What Matters to Citizens Living Near the Nevada Test Site? – 10220

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ABSTRACT

The purpose of this paper is to summarize responses to a questionnaire of residents living around the Nevada Test Site and use this data to test whether personal and community variables are significant predictors of environmental issues. [1] Using logit regression models and questionnaire data collected between March 2008 to May 2009, the results suggest female respondents and respondents with less experience or knowledge about the Nevada Test Site are more likely to identify an environmental issue as important. These findings are consistent with earlier studies at other U.S. Department of Energy sites and support further outreach efforts for those with less familiarity.

INTRODUCTION

Greenberg, Lowrie, Burger, Powers, Gochfeld, and Mayer [2] [3] examine public perceptions at six U.S. Department of Energy sites through a telephone survey with 1,351 responses. They collected approximately 225 surveys for each site and report respondent demographic characteristics for Fernald, Hanford, Idaho, Oak Ridge, Rocky Flats, and Savannah River. While qualifying their findings given limited sample sizes for each location, they use both analysis of variance (ANOVA) and ordinary least squares (OLS) to test hypotheses related to gender, knowledge and experience of respondents with nearby sites. They report results that suggest respondents who are female, less educated, and those with less familiarity or knowledge about a nearby site, are all more likely to be concerned about a nearby site. They also report using a one way ANOVA test that policy preferences for respondents living less than 20 miles versus respondents living 20 to 50 miles are different ($F= 12.6$, $p < 0.01$). This last finding might suggest that there might be differences in attitudes and perceptions across communities for one site.

Using an alternative data set [1] with 1,732 responses and binary choice regression model, the purpose of this paper is to examine what environmental issues rural respondents living near the Nevada Test Site identify when given choices between soil contamination, low-level radioactive waste disposal, radioactive contamination of groundwater, transportation of

low-level radioactive waste and unsure? In addition, to reporting descriptive information on percentages of affirmative responses, one can test whether personal and community variables are significant predictors of a particular environmental issue.[1] See Neill, Snyder and Ward (2009)[4] for an examination of public outreach and awareness. See Ward (2009) [5] for an examination of time lived in area and awareness and Neill (2009) [1] for earlier models and analyses. See Stone and Chapman (2009)[6] for another study on Nevada that focused on the proposed Yucca Mountain Project and public trust in Beatty, Amargosa Valley and Pahrump. They report a sample size (N) of 117 surveys where Stone and Chapman report results that suggest women are more worried about contaminated groundwater than men.

MODEL AND DATA

To examine whether responses to personal or community variables matter, one can use a general logistic regression model where one can control for multiple explanatory variables.

Environmental issue = f (personal characteristics, community variables, information sources)

(Eq. 1)

Environmental issue includes one of the following with variable name in parentheses: soil contamination (env_soil1), low-level radioactive waste disposal (env_llw1), radioactive contamination of groundwater (env_gw1), transportation of low-level radioactive waste (env_transport1), multiple responses (multi_env_issues) and unsure (env_unsure). We report a regression for each environmental issue and control for the same explanatory characteristics across all six regressions.

With respect to explanatory characteristics, personal characteristics include gender (female), awareness of environmental programs (aware_em1), awareness that Yucca Mountain Project is not part of Environmental Management (aware_ym1), and awareness of low level waste disposal at the Nevada Test Site (aware_lld1). Community variables include whether respondents report living in Beatty, Amargosa Valley, Pahrump or Caliente. Finally, we report where respondents get their information about the Nevada Test Site.

To test these models we used data from a questionnaire instrument which was developed and approved by the University of Nevada, Las Vegas Office of Protection of Research Subjects. The questionnaires were sent by mail to 14,083 rural homes across 22 zip codes in Southern Nevada. We received 1,732 responses, a 12.2% response rate. [1]

RESULTS

Table 1 provides definitions, variable names and descriptive statistics of data used for this paper. Note, with respect to environmental issues, the majority of respondents, 76% (N=1,319) identified radioactive contamination of the groundwater as an important environmental issue. The rest in descending order include transportation of low-level radioactive waste 33% (N=566), soil contamination 28% (N=485), and low-level radioactive waste disposal 22% (N=377). Given these responses, 30% identified more than one environmental issue while 8% reported that they were unsure of environmental issues as being important to self and community.

