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Lessons from the Navajo: Assistance with Environmental Data Collection Ensures Cultural Humility and Data Relevance

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Abstract

Background—The Navajo Nation suffers from a legacy of environmental pollution from historical uranium mining activities, resulting in adverse public health outcomes and continuous exposure.

Objective—Partner with a Navajo graduate student and community members in a field campaign to characterize the spatial distribution and geochemistry of uranium for a multipathway uranium exposure assessment under development by the Dine Network for Environmental Health (DiNEH) project.

Methods—Attend community meetings, acquire Navajo language skills, and integrate local knowledge into sampling approach of sediment, water, and vegetation.

Results—Navajo participation (1) helped to foster trust in research efforts during community interactions, (2) taught aspects of Navajo culture and language to maintain positive and respectful relations, and (3) conveyed information on Navajo culture that would impact sampling strategies.

Conclusions—Community engagement helps to sustain equitable partnerships and aids in culturally appropriate, relevant data collection.

Keywords

Environmental health; community-based participatory research; community health partnerships; environmental illness; disorders of environmental origin

The Navajo Nation in New Mexico, Arizona, and Utah, home to some of the largest uranium reserves in the world, suffers from a legacy of contamination associated with the extraction and processing of this uranium.¹ Uranium mining occurred primarily between 1947 and 1986²; the Navajo Nation banned the mining in April, 2005.³ Mines and mills on tribal lands provided employment opportunities for Navajo men; however, these jobs offered no health or safety protection from mine waste and radiation hazards.¹ In addition, environmental exposures within the Navajo Nation also place the *Diné* (Navajo name for themselves) at risk for adverse health outcomes. These environmental hazards include proximity to mining and milling sites and waste piles, as well as consumption of unregulated drinking water contaminated with uranium and other heavy metals.

Renal disease is pervasive throughout the Navajo Nation, with chronic kidney disease being three times more prevalent than in the general U.S. population.^{4–6} Diabetes and hypertension,

risk factors for kidney disease, are also common among the Navajo people, but are not alone likely to account for the tripling of renal disease. The prevalence of kidney disease maybe attributable to the nephrotoxic effects of uranium^{7–9} resulting from occupational and environmental exposures. Community activism raised awareness of the potential public health impacts of uranium exposure, prompting the Eastern Navajo Health Board to seek assistance from a multidisciplinary partnership to address concerns about uranium as a potential kidney toxin in 22 Navajo chapters (similar to towns). As a result, a comprehensive community-based participatory research (CBPR) program is in progress, including the identification and modeling of environmental, health, socioeconomic, and cultural risk factors for kidney health.

The DiNEH is approved by the Navajo Nation Human Research Review Board, University of New Mexico Human Research Review Committee, and Tufts University Institutional Review Board. The collaboration aims to reduce uranium exposures resulting from ingestion of unregulated drinking water and identify the relative risks for chronic kidney disease in the Navajo population.

OBJECTIVES

Because of historical mine-water discharges to drainages in the study area as well as the potential for redistribution of uranium from unreclaimed waste piles during episodic precipitation, the DiNEH research team developed a field and laboratory campaign to characterize both the spatial distribution of uranium contamination and the geochemical controls on uranium mobility from waste sources. Field and experimental data will be incorporated with self-reported uranium exposures to form the exposure assessment of a multilevel risk model under development to identify the relationship between kidney disease and uranium exposure.

To execute this investigation, three new members joined the project team, including two white (non-tribal) graduate students and one bilingual Navajo graduate student, all novices with respect to CBPR practice. DiNEH project researchers have spent years developing relationships with the Navajo community and establishing an equitable and productive research partnership, the cornerstone of successful CBPR.^{10,11} As such, it was critical that new team members assimilate and spend time collecting samples in a positive and culturally appropriate manner to maintain successful working relationships between DiNEH researchers and the community. With one third of the Navajo population speaking only Navajo,¹² it is not difficult to envision barriers when non-tribal researchers enter a Navajo community. In addition to language obstacles, the historical abuse to the Navajo People by the U.S. government¹³ and mineral exploiters has done nothing but foster mistrust between the Navajo people and outsiders.

Data collection consisted of surface water, sediment, and vegetation sampling, requiring access to private land and local knowledge of mine sites, roads, and cultural practices. This account describes the shared experience of the cross-cultural field researchers as they work not only to build their own team, but also earn the trust of the broader community. In addition, the necessity of local knowledge in a field campaign is demonstrated as a method to collect samples both respectful of and relevant to Navajo culture. The experience is recounted in the context of a CBPR framework, touching on both limitations and successes generalizable to other cross-cultural CBPR projects and will be useful for new CBPR investigators. This is a qualitative process analysis about the execution of a participatory field campaign; physical results of the sampling will be reported elsewhere.

