

Uranium Legacy Impacts on Health in Eastern Navajo Agency

Diné Network for Environmental Health (DiNEH) Project Update



Navajo Uranium Contamination Stakeholders Meeting
Tuba City (AZ), Navajo Nation

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Representing
Diné Network for Environmental Health Project

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DiNEH Project: Purpose and Partnerships

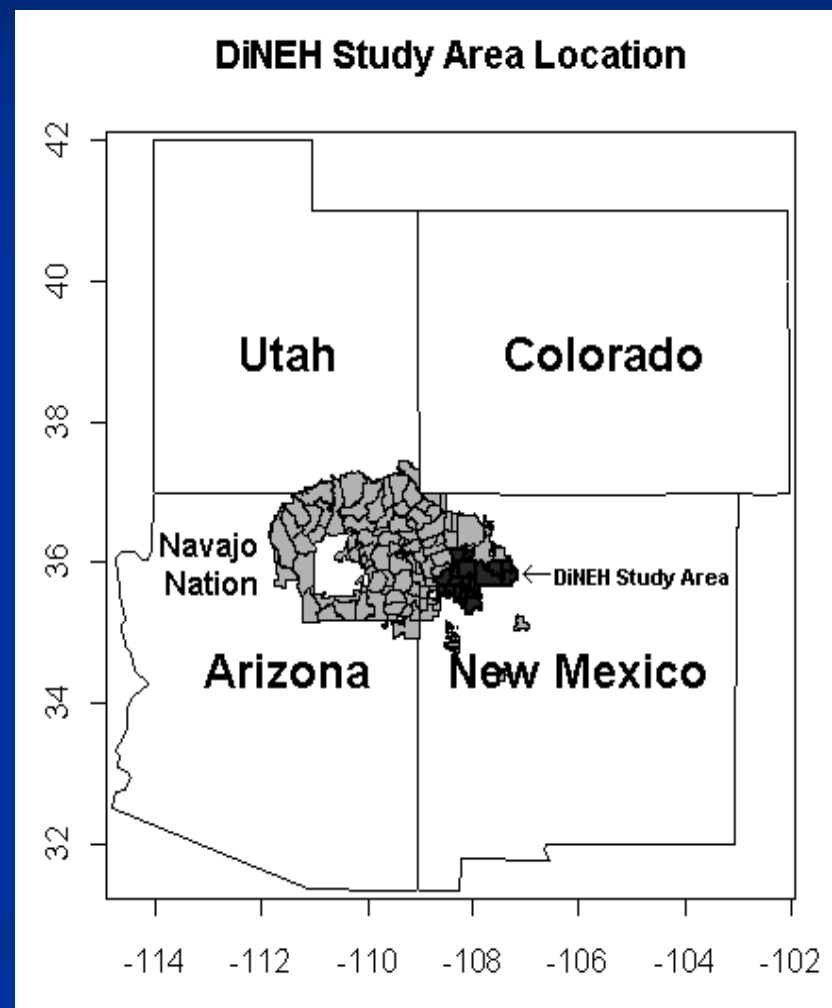
- Assess relative contribution of environmental uranium exposures to community health through a culturally appropriate community-based participatory approach
 - Data collection and outreach by Navajo community staff
 - Interdisciplinary team committed to translational research: community → research → clinical care → policy
- Partnership of University of New Mexico Community Environmental Health Program, Southwest Research and Information Center, Crownpoint Service Unit, University of Texas-Houston Medical Center, 20 Chapters of the Eastern Navajo Agency

DiNEH Project reviewed and approved by

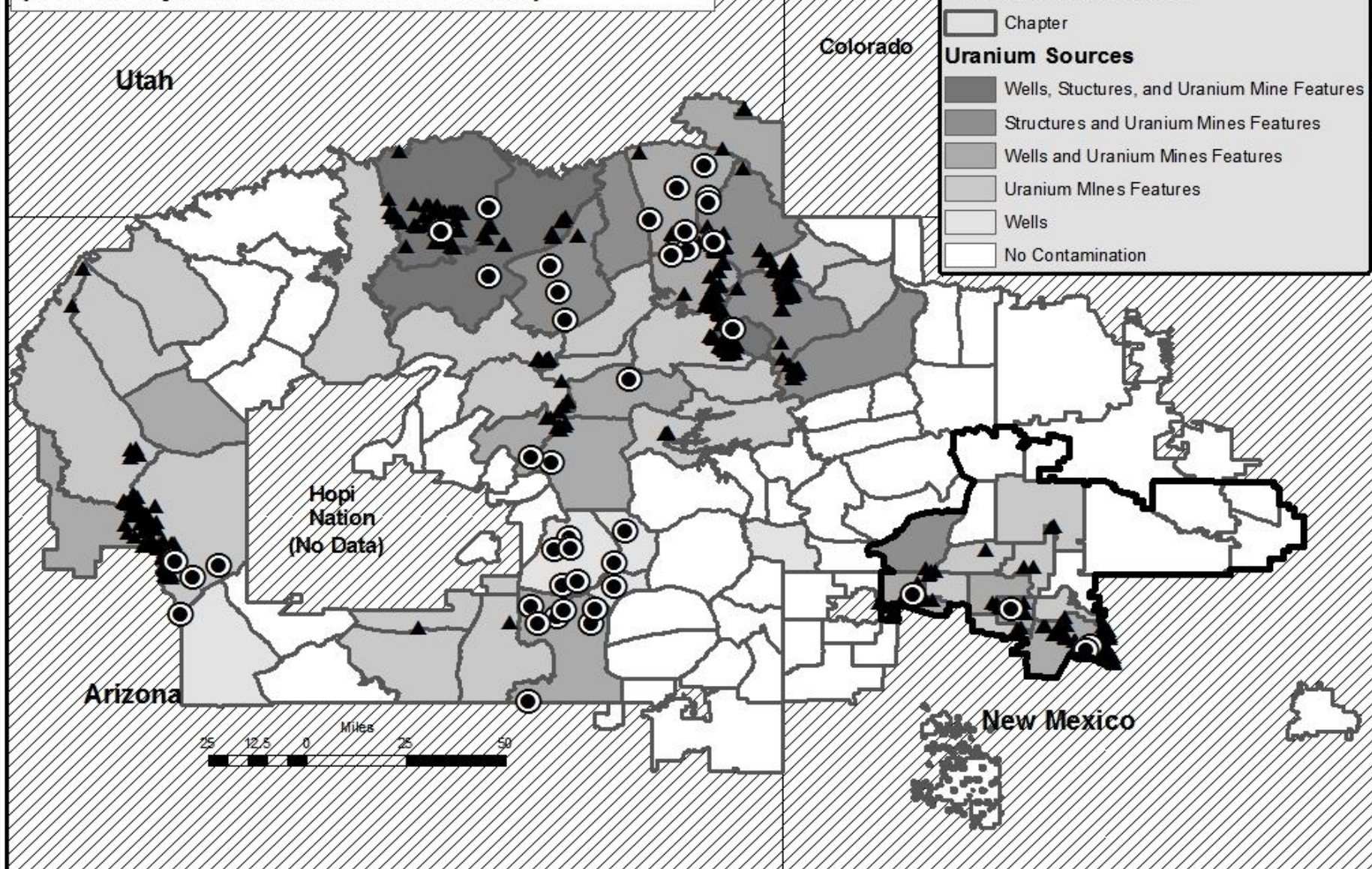
- Navajo Nation Human Research Review Board
 - Ensures protection of the Navajo people, respect for Navajo culture
- UNM Human Research Review Committee
- Peer-Reviewed by the National Institute of Environmental Health Sciences of NIH
- Data presented reflect support from the following 20 chapters of the Eastern Agency of the Navajo Nation
 - Baca/Prewitt/Haystack, Becenti, Casamero Lake, Church Rock, Crownpoint, Coyote Canyon, Iyanbito, Lake Valley, Littlewater, Mariano Lake, Nahodishgish, Ojo Encino, Pinedale, Pueblo Pintado, Smith Lake, Standing Rock, Thoreau, Torreon/Star Lake, Whitehorse Lake, White Rock
- ***We thank the 1,304 residents of these chapters who have participated in this research to date.***

