB, was revealing and informative leading to a stronger degree of interpretation of the process and results.

Emergent themes were not mutually exclusive. There were intersectional interpretations of themes, such as food access, environmental hazards (or pollution), and economic issues. For example, the theme of food access resulted in identification of the need for fertile soil and ideal growing conditions in order to take advantage of the multiple benefits of growing food. Due to physical features of the environment, some participants expressed concern for the safety of growing food (due to environmental hazards and pollution) whereas others viewed this as an intersectional opportunity for better health through consumption of more fruits and vegetables –
free of chemicals and additives – and economic opportunity. The intersection of multiple themes in a single photograph demonstrated the complexity of examining the environment and influences on health.

The methods used served as way to engage members of community, and as noted, their involvement enhanced the process and results. The focus on actionable steps leading to opportunities that must be seized with such a motivated group. Following presentation of photovoice results to participants and the CAB, the research team worked with the CAB to produce a full color booklet featuring photos, selected by the CAB, for each of the seven themes. The booklet became a tool for advocacy for the CAB and members of the community to acknowledge positive features of the environment and draw attention to negative conditions. During this process, the research team facilitated discussions with the CAB about opportunities for next steps and allowed for the CAB to assume ownership of the process. Members of the CAB contributed to academic products, including posters presented at professional conferences nationally and locally. The results of the assessment have been shared by members of the CAB without the involvement of the research team. This was a direct result of the active engagement of the CAB and recognition of the importance of the role of the environment to health. Following the photovoice activities, the CAB remained involved with subsequent efforts to more fully understand environmental influences on health in the community, including a community-side survey, review of existing data, and additional meetings with stakeholders to determine plans to act on information gathered. Photovoice as a critical tool to engage the community in these efforts.

Limitations

The study had several notable strengths, including the active involvement of committed members of the community, use of a participatory research method to increase and enhance engagement, and iterative methodology to aid in interpretation of data. The study also has limitations. The results presented are based on a small sample size in one environmental justice community in the southeastern United States. The results may not be generalizable to other communities. The limit of 10 photos per participant was necessary to manage the process and may have resulted in important photos not being included in analysis and interpretation due to these limits. The quality of some photos was limited and restricted selection of some photos due to such concerns. The participants were actively involved, a noted strength, but may not represent the larger population of Orangeburg County, thus, the sample may not be representative.

CONCLUSION

Photovoice was successful in engaging participants and the CAB in a thoughtful, strategic process of considering how the environment influenced health and was connected to health disparities. The photos served as a tool for enhancing discussions and enriched the larger project. An environmental health survey, based in part on the interpretation of photos, was administered following Photovoice to capture additional information of perceptions related to the environment and health and inform subsequent action. CAB members had the opportunity to develop and enact an action plan to sustain engagement and stimulate positive change to the environment to improve health in Orangeburg County after the end of the assessment process.
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Using Photovoice as a Tool for Community Engagement to Explore Environmental Health Disparities - Brandt et al.


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