FOSTERING TRUST

The issue of developing trust is a persistent theme throughout the CBPR literature,¹⁴ being cited as necessary element for the success of group processes, particularly in communities where mistrust of outsiders may be present at the outset.¹⁵ A common Navajo perception of researchers outside of the tribe is that they are exploitive of the Navajo people, gathering information that does not directly benefit the tribe, and not reporting data back to the tribe so that they might use it to solve a problem. This feeling can be generalized to experiences of other Native American tribes, citing contact with outside researchers only during the data collection process, publication of their results solely for professional audiences, and disappearance of the researchers after the fact.^{16–18} Failure to report results back to communities and Navajo decision makers minimizes the possible benefits to the Navajo Nation, such as public health interventions and remedial action. Perhaps most significant are the inappropriate approaches and attitudes researchers have toward the Navajo people during data acquisition, resulting in misinterpretations and disrespect of Navajo culture. In fact, these observations were the impetus for the creation of the Navajo Nation Human Research Review Board in 1996, the first human research review board established by a Native American tribe to protect their people.¹⁹

To build trust and respect through personal actions, cultural education was the first step to team assimilation. Our Navajo team member taught the non-tribal researchers about cultural demonstrations of respect such as introducing your clan and your place of residence in Navajo, minimizing direct eye contact with elders, being humble, and avoiding aggressive handshakes. The non-tribal team members were instructed to introduce themselves by stating their first and last name, folio wed by the Navajo word *iin'sha*, and then their university and location, followed by the Navajo word, *dee' noosha*. In addition, every effort was made to learn Navajo greetings and conversational elements, which generally made community residents laugh in both amusement and appreciation. In turn, our Navajo team member quickly gained our trust and respect by demonstrating his commitment to the project through the sharing of personal stories related to uranium mining and Navajo culture, willingness to learn new skills and work hard, punctual arrival at field sites, and patience.

The field team was introduced to community members and chapter leaders at a chapter house meeting. Despite being from a different region of the Navajo reservation, the people acknowledged our Navajo team member as part of their community through clanship and knowledge of the Navajo language. For those community members who were not in attendance, our Navajo team member and local Navajo community members familiar with the DiNEH project introduced us to household members in the field sampling areas, providing a brochure and number to call if they had any further questions about our activities. The DiNEH team also facilitated our acceptance by providing us with a DiNEH project sign for our car and photo IDs identifying our connection with the DiNEH project. Had we not been a team, the presence of unfamiliar “white” faces and the inability to translate our reason for being on Navajo land would likely have precluded progress in sample collection and caused reason for mistrust and concern.

LOCAL KNOWLEDGE AND CO-LEARNING

Historically, studies in Native American communities have made serious omissions of native lifestyle practices in their research, resulting in inaccurate or false risk characterization and, ultimately, inhibiting appropriate interventions.²⁰ Schwab and Syme^{21p504} state that both quantitative and qualitative data collection must “reflect the ecological reality of life in that population, as people experience it.” It is only when this paradigm is followed that data collected can generate findings that can be translated into efforts to improve health.²² Our

Navajo team member cited an initial concern in becoming a member of the team out of fear that the data collected would make no difference to the health of his people and the environment. As such, it was important for the field campaign to foster a co-learning environment so that anyone involved in our effort could contribute local expertise to aid in our approach and ensure the relevance of our data.²³

The importance of local input is supported through our experience in collecting vegetation samples in the field. To provide exposure information for the DiNEH risk model, it was necessary to determine if livestock were consuming uranium-contaminated grasses, thereby creating an exposure pathway for humans. Our Navajo team member was able to identify grass species that were eaten by cattle and sheep based on his experience raising livestock with his family. A Navajo community member helped the team to identify a local plant known as the *Cleome serrulata* (Rocky Mountain Bee Plant), which produces an edible seed pod that was eaten by his family throughout his childhood. Based on this input, we were able to select grass and plant species for sampling that could potentially impact livestock or human health.

Upholding appropriate cultural approaches to field sampling required constant input from our Navajo team member. Part of the field plan was to take samples from an uncontaminated control location that was not impacted by uranium mining activities; however, a Navajo ceremony was taking place at this time. This ceremony was described to us as an “Enemy Way Ceremony” or *nidaa*, which typically lasts for 3 nights and 4 days and is held only during the summer months. This is a healing ceremony to treat ill patients or veterans who have returned from a foreign war.²⁴ Ceremonial practices typically have many participants out on horseback trips and clan relatives and friends coming and going to provide positive reinforcement to the ill person. During this time, the field team was told by a Navajo community member to stay away from the area until the ceremony was complete. Typically, when field sampling for contaminants, a general rule of thumb is to sample first from uncontaminated areas followed by contaminated areas. However, with this ceremony going on, we altered our plan to begin at a different location, still utilizing our time efficiently, while respecting the Navajo ceremony that was in progress.