Project Activities Summary 2004-2010

- 1,304 face-to-face interviews in English and/or Navajo
- Participants' homes located by GPS
- Results provided to chapters at >60 meetings, in regularly updated binders
- Health data based on self-reported information from participants
 - Validated through reviews of population-proportional random sample of medical records
- 130 water sources tested; >160 visited
- 450 of 1,304 survey respondents selected for blood and urine analyses for early indicators of health effects related to environmental exposures (*in progress*)

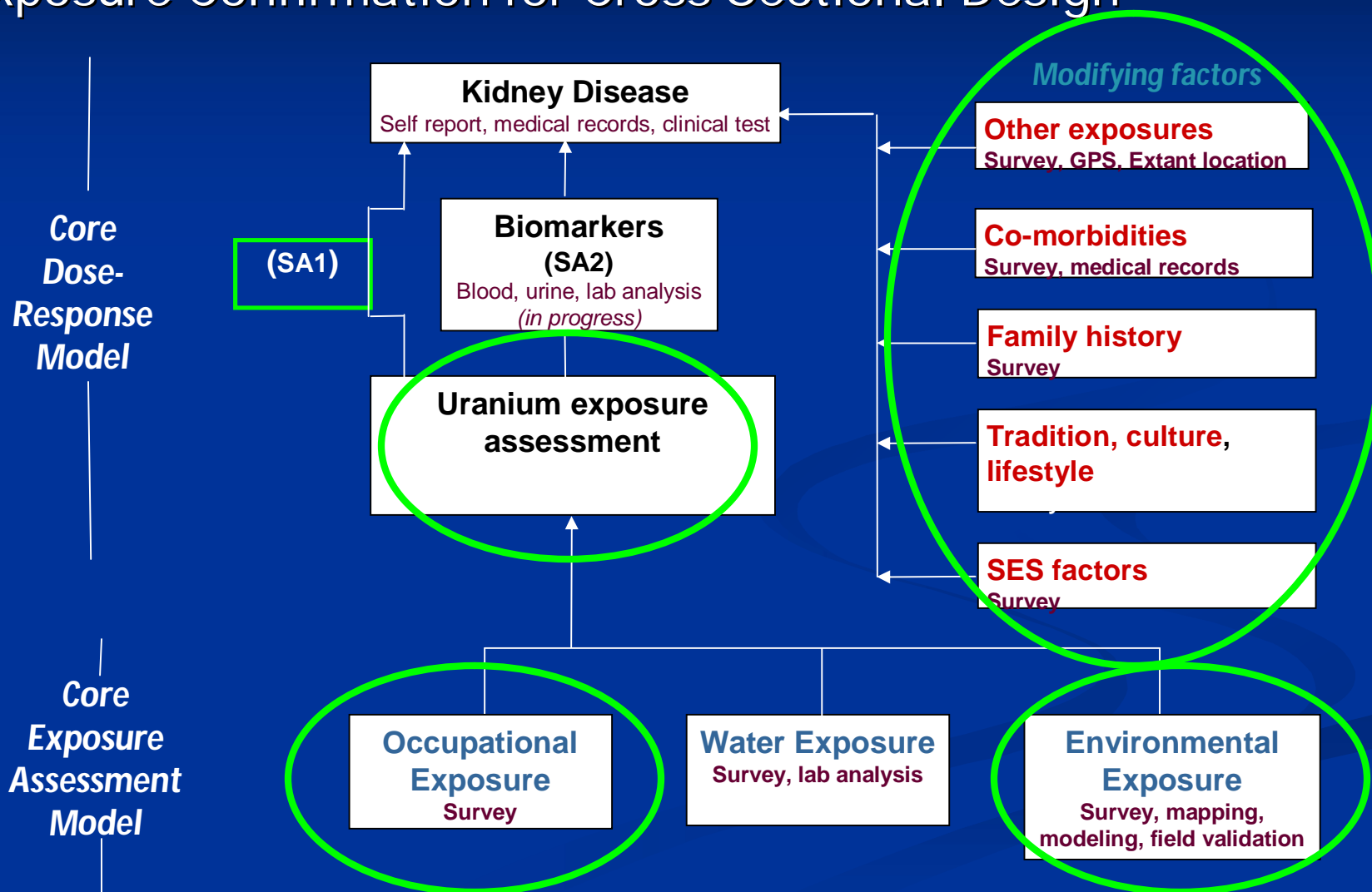


**Navajo Nation Uranium Exposure Sources:
Uranium Mine Features, Contaminated Structures
Uranium Contaminated Wells
(Non-Navajo Lands data not included)**