Table 1: Definitions, variable names and descriptive statistics where n = 1,732

Description	Variable name	If response is a no	If response is a yes	Mean
Respondent identified soil as an important environmental issue.	env_soil1	0	1	0.280
Respondent identified low-level radioactive waste disposal as an important environmental issue.	env_llradwaste1	0	1	0.218
Respondent identified groundwater as an important environmental issue.	env_gw1	0	1	0.762
Respondent identified transportation of low-level radioactive waste as an important environmental issue.	env_transport1	0	1	0.327
Respondent identified unsure.	env_unsure1	0	1	0.080
Respondent identified multiple environmental issues.	mult_env_issues	0	1	0.301
Respondent is aware of environmental programs.	aware_em1	0	1	0.635
Respondent is aware Yucca Mountain Project is part of the Office of Civilian Radioactive Waste Management and not part of the Office of Environmental Management.	aware_ym1	0	1	0.406
Respondent is aware of low level radioactive waste disposal.	aware_lld1	0	1	0.580
Respondent is female.	female	0	1	0.468
Respondent lived in neighborhood over 16 years.	time_over16	0	1	0.363
Respondent attended meeting about the Nevada Test Site.	mtg_att1	0	1	0.184
Respondent took tour of the Nevada Test Site.	tour_nts1	0	1	0.277
Respondent or family member worked at NTS.	work_nts1	0	1	0.307
Highest level of education completed some college.	educ_somecol	0	1	0.329
Highest level of education completed, some college.	educ_somecol	0	1	0.329

Description	Variable name	If response is a no	If response is a yes	Mean
Highest level of education completed, college degree.	educ_college	0	1	0.221
Highest level of education completed, advanced degree.	educ_adv	0	1	0.129
Age 46 to 65 years	age_46_65	0	1	0.472
Age 65+ years	age_65_plus	0	1	0.361
Respondent lives in Beatty, NV.	Beatty	0	1	0.060
Respondent lives in Amargosa Valley, NV.	Amargosa Valley	0	1	0.051
Respondent lives in Pahrump, NV – zip code 89041.	Pahrump_89041	0	1	0.028
Respondent lives in Pahrump, NV – zip code 89048.	Pahrump_89048	0	1	0.198
Respondent lives in Pahrump, NV – zip code 89060.	Pahrump_89060	0	1	0.082
Respondent lives in Pahrump, NV – zip code 89061.	Pahrump_89061	0	1	0.053
Respondent lives in Caliente, NV.	Caliente	0	1	0.057
Television is an information source.	info_tv1	0	1	0.766
Newspaper is an information source.	info_pap1	0	1	0.760
Radio is an information source.	info_rad1	0	1	0.338
Internet is an information source.	info_www1	0	2	0.303
Books are an information source.	info_books1	0	1	0.191
State of Nevada is an information source.	info_statenv1	0	1	0.203
US Department of Energy is an information source.	info_doe1	0	1	0.152
Environmental organization is information source.	info_envorg1	0	3	0.122
Other is information source such as neighbors friends or family working at the Nevada Test Site.	info_other1	0	4	0.327
Number of observations	n	1732	1732	1732