The Navajo belief in the power of lightning was another prevalent issue in our field program. Lightning was used by the Twin Navajo warriors as a weapon in the Navajo Creation story, and as a result, is respected by the tribe. However, Navajo people believe an illness can result from contact with anything that has been struck by lightning, and that only people with bad intentions or those participating in a “Lightning Way” (or healing ceremony) associate with it. It was desirable for the non-tribal researchers to sample during or immediately after rainstorms because we expected uranium transport during precipitation events. However, summer rainstorms are typically associated with lightning. Sampling during lightning events, while also dangerous, would have been disrespectful to a strong cultural belief, compromising the well-being of our Navajo team member.

Non-tribal team members were able to demonstrate soil and water sampling techniques, including auguring and collection of soil samples from different depths; taking river flow velocity measurements; collection, filtration, preservation, and storage of water samples; and measurements of soil and water chemistry using a computer-interfaced, multiparameter probe. Mechanisms of uranium mobilization and transport were discussed among the team members, as well as the surrounding geology and geomorphology of our field area. It is important to note that successful execution of a field campaign requires consistent communication between team members, providing daily team-building and learning exercises through continuous teamwork.

SUCCESSES AND LIMITATIONS

The project team draws many successes from this partnership. First, we feel the field data collected will accurately reflect the environment and culture from which they were collected, aiding in overall exposure assessment that will support an appropriate public health intervention and have implications for remedial decisions. Second, the team felt a positive start to a long-term community partnership and learned important tools to interact respectfully among the Navajo people. Third, our Navajo team member cites that his participation in this project has helped to give meaning to the lives that have been lost through uranium mining illnesses. He also notes this experience has changed his negative perceptions of outside researchers, breaking the stereotype that outside researchers take advantage of the Navajo people. Drawing from a positive experience working with non-tribal researchers will help to foster new research collaborations rather than shy away from them out of concern that they might harm the tribe. Finally, it did not take a significant funding source to support Navajo student participation in this field investigation, providing another example of how the existence of such funding can increase success in CBPR programs by providing the means to support emerging project needs.

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As with any CBPR project, there are common limitations that must be addressed. First, some members of the project team reside far from the field site and funding is sparse, making return trips limited, thereby not achieving one of the most essential strategies for CBPR, namely, physically "showing up" in the community.²⁶ This is a major concern for the entire field team, because we do not want lengthy time periods spent away from the community to reinforce old stereotypes of non-tribal researchers. The field campaign was of short duration, and although we stayed on the reservation, we failed to connect with various members of the project team and community members as frequently as we would have liked owing to schedule conflicts and travel distances. Unlike CBPR in urban areas, where researchers have more frequent contact with the community because of population density and infrastructure, only four paved roads are present in the DiNEH study area, and dirt roads are slow and often impassible after a rain or snow event. This inhibits the ability for DiNEH team members to connect at centralized locations (such as a Chapter House or Health Board office) and limits access to field sites. Therefore, project schedules must remain flexible and adequate time must be allocated to complete project tasks and connect with the community. Finally, some Navajo landowners denied us permission to collect samples on their land, based on a historical lack of follow-through and mistrust of previous outside investigators. This suggests that no matter how strong new relationships may be with a community, there are some traumas that could not be repaired in the limited time that was available to our field team, and we must respect those feelings and keep our distance.

CONCLUSIONS

Quigley et al.²⁰ cite a number of key strategies necessary for equitable research partnerships in communities impacted by uranium mining and other nuclear contamination. The four issues cited are (1) community participation at all stages, including design, implementation, results, interpretation, and dissemination, to prevent bias, unethical goals and conflicts of interest; (2) community knowledge of disease must be integrated into the research and not be rejected as anecdotal or subjective; (3) community members must be educated about the impacts of contamination and training in CBPR to understand and manage public health issues related to contamination; and (4) research that is solely quantitative must not dominate health assessment findings. These CBPR strategies have been employed successfully in other Native American communities²⁷ and have also formed the positive, productive foundation of the DiNEH project. Our project team employed these principles during our field campaign, and will continue to do so throughout the interpretation and dissemination phase of this research.

In sum, a small pocket of flexible funding enabled a successful partnership of Navajo and non-tribal researchers to collect field data necessary to complete a uranium exposure assessment for the DiNEH project. Such a partnership is essential for having local knowledge to collect relevant data, learning appropriate tools and approaches for interacting with different cultures, and changing historical misconceptions of outside researchers in communities where mistrust is prevalent. The benefits, as well as the limitations noted, relevant to any cross-cultural and rural setting and should be considered by all investigators new to participatory research. Data analysis is currently underway for samples collected throughout this field campaign. As results come in, they are shared with our Navajo team member and the DiNEH Project team. We will work together to prepare an interactive presentation to the community to discuss our findings and implications, employing a risk mapping strategy as discussed by Minkler and Hancock.

²⁸ Our results will be integrated into the broader community health assessment of DiNEH, providing long-term continuity and impact. A return to the DiNEH study area with our results will bring our field campaign full circle, reinforcing our commitment to the community.

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