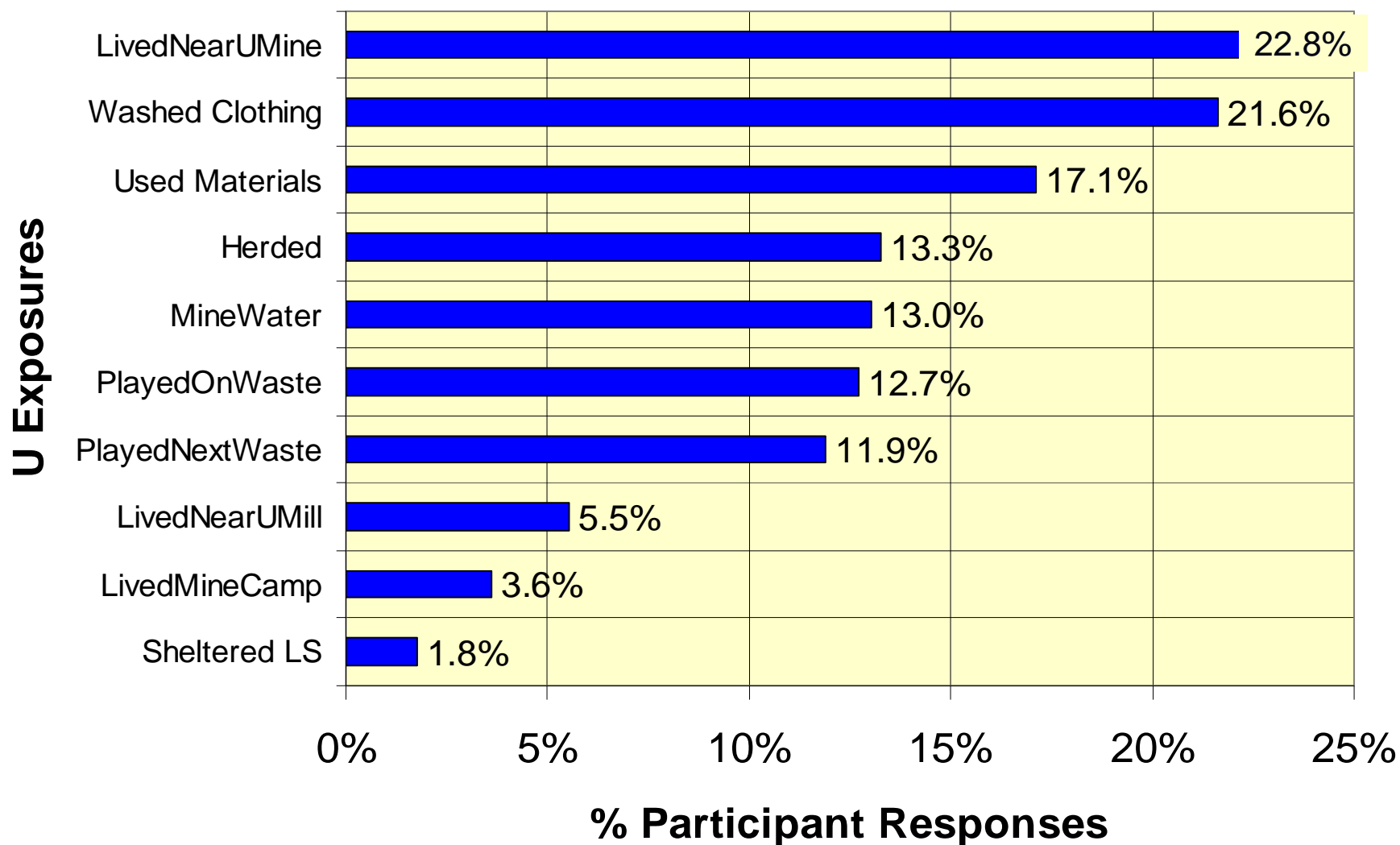


Multilevel model

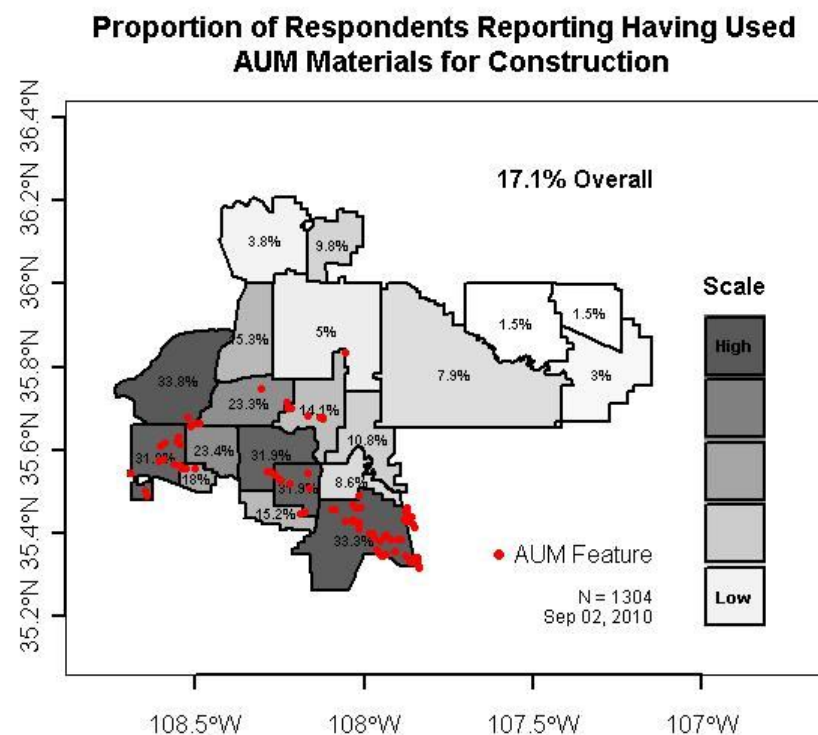
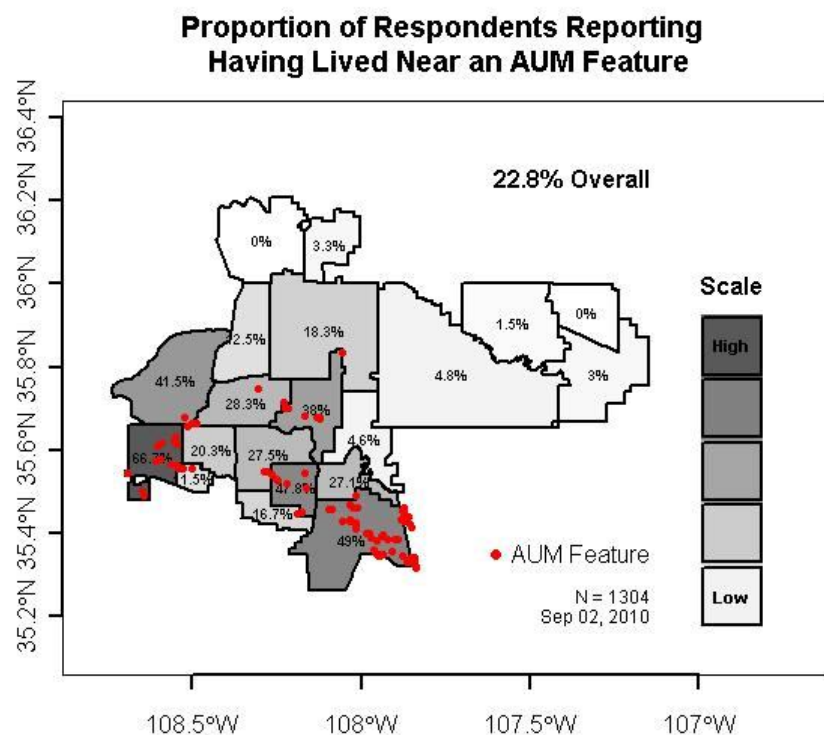
Replication, Convergent Validity, Field Validation,
Exposure Confirmation for Cross-Sectional Design