Table 2. Logistic regression results of environmental issues

Model	1	2	3	4	5	6
Dependent variable	Soil	llwd	gw	transport	multiple	unsure
Intercept	-0.842	-1.321	1.695	-1.170	-0.773	-2.138
	(0.245)***	(0.272)***	(0.262)***	(0.235)***	(0.240)***	(0.399)***
female	0.524	0.519	0.106	0.350	0.574	-0.278
	1.689	1.680	1.112	1.420	1.775	0.758
	(0.123)***	(0.135)***	(0.129)	(0.115)***	(0.119)***	(0.205)
time_over1	0.001	-0.193	-0.294	0.172	-0.061	-0.087
	1.001	0.825	0.746	1.187	0.941	0.916
	(0.136)	(0.151)	(0.135)**	(0.126)	(0.132)	(0.214)
aware_em1	-0.771	-0.746	-0.250	-0.293	-0.542	0.183
	0.463	0.474	0.779	0.746	0.581	1.201
	(0.140)***	(0.152)***	(0.155)	(0.133)**	(0.135)***	(0.244)
aware_ym1	-0.311	-0.208	-0.399	-0.380	-0.467	0.238
	0.733	0.812	0.671	0.684	0.627	1.269
	(0.139)**	(0.154)	(0.134)***	(0.127)***	(0.134)***	(0.214)
aware_lld1	-0.273	-0.500	-0.418	-0.007	-0.286	0.114
	0.761	0.607	0.658	0.993	0.751	1.121
	(0.138)**	(0.151)***	(0.149)***	(0.130)	(0.134)**	(0.238)
mtg_att1	0.185	0.299	-0.014	0.222	0.315	0.158
	1.203	1.349	0.986	1.248	1.370	1.171
	(0.192)	(0.211)	(0.183)	(0.175)	(0.184)*	(0.286)
tour_nts1	-0.127	-0.221	-0.079	-0.230	-0.184	0.402
	0.881	0.802	0.924	0.795	0.832	1.494
	(0.165)	(0.188)	(0.154)	(0.150)	(0.158)	(0.240)*
work_nts1	-0.329	-0.237	0.085	-0.287	-0.234	-0.008
	0.719	0.789	1.089	0.750	0.791	0.992
	(0.148)**	(0.165)	(0.145)	(0.137)**	(0.142)*	(0.227)
educ_somec	-0.306	-0.389	-0.197	-0.193	-0.444	0.210
	0.737	0.678	0.822	0.825	0.642	1.234
	(0.143)**	(0.155)**	(0.157)	(0.136)	(0.139)***	(0.238)
educ_colle	-0.778	-0.804	-0.301	-0.563	-0.850	0.123
	0.459	0.448	0.740	0.569	0.427	1.131
	(0.173)***	(0.189)***	(0.175)*	(0.161)***	(0.166)***	(0.270)
educ_adv	-0.498	-0.709	-0.314	-0.376	-0.756	-0.368
	0.608	0.492	0.731	0.687	0.470	0.692
	(0.203)**	(0.228)***	(0.206)	(0.189)**	(0.200)***	(0.371)
age_46_65	0.278	0.393	-0.043	0.384	0.462	-0.022
	1.320	1.482	0.957	1.468	1.587	0.979
	(0.173)	(0.189)**	(0.182)	(0.164)**	(0.170)***	(0.293)
age_65_plu	0.332	0.393	-0.154	0.495	0.504	0.112
	1.393	1.481	0.857	1.640	1.655	1.119
	(0.185)*	(0.204)*	(0.194)	(0.176)***	(0.183)***	(0.307)
info_tv1	0.205	0.293	0.111	0.275	0.154	-0.093
	1.228	1.341	1.118	1.316	1.167	0.911
	(0.161)	(0.181)	(0.163)	(0.153)*	(0.156)	(0.253)
info_pap1	0.098	0.133	0.150	0.077	0.136	-0.222
	1.103	1.142	1.161	1.080	1.146	0.801
	(0.157)	(0.172)	(0.162)	(0.148)	(0.152)	(0.248)
info_rad1	0.172	0.424	0.134	0.296	0.217	-0.134
	1.187	1.529	1.143	1.345	1.242	0.875
	(0.133)	(0.144)***	(0.142)	(0.124)**	(0.129)*	(0.228)