Self-reported Non-Occupational Uranium Exposures Among All DiNEH Survey Participants (N=1,304)

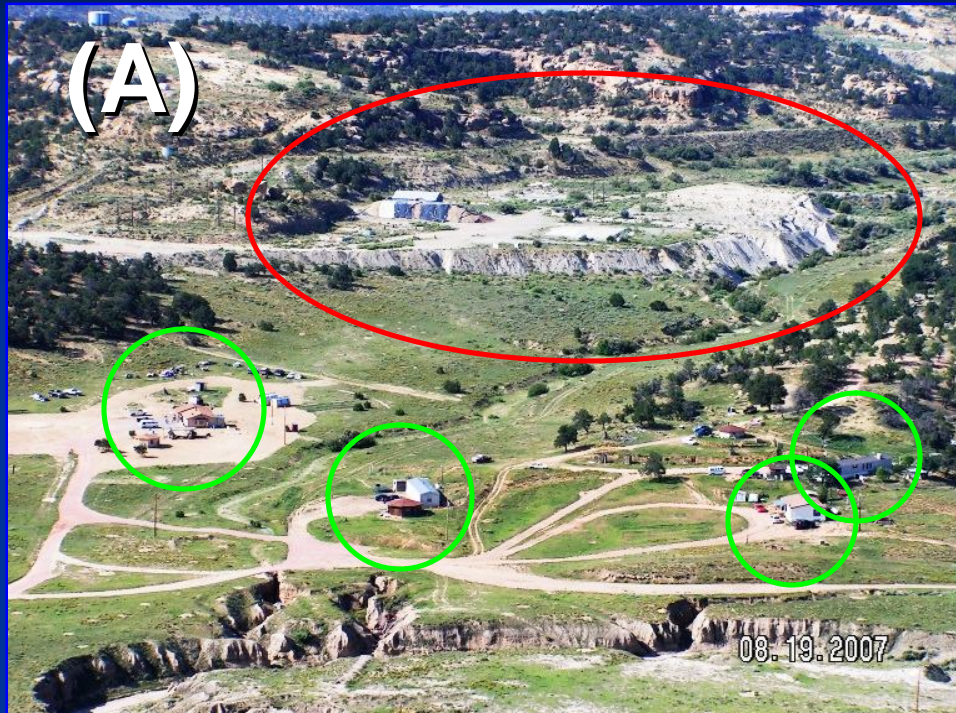


Distribution of two exposure pathways among 20 chapters



Darker shading indicates higher proportion of survey responses; red dots show locations of AUM features

DiNEH survey responses documented multiple exposures routes in Navajo communities



- (A) Lived near abandoned mines
- (B) Played on or near mines, mills
- (C) Used mine materials in home
- (D) Herded livestock in mines
- (E) Drank or contacted mine water
- (F) Washed workers' clothes

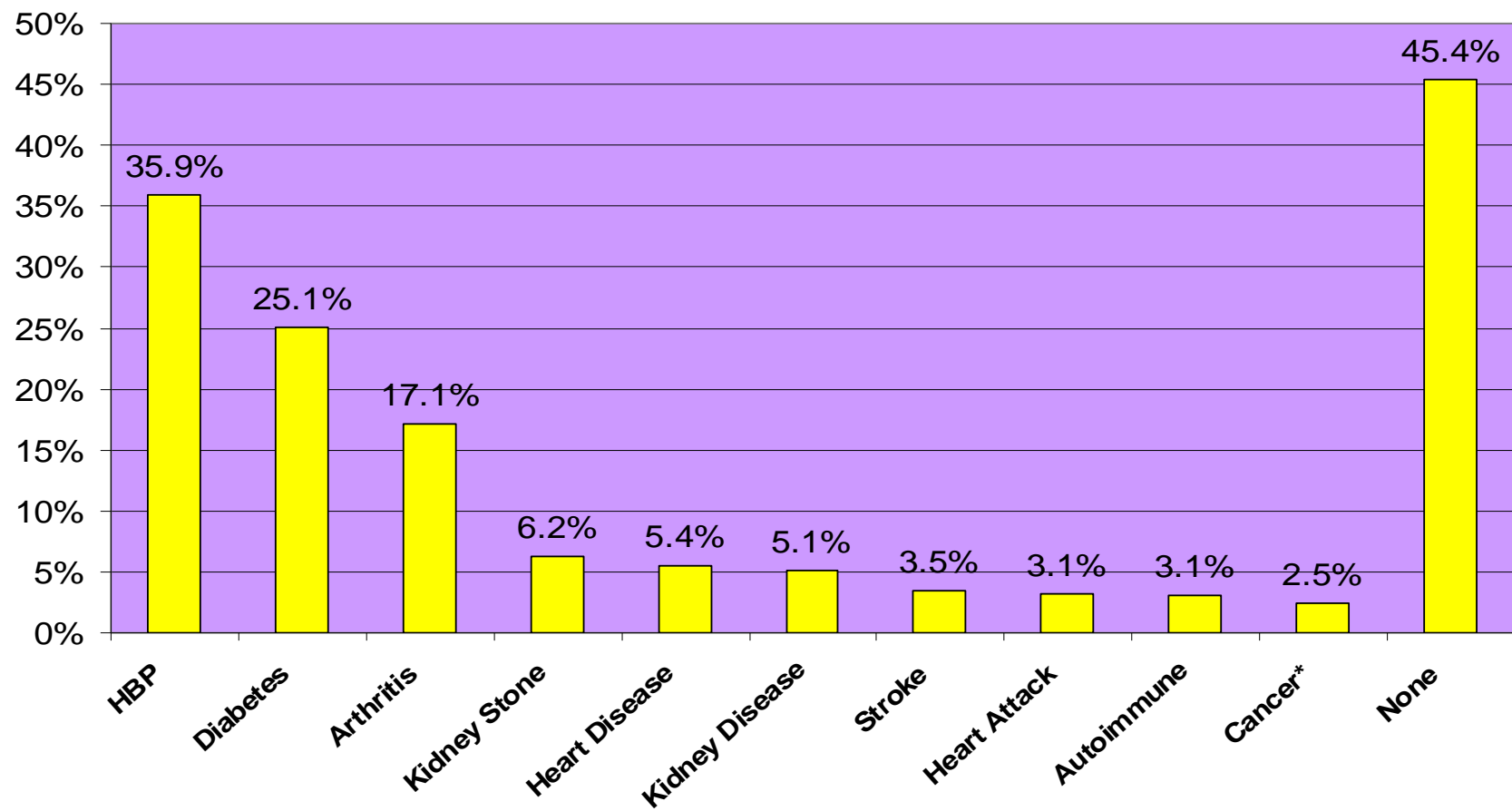


NOCSW 9.15.10

DiNEH Survey

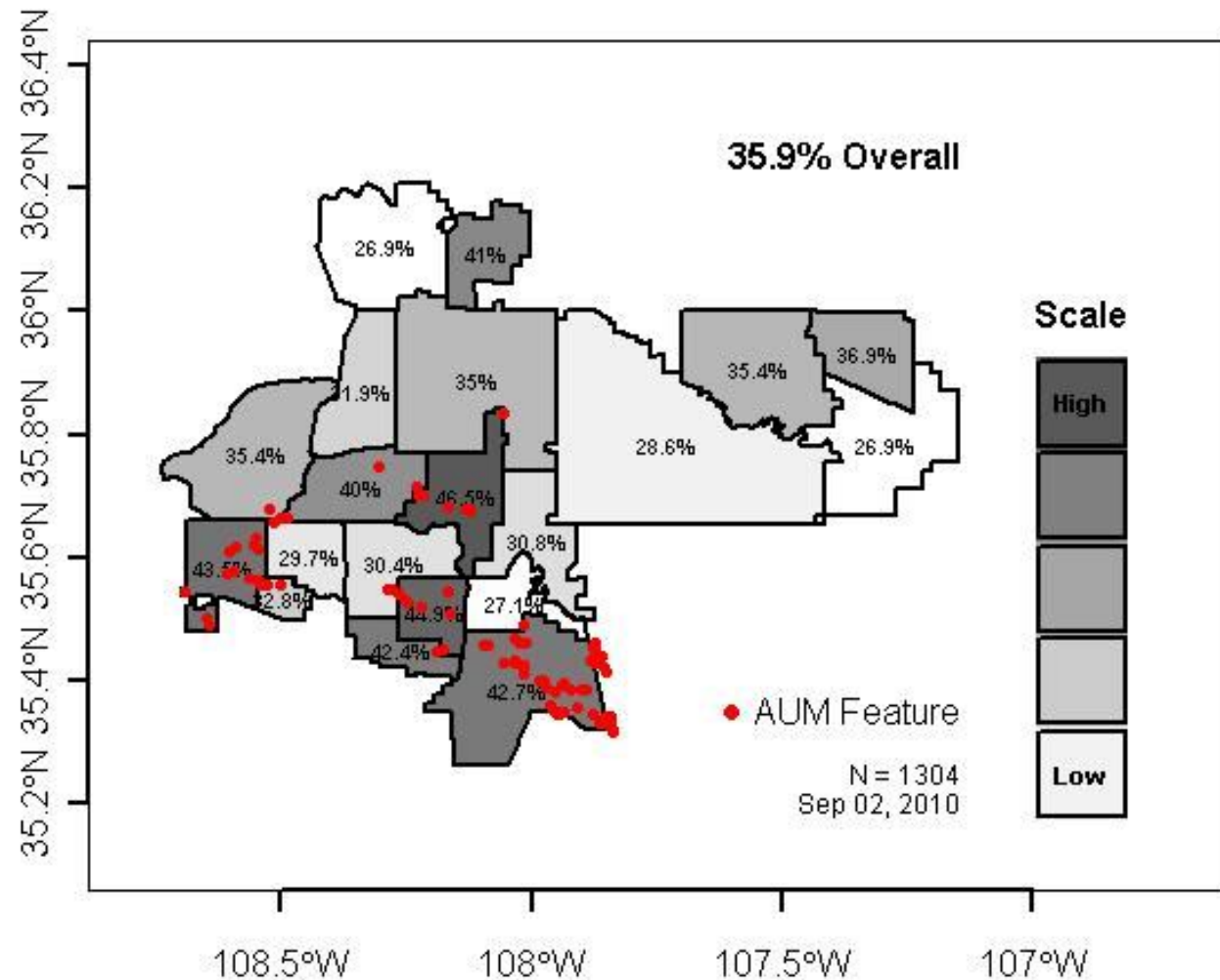
Self-reported Health Conditions

**Prevalence of Self-Reported Health Conditions
Among 1,304 DiNEH Survey Participants**
(*Cancer prevalence based on 1,011 participants surveyed)