Table 2. Logistic regression results of environmental issues continued

Model	1	2	3	4	5	6
Dependent variable	Soil	llwd	gw	transport	multiple	unsure

info_www1	-0.173	0.090	-0.256	0.164	-0.119	-0.305
	0.841	1.094	0.774	1.178	0.887	0.737
	(0.141)	(0.152)	(0.140)*	(0.129)	(0.136)	(0.235)
info_books1	0.399	0.433	0.210	-0.090	0.303	-0.086
	1.490	1.541	1.234	0.914	1.354	0.917
	(0.160)**	(0.175)**	(0.167)	(0.153)	(0.157)*	(0.266)
info_state1	0.391	-0.019	0.107	0.120	0.197	0.220
	1.479	0.981	1.113	1.127	1.218	1.246
	(0.166)**	(0.189)	(0.169)	(0.155)	(0.163)	(0.264)
info_doe1	0.020	-0.059	0.015	0.122	-0.115	-0.564
	1.020	0.942	1.015	1.130	0.891	0.569
	(0.213)	(0.240)	(0.198)	(0.193)	(0.207)	(0.335)*
info_envor	0.306	0.535	0.349	0.209	0.519	-0.449
	1.358	1.707	1.418	1.232	1.680	0.638
	(0.187)	(0.200)***	(0.208)*	(0.177)	(0.183)***	(0.380)
info_other	0.039	0.109	-0.247	0.226	0.076	-0.033
	1.040	1.115	0.781	1.254	1.079	0.967
	(0.136)	(0.150)	(0.134)*	(0.125)*	(0.131)	(0.218)
Beatty	-0.040	-0.286	0.624	-0.472	-0.243	-0.615
	0.961	0.751	1.866	0.624	0.785	0.541
	(0.262)	(0.314)	(0.270)**	(0.256)*	(0.261)	(0.446)
Amargosa	-0.055	0.131	1.275	-0.150	0.070	-0.378
Valley	0.947	1.140	3.577	0.861	1.073	0.685
	(0.288)	(0.303)	(0.355)***	(0.263)	(0.270)	(0.451)
Pahrump	0.325	0.129	0.513	-0.566	0.157	-0.728
89041	1.384	1.138	1.671	0.568	1.170	0.483
	(0.356)	(0.402)	(0.364)	(0.372)	(0.346)	(0.620)
Pahrump	0.162	0.056	0.264	-0.028	0.080	-0.579
89048	1.176	1.058	1.302	0.972	1.084	0.561
	(0.157)	(0.170)	(0.164)	(0.148)	(0.153)	(0.274)**
Pahrump	-0.088	-0.193	0.590	-0.234	-0.094	-0.316
89060	0.916	0.825	1.805	0.791	0.910	0.729
	(0.227)	(0.249)	(0.249)**	(0.213)	(0.218)	(0.347)
Pahrump	0.339	0.156	1.415	-0.222	0.390	-1.582
89061	1.403	1.168	4.115	0.801	1.478	0.206
	(0.251)	(0.273)	(0.410)***	(0.251)	(0.243)	(0.731)**
Caliente	-0.104	0.023	-0.360	0.620	-0.094	-1.181
	0.901	1.023	0.697	1.859	0.910	0.307
	(0.258)	(0.277)	(0.241)	(0.229)***	(0.251)	(0.607)*

Table 2. Logistic regression results of environmental issues continued

Model	1	2	3	4	5	6
Dependent variable	Soil	llwd	gw	transport	multiple	unsure
LR	161***	167***	121***	94***	175***	41*
AIC	1911	1665	1811	2112	2005	899
N	1711	1711	1711	1711	1711	1711

Each variable contains 3 lines of information where first line shows logistic regression coefficient, second line shows odds ratio, and standard errors appear in parentheses. LR stands for likelihood ratio test which provides a test for global B = 0. AIC stands for Akaike Information Criteria for model fit statistics where smaller values represent a better fit.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 2 shows logistic regression results for 6 environmental issues which include in order (1) soil, (2) low level waste disposal (LLWD), (3) groundwater (GW), (4) transportation of low level waste (transport), (5) multiple environmental issues (multiple), and (6) respondent is unsure of environmental issue (unsure). The results suggest female respondents are more likely to identify environmental issues with the exception of groundwater. Education variables for college and above are negative and significant which suggest education reduces probability respondent will identify an environmental issue while not significant for groundwater.

With respect to community, most of the categorical variables are insignificant for the majority of the environmental issues with the exception of groundwater. Respondents from Beatty, Amargosa Valley, and a few of the Pahrump zip codes are more likely to identify groundwater contamination as an issue.

DISCUSSION AND CONCLUSIONS

The purpose of this paper was to examine whether personal and community characteristics can be used to predict responses to environmental issues at the Nevada Test Site. Our findings are similar to earlier findings while including additional variables to our models.

1 Neill, H. (2009) An examination of rural residents' perceptions of environmental activities at the Nevada Test Site: Results of a mail questionnaire 2008 – 2009, a report submitted to the U.S. Department of Energy, University of Nevada, Las Vegas.
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4 Neill, H., Snyder, K., Ward, J. (2009). Rural communities and awareness of DOE Environmental Management Programs at the NTS: Do outreach efforts matter? In Proceedings of Waste Management 2009 Conference. Phoenix, AZ, March 1-5.
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6 Stone, A. and Chapman, J. (2009), Assessment of Citizen Perceptions and Knowledge for a Groundwater Monitoring Network Design, Desert Research Institute.