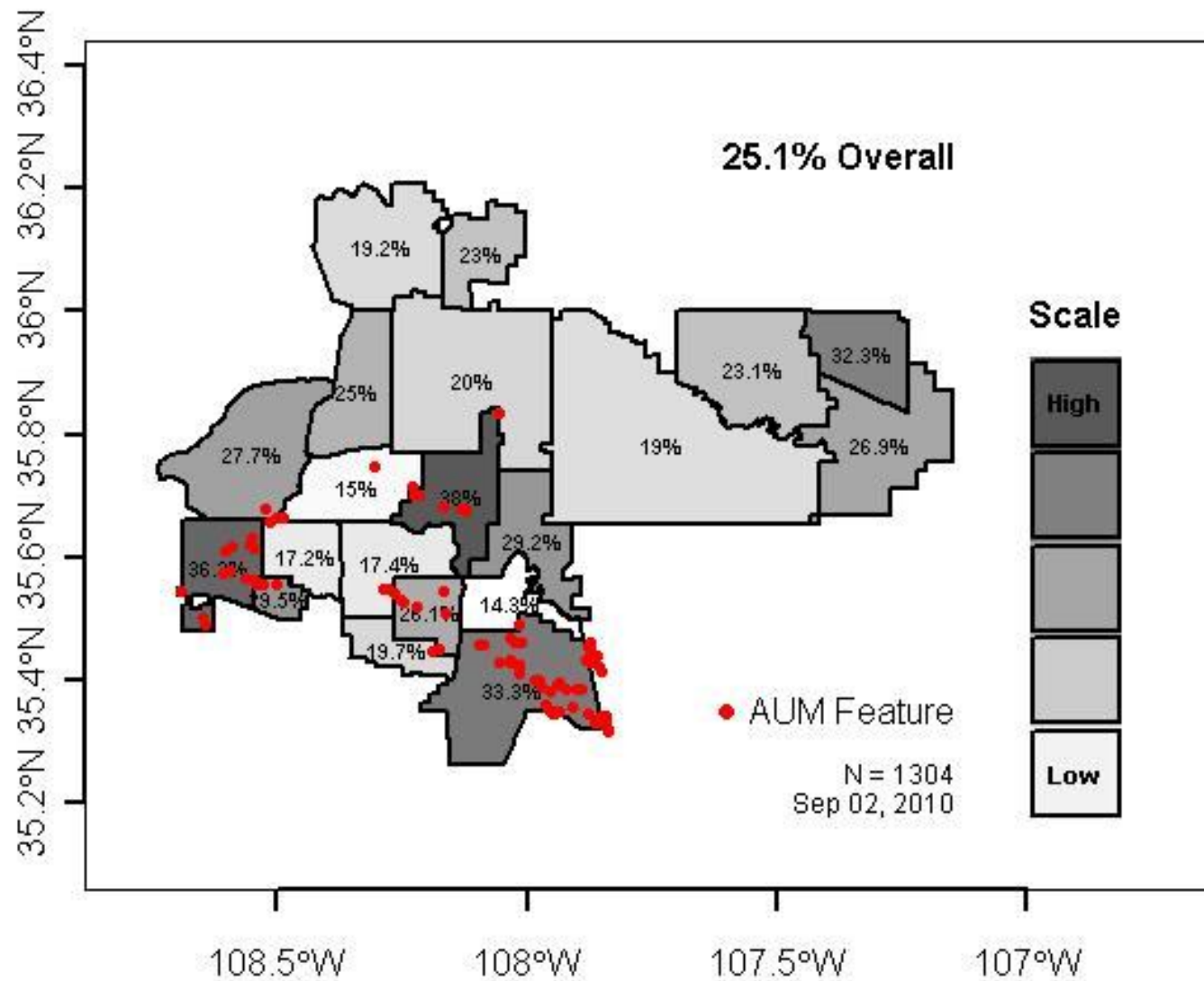


Prevalence maps were prepared to show proportion of participants reporting disease and locations of AUMs in the study area.

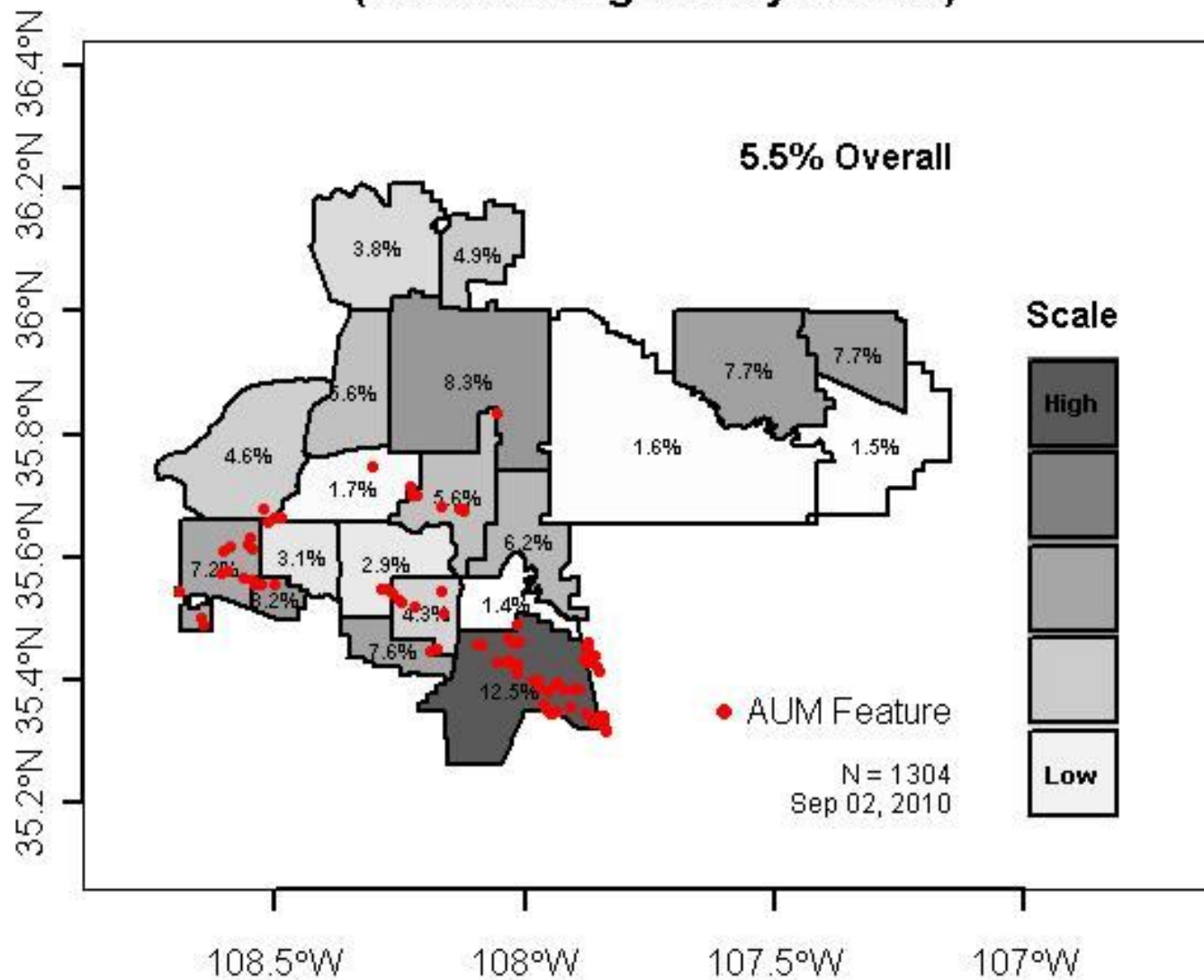
Proportion of Respondents Reporting High Blood Pressure



Proportion of Respondents Reporting Diabetes

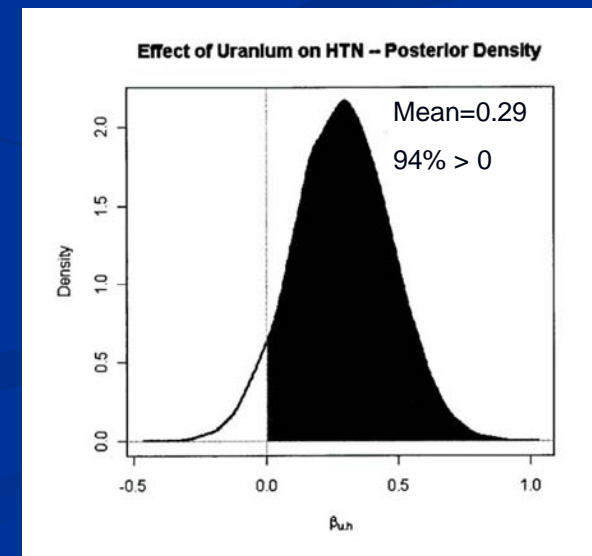
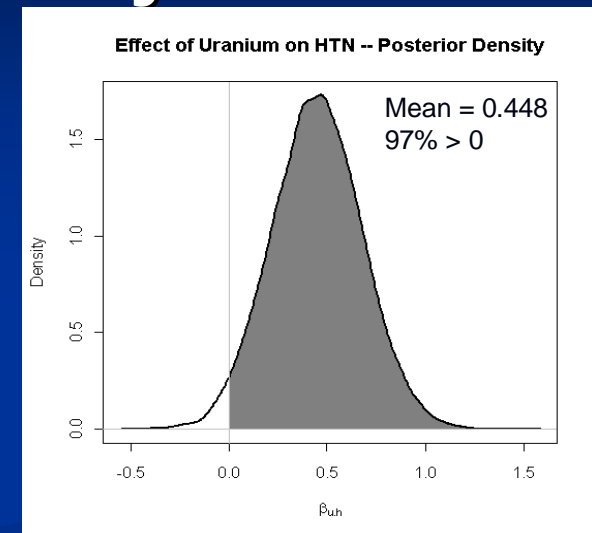


Proportion of Respondents Reporting Kidney Disease (not including Kidney Stones)



Proximity to AUM Features predicts Hypertension/Diabetes/Kidney Disease

- First, used conditionally specified logistic regression model to understand the relationships among hypertension, diabetes and kidney disease
 - Each of the three disease endpoints is a significant predictor for the other two
- Then used Bayesian model to test relationship of uranium exposures to disease outcomes
 - Well-known predictors (gender, family history, age, and BMI) also significant in this model
 - All uranium exposures were collapsed in a single single *"proximity factor"*, which was found to be *a significant predictor of these disease outcomes in two reiterations of the analysis* (right)
 - Second analysis: OR = 1.33 (95% CI, 0.98-1.79)



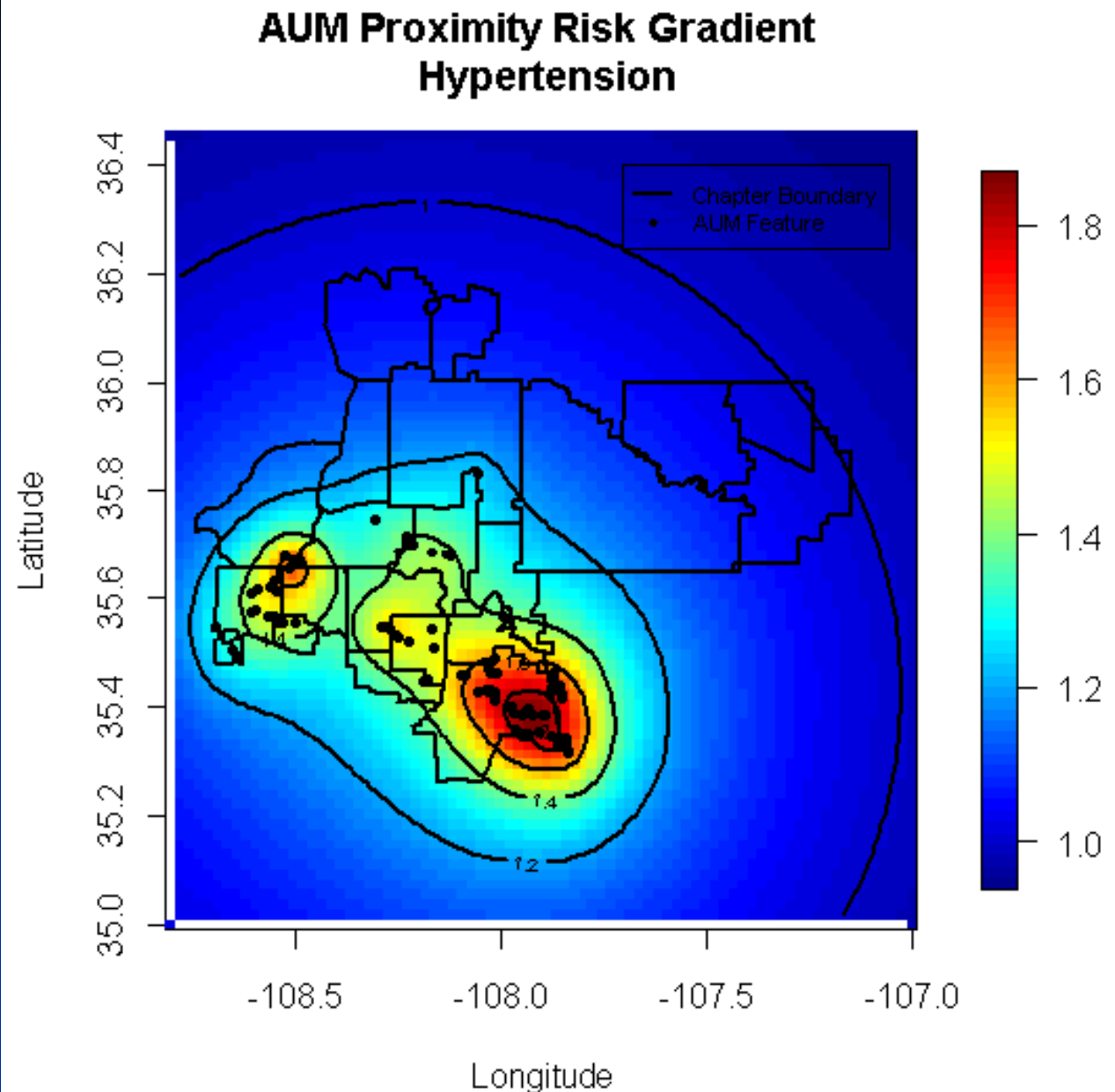
Refinement of 'Proximity Factor'

- Best predictor of disease is the proximity to mine waste features weighted by surface area of feature
 - In other words, for two mines of equal size, value is greater for closer mine, but a big waste pile 10 miles away may be less important than several smaller mine features within 1 mile of a home.
- 19-25% of respondents are unaware of whether or not they live near mines

Can You Tell These are Abandoned Uranium Mines?

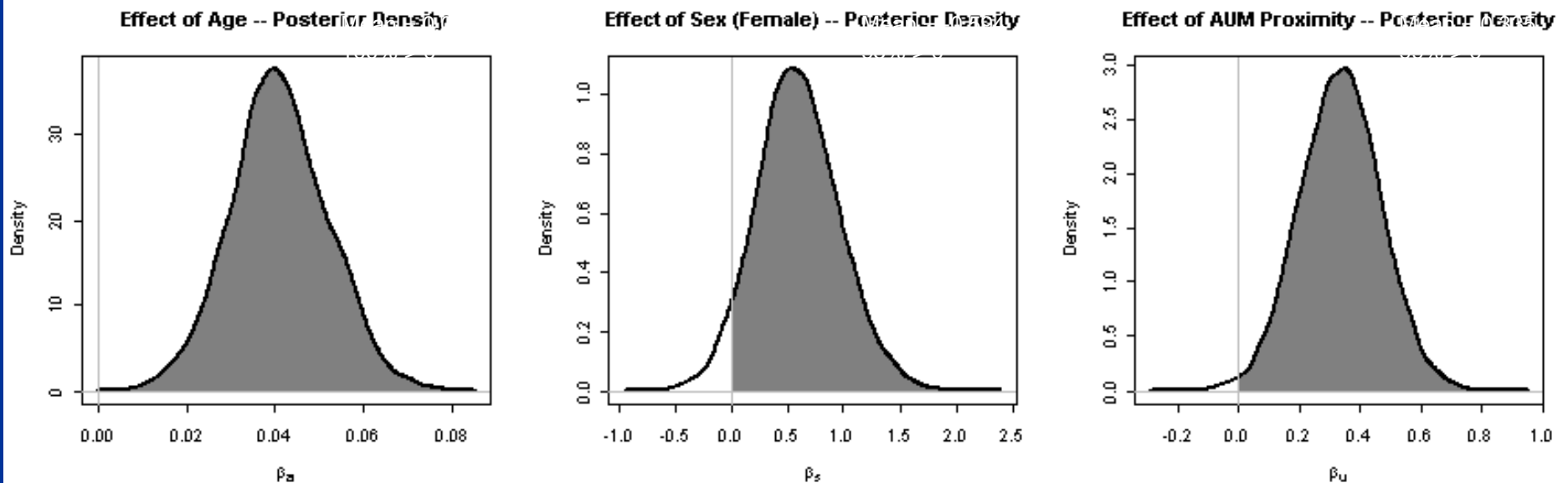


People living in areas with greatest number of mine features can have twice the risk of hypertension when all other significant factors — kidney disease, diabetes, family history of disease, BMI, age and gender — are accounted for as the baseline.



Proximity to AUM Features Also Predicts Prevalence of Self-reported Autoimmune Disease

- Overall prevalence of self-reported autoimmune disease is low (3.1%), but varies widely over the study area
- Overall, women (28 of 736, or 3.8%) were more likely to report autoimmune disease than men (12 of 568, or 2.1%)
- Proximity to an AUM is a significant predictor of autoimmune disease among survey participants when age and gender are taken into account (graphic at lower left)



Blood and urine collections for biomarker analyses



About 90 community members participated in a DINEH-CUEJTH screening and collection day at Baca Chapter in August.



- Pilot collection among 22 residents living near AUMs in Churchrock mining district, June 2007
- Collections began July 2010; goal is 450 participants by April 2011
- Standard clinical assessments for overall health
 - Partnering with NAIHS medical monitoring program, CUEJTH
 - Biomarker analyses for kidney function, immune function, cardiovascular damage
 - Analyses at UNM, UT-